Nigeria Erosion and Watershed Management Project (NEWMAP)

Environmental and Social Management Plan (ESMP) For the Amuzukwu Gully Erosion Site Umuahia North LGA, Abia State

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Prepared for the Abia State Project Management Unit
Nigeria Erosion and Watershed Management Project

Nigeria Erosion and Watershed Management Project (NEWMAP)

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Abbreviation

ASEPA	Abia State Environmental Protection Agency
CBO	Community Based Organization
EA	Environmental Assessment
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
FEPA	Federal Environmental Protection Agency
FMEnv	Federal Ministry of Environment
FPMU	Federal Project Management Unit
FRSC	Federal Road Safety Corps
GHG	GreenHouse Gas
GSM	Global Systems for Mobil
HAZCOM	Hazard Communication Program
HIV	Human Immunodeficiency Virus
IUCN	International Union for the Conservation of Nature and Natural Resource
JHA	Job Hazard Analysis
LGA	Local Government Area
NESREA	National Environmental Standards and Regulations Enforcement Agency
NEWMAP	Nigeria Erosion and Watershed Management Project
NGO	Non-Governmental Organization
NIWA	Nigeria Inland Waterways Authority
Nos	Number
NSCDC	Nigeria Security and Civil Defence Corps
OHSMP	Occupational Health and Safety Management Plan
OHSRA	Occupational Health and Safety Risk Assessment
OP	Operational Policies
PAD	Project Appraisal Document
PAPs	Project Affected Persons
PHA	Process Hazard Analysis
PIM	Project Implementation Manual
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SA	Social Assessment
SME	State Ministry of Environment
SPMU	State Project Management Unit
STD	Sexual Transmitted Diseases
TOR	Terms of Reference
WB	World Bank

Executive Summary

Preamble

This executive summary presents a brief of the main findings of the Environmental and Social Management Plan (ESMP) conducted for the proposed Rehabilitation of the Amuzukwu Gully Erosion. This executive summary provides key information on the environmental and social aspects, potentially significant impacts, and mitigation measures, which need to be addressed during the implementation of the proposed sub-project.

The executive summary gives a general overview of the ESMP. Dr. Obi A. Anyadiegwu, an independent consultant prepared this ESMP report.

Introduction

Nigeria faces severe problems of soil erosion – both sheet and gully erosion – due to both natural and anthropogenic causes. Over 6,000km^2 of land are affected by erosion and about 3,400km^2 are highly exposed. In some areas of southern Nigeria, farmland degradation has caused yield reductions of between 30% and 90%, and as much as a 5% drag on agricultural GDP. Erosion has a devastating effect on many peoples' lives and destroys infrastructure essential for economic development and poverty alleviation.

Gully erosion contributes to environmental problems and damage estimated at over $100 million annually (mostly in South-Eastern Nigeria). It creates channels of various sizes through concentrated runoff on definite routes, which result in systematic removal of soil particles, including plant nutrients, from one location to another, and even in worse cases destruction of lives and properties. In view of this, the Government of Nigeria is implementing the multi-sectoral Nigeria Erosion and Watershed Management Project (NEWMAP), financed by the World Bank, Global Environment Facility, the Special Climate Change Fund, and the Government of Nigeria, which is aimed at reducing vulnerability to soil erosion in targeted sub-catchments. The project is currently been implemented in 7 states, namely Anambra, Abia, Cross River, Edo, Enugu, Ebonyi, and Imo states. NEWMAP finances activities implemented by States and activities implemented by the Federal government.

The principal proposed investment components of the NEWMAP Project are the following:

Component 1: Erosion and Catchment Management Investments

Subcomponent 1.1: Gully Rapid Action and Slope Stabilization

Subcomponent 1.2: Integrated Catchment Management

Subcomponent 1.3: Adaptive Livelihoods

Component 2: Erosion and Catchment Management Institutions and Information Services

Subcomponent 2.1: Federal MDA Effectiveness and Services

Subcomponent 2.2: State MDA Effectiveness and Services
Subcomponent 2.3: Local Government Capacity

Subcomponent 2.3: Private Sector Capacity

Component 3: Climate Change Agenda Support

Subcomponent 3.1: Policy and Institutional Framework

Subcomponent 3.2: Low Carbon Development.

Component 4: Project Management

This report focuses on the Environmental and Social Management Plan that is prepared as a safeguard instrument for the Rehabilitation of the Amuzukwu Gully Erosion Site, in Umuahia North Local Government Area of Abia State. The Amuzukwu Gully Erosion Site is located at Amuzukwu- Mbom Road. Information garnered during the field visits and review of documents informed that the gully site in Umuelehe Azuahia in Amuzukwu village was a mining excavation site for laterite before the 1960s, which was explored tremendously. Laterites was excavated from Amuzukwu and hauled to Umuahia for vigorous infrastructural development and road construction works. The overexploitation of this area without substituting the loss of nutrients led to a variety of gully erosion and alternation of discharge**.**

Objectives of the Rehabilitation of the Amuzukwu Erosion Gully

The objective of the Rehabilitation of the Amuzukwu Erosion Gully is to prevent and reverse land degradation, promotion of afforestation programs (with all its benefits) as well as minimization of flooding and control of coastal overflow in the area.

Aim of the ESMP

The aim of the ESMP is to provide a framework of procedures through which the Abia State Project Management Unit (PMU) NEWMAP, will develop and implement environmental, social, health and safety management systems, programs, processes and procedures that will establish a foundation for sound mitigation of adverse impacts, enhancement of positive impacts, institutional responsibilities, indicative costs for mitigation and eventual monitoring of the ESMP.

Description of the state of the environment and Baseline Studies

The project area is located in Amuzukwu, Abia State, South-Eastern Nigeria and lies at latitude 5.25°N and longitude 7.30°E. Abia state lies within the riverine part of Nigeria and shares boundaries with Anambra, Enugu, Ebonyi, Imo, Cross River, Akwa Ibom and Rivers states.

The project site is dominated by flat and low-lying land, generally less than 120m above sea level. The soils of Abia State fall within the broad group of ferrallitic soils of the coastal plain sand and escarpment. Other soil types include alluvial soils found along the low terrace of the Cross River and other rivers. The soils are not particularly fertile and are prone to leaching due to the heavy rainfall experience in the region. This leads further to sheet and gully erosion. Abia state is prone to flooding and erosion, which can be attributed to the soil types found in the areas, the low-

lying topography, increased rainfalls and poor sanitation, credited to behavioural practices of the people.

Project and Process Description

The proposed rehabilitation works will involve the following:

- Filling and Compaction at Gully Head with Imported Materials
- Construction of peripheral Drains
- Construction of a collection chamber
- Construction of a transition channel upstream of the chute channel
- Construction of reinforced Chute Channels
- Construction of USBR Type III Stilling Basins.
- Protection works at the outflow section of the basin
- Construction of 2nos Check Dams
- Re-vegetation with local/domesticated grass and trees

Policy, Legal and Administrative Framework

The chapter identifies and summarizes all the triggered Nigerian environmental regulations and legal instruments (as they apply to the environment, water resources and agriculture), World Bank safeguards, and relevant international guidelines and legal instruments applicable to irrigation and agriculture.

The Amuzukwu Erosion Gully Rehabilitation Project is rated a Category B (equivalent to Category II in the Nigeria EIA Act) project in accordance with the Environmental Assessment Policy (OP 4.01) of the World Bank because of the potential scale of impacts in terms of socio-economic impacts, soil quality, food security, water quantity, water quality, water access, farm land access, access to markets, and health and safety; The impacts resulting from these issues have been assessed and enhancement and mitigation/prevention measures for beneficial and negative impacts respectively proposed.

The identified World Bank safeguard policies triggered by the rehabilitation of the Erosion Gully include Environmental Assessment (OP 4.01), Natural Habitats (OP 4.04) and Involuntary Resettlement (OP 4.12).

Potential Impacts and Mitigation Measures

The beneficial (positive) Environmental and socio-economic impacts of the rehabilitation works will include the following:

- Rehabilitation works will commence in the Amuzukwu gully erosion site.
- Channelization of flood waters: Drainage channels will be constructed, to channel storm water to collector drains at the gully head.
- Construction of suitable sized and aligned collector drains at the gully head to collect and lead the storm water/runoff from the roads into drop structures.

- A chute will be constructed to channel water into the stilling basin. This will enable the controlled flow of water from the collector drain to the stilling basin.
- This phase will allow for recovery works for land located within the gully, so as to safeguard residential properties at risk of erosion.
- Re-vegetation activities will be carried out, to provide cover for the eased out slopes, channels, chute and the stilling basin. The structured vegetation to be applied include sand bags, erosion resistance trees, plants and grasses in other to make the area environmentally friendly and to improve the aesthetic of the project area.
- Stabilization (even out/ uniformity) of the slopes, where feasible to prevent further collapse of the slopes.
- Employment of skilled and unskilled labour will be promoted. Artisans and professionals from the project area will be provided contractual employment during this phase. This will help promote community goodwill.
- This phase will encourage economic activities within and around work areas. Petty traders, food vendors and other small businesses will benefit from the demands at the work site.
- The construction phase will see the implementation of a viable waste management plan for project activities.

Some adverse impacts that may be associated with the rehabilitation of the gully site are highlighted in this report as well. Notwithstanding the ESMP will be prepared to ensure that these impacts are reduced to the barest minimum.

Project Alternatives

Various alternatives to the project are discussed in the sections below.

1. The use of rock lined chute
2. The use of wood drop structure
3. Do nothing Alternative

Environmental and Social Management Plan (ESMP)

A matrix table format of the ESMP is described in this report. All impacts are discussed according to the respective phases during project implementation. The impacts have been described, as they would impact on different environmental and social sensitivities with emphasis on occupational health and safety at all phases. The chapter also includes mitigation measures and mitigation costs, and institutional responsibilities in the implementation of the ESMP.

The roles and responsibilities for monitoring the environmental and social impacts and mitigation measures are also stated.

Cost of Implementing the ESMP

The total cost for the implementation of the ESMP for the rehabilitation works for the Amuzukwu gully erosion site is estimated at **Thirteen Million Seven Hundred and Ninety**

Thousand Four Hundred Naira Only(₦13,790,400); [Eighty One Thousand Six Hundred US. Dollars $81,600.00]

Stakeholders' Consultations

The stakeholder's consultation for the Environmental and Social Management Plan (ESMP) was conducted on the 6th of March, 2014, following notification passed on to the Community Liason Officer, Amuzukwu Township Secretary and other stakeholders through the Abia State NEWMAP Environmental and Social safeguards officers.

The public consultation meeting was held at the Umueleghe village square in Amuzukwu. The consultation was conducted to ensure the effective participation and awareness of the Project Affected Person's (PAPs) and to document comments, suggestions and concerns raised with regards to the project and its sub-activities.

A major concern from the stakeholders was for the need for the actual realization of the rehabilitation of the erosion site in their community.

CHAPTER ONE INTRODUCTION

1.1 Overview of the Nigeria Erosion and Watershed Management Project (NEWMAP)

The Federal Government of Nigeria is implementing an eight (8) years multi-sectoral Nigeria Erosion and Watershed Management Project (NEWMAP), financed by the World Bank, Global Environment Facility, the Special Climate Change Fund, and the Government of Nigeria. NEWMAP finances activities implemented by States and activities implemented by the Federal government. This intervention is currently been implemented in 7 states, namely Anambra, Abia, Cross River, Edo, Enugu, Ebonyi, and Imo.

The Nigeria Erosion and Watershed Management Project (NEWMAP) aims to reduce vulnerability to soil erosion in targeted sub-catchments. The Project Development Objective (PDO) of the NEWMAP is to improve erosion management and gully rehabilitation; increase incomes for rural households from improved agricultural and forest practices through the use of conservation agriculture, agroforestry, natural regeneration, etc.; and gain efficiency in public administration and public spending through improved knowledge base, analytical tools, multi-sectoral coordination and stakeholder dialogue.

NEWMAP investments include a strategic combination of civil engineering, vegetative land management and other catchment protection measures, and community-led adaptive livelihood initiatives. The sustainability of these investments will be reinforced by strengthening institutions and information services across sectors and States, including support to improve governance, regulatory compliance, environmental monitoring, impact evaluation, catchment and land use planning, and to strengthen Nigeria's capacity to promote and implement climate-resilient, low-carbon development.

NEWMAP involves many Federal and State Ministries, Departments and Agencies (MDAs), local governments, communities, and civil society. Effective implementation requires inter-ministerial and inter-state coordination, collaboration, and information sharing. Each component, sub-component and activity will be implemented through relevant Federal and State MDAs. The various MDAs include those responsible for planning, economy and finance, works, agriculture, water resources, forests, transport, power, emergency response, as well as those focused on climate and hydrological information or catchment/ basin regulation. Most of NEWMAP's investments will be made at the State level, as States have primary responsibility for land management and land allocations.

NEWMAP Components are divided into 4 viz;

Component 1: Erosion and Catchment Management investment

Sub-component 1A Gully Rapid Action and Slope Stabilization

Sub-component 1B Integrated Catchment Management

Sub-component 1C Adaptive Livelihoods

Component 2: Erosion and Catchment Management Institutions and Information Services

Sub-component 2A Federal MDA Effectiveness and Services
Sub-component 2B State MDA Effectiveness and Services
Sub-component 2C Local Government Capacity
Sub-component 2D Private Sector Capacity

Component 3: Climate Change Agenda Support

Sub-component 3A Policy and Institutional Framework
Sub-component 3B Low Carbon Development

Component 4: Project Management

Table 1 Summary of NEWMAP Components

	Component 1	**Component 2**	**Component 3**	**Component 4**
Title	Erosion and Catchment Management Investments	Erosion and Catchment Management Institutions and Information Services	Climate Change Agenda Support	Project Management
Sub-components	1A Gully Rapid Action and Slope Stabilisation 1B Integrated Catchment Management 1C Adaptive Livelihoods	2A Federal MDA Effectiveness and Services 2B State MDA Effectiveness and Services 2C Local Government Capacity 2D Private Sector Capacity	3A Policy and Institutional Framework 3B Low Carbon Development	
Main activities	Stabilise severe gulley erosion sites and conduct community-based catchment interventions.	Strengthen the enabling environment for effective erosion and catchment management.	Strengthen government capacity to promote low carbon, climate resilient development.	Procure goods and specialist services to support project management, safeguards, M&E and oversight.
Main outcome	Priority erosion sites rehabilitated, and more secure livelihoods and catchment services established.	More capable, modernized and coordinated Federal, State, and local institutions.	Government better equipped to respond to climate change, and low-carbon development options demonstrated.	Established systems for project management, M&E and best-practices for future replication.
USD budget (million)[1]	**484.34**	**35.80**	**30.00**	**40.50**

1.2 Environmental and Social Safeguard Concerns

The environmental and social safeguards concerns for NEWMAP are addressed through two national instruments already prepared under the project: an Environmental and Social Management Framework (ESMF) and a Resettlement Policy Framework (RPF).

Other documents already prepared in line with NEWMAP include the Project Appraisal Document (PAD) and the Project Implementation Manual (PIM). Specifically engineering designs are also prepared for the site-specific gully sites.

This report therefore focuses on the Environmental and Social Management Plan (ESMP) developed for the Amuzukwu Gully Erosion Site in Umuahia North Local Government Area of Abia State. The Amuzukwu Gully Erosion Site is located at Amuzukwu-Mbom Road. The formation of theerosion gully site was attributed to the increased excavation of laterite soil from the area, which was used in infrastructural development and road construction works in the state capital, Umuahia. The problem further worsened when the excavated soils were not replenished back to the sites. Overtime, and in addition to other anthropogenic activities, the ravines continued to expand leading to the formation of gully in the area. Runoffs from roofs and drainage systems were also channelled to the already dilapidated area, which further exacerbated the formation of gullies.

The NEWMAP intends to rehabilitate the gully erosion site and reduce longer-tern erosion vulnerability in the targeted area. This activity will be employed through some civil works such as construction of infrastructure and stabilization of the gully. An engineering report has already been prepared for the Amuzukwu erosion gully intervention, which highlights on the detailed civil works that will be carried out. This ESMP study will therefore, aim to identify potential and significant adverse environment and social impacts and to propose means of mitigation them to acceptable levels. Also during the civil works, there will be need for acquisition of land or displacement of families, business or public infrastructure, thus triggering the World Bank OP/BP 4.12 – Involuntary Resettlement. a **standalone Abbreviated Resettlement Action Plan (ARAP) will be prepared for the site as well.**

This ESMP is prepared in compliance to the Federal Government of Nigeria (FGN) Environmental Impact Assessment (EIA) Law, and the Federal Ministry of Environment Guidelines. It is also compliant to the Environmental and Social safeguards Policies of the World Bank. The World Bank has various instruments for addressing the environmental and social impacts of projects. The rehabilitation of the Amuzukwu Gully Erosion site will trigger some of the World Bank Safeguard Policies including Environmental Assessment (OP 4.01); Natural Habitats (OP 4. 04) and Involuntary Resettlement (OP 4.12).

1.3 Purpose of the ESMP

The **ESMP** is an instrument that details the measures to be taken during the implementation and operation of a project to eliminate or offset adverse environmental and social impacts or to reduce

them to acceptable levels; and the actions needed to implement these measures. The ESMP is an integral part of Category "A" Environmental Assessments (EAs) (irrespective of other instruments used). EAs for Category "B" projects may also result in an ESMP. However, impacts that will be accrued form the Rehabilitation of the Amuzukwu Gully Erosion site are considered to be mainly site specific. The project will concentrate mainly on the reclamation of parts of the gully in the area were chute channels will be constructed. It is intended that this reclamation will be done with laterite from an approved borrow pit located at Otamkpa in the state. Other fill materials for construction shall be used to compact the gully. It is also intended that the gully be vegetated with Indian Bamboo tress and other fast growing erosion inhibiting trees.

The adverse impacts associated with the Rehabilitation works will be largely reversible, indirect and short term. Considering the aforementioned, the project falls suitable into the World Bank's category B, hence the most suitable safeguard instrument to address beneficial and adverse impacts is an Environmental and Social Management Plan (ESMP).

The **Environmental and Social Management Plan** (**ESMP**) provides a framework of procedures through which **NEWMAP** will develop and implement environmental, social, health, and safety management systems, programs, processes and procedures that will establish a foundation for sound mitigation of adverse impacts, enhancement of positive impacts, institutional responsibilities, indicative costs for mitigation and eventual monitoring of the ESMP.

The ESMP outlines Abia State NEWMAP Project Management Unit's corporate commitment to managing the project in a responsible, safe and sustainable manner whereby the protection of the environment, safety of people and social concerns take priority above all other business concerns.
The ESMP will also ensure compliance with applicable environmental standards all through the life span of the projects. If the recommendations and guidelines in this ESMP document are followed, it is envisaged that the anticipated potential negative environmental and social impacts associated with the sub-project will be markedly minimized, and the positive impacts enhanced. The Bank will disclose the ESMP document publicly, in Nigeria and at the World Bank Info- shop before project appraisal.

1.4 Objective the Environmental and Social Management Plan

The objective of the **ESMP** is to develop procedures and plans to ensure that the mitigation measures will be implemented throughout the phases for the **Rehabilitation of Amuzukwu Gully Erosion site.** It has also been prepared to ensure the effective long-term protection of the area and other biotic and abiotic components of the environment.

Specific objectives of this ESMP include the following:

- To examine the project in terms of its major activities and identify the aspects associated with the project construction which generate environmental impacts,

- Identify the environmental issues associated with the major activities,
- Develop mitigation measures for the aspects identified as having environmental impacts,
- Incorporate environmental mitigation measures into activities and develop corrective actions and ensure monitoring.
- Define the specific actions required, roles and responsibilities for these actions, and associated costs and,
- Define a proposed institutional structure to govern the implementation of the ESMP.

1.5 Specific Tasks

The Consultant is required to carry out the following:

- Describe the existing status of the sub-watershed and gullies;
- Identify the environmental and social issues/risks associated with the existing conditions;
- Select and measure appropriate baseline indicators (for example, m^3/sec of runoff collected in the sub-watershed during a heavy hour-long rainfall);
- Develop a plan for mitigating environmental and social risks associated with construction and operation in the gully in consultation with the relevant public and government agencies; Identify feasible and cost-effective measures that may reduce potentially significant adverse environmental and social impacts to acceptable levels;
- Develop a time-bound plan for mitigating environmental and social risks associated with sub-watershed management in consultation with the relevant public and government agencies; Identify feasible and cost-effective measures that may reduce potentially significant adverse environmental and social impacts to acceptable levels;
- Identify monitoring objectives and specifies the type of monitoring, with linkages to the impacts assessed and the mitigation measures described above;
- Provide a specific description of institutional arrangements: the agencies responsible for carrying out the mitigation and monitoring measures (e.g., for operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training) and the contractual arrangements for assuring the performance of each implementing agency;
- Define technical assistance programs that could strengthen environmental management capability in the agencies responsible for implementation;
- Provide an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and
- Provide the expected capital and recurrent cost estimates and sources of funds for implementing the ESMP and inform accordingly the design consultants so that these costs are duly taken into consideration in the designs.

1.6 Technical Approach and Methodology

This ESMP has been prepared in accordance with standard procedures for environmental assessment including the applicable World Bank (WB) safeguard policies and Nigerian environmental assessment guidelines.The preparation of the ESMP was for a period of 4 weeks - within which the consultant accomplished all the tasks as stated in the Terms of Reference (TOR).

A brief description of activities carried out in preparing the ESMP document is indicated below:

Literature Review: The methodology adopted for the ESMP studies involved an intensive application of desk reviews and collection of all relevant information in order to achieve successful outputs. Information was garnered from the Abia State NEWMAP PMU.

Literature review was carried out on the following:

- Engineering Report for the Amuzukwu gully erosion site, Umuahia, Abia state
- Environmental and Social Management Framework for the Nigerian Erosion and Watershed Management (NEWMAP)
- Resettlement Policy Frameworks for NEWMAP
- Project Appraisal Document (PAD) prepared for the NEWMAP

Field Visit: This activity involved:

- Visit to Abia state NEWMAP Office
- Visit to Umuelehe Azuahia, Amuzukwu community
- Impact Identification and Assessments
- Potential Impacts Assessment and definitions
- Oral interview with Residents, PAPs
- Public consultation with residents, site committee and PAPs

1.7 Deliverables

The deliverable will include the preparation of Inceptions, draft and final ESMP Report, which will be acceptable to the SPMU Abia State, and to the World Bank.

CHAPTER TWO: DESCRIPTION OF THE PROJECT LOCATION AND BASELINE STUDIES

2.1 Overview of the Project State

Abia State is located in the south-eastern zone of Nigeria with a land mass of over 4902.24 sq. km. The state has a population of 2,845,380 (2006 Census). Abia state lies within the riverine part of Nigeria and shares boundaries with Anambra, Enugu, Ebonyi, Imo, Cross River, Akwa Ibom and Rivers states. The state consist of 17 Local Government Areas and they include; Aba North, Aba South, Arochukwu, Bende, Ikwuano, Isiala-Ngwa North, Isiala-Ngwa South, Isiukwuato, Obi Ngwa, Ohafia, Osisioma Ngwa, Ugwunagbo, Ukwa East, Ukwa West, Umuahia North, Umuahia South and Umu-Nneochi.

The project area is situated in Umuahia, the capital of Abia State is an urban city located between Latitude 5.25°N and Longitude 7.30°E on the south eastern part of Nigeria with an estimated population of 359,230 as of 2006 Nigerian census Figure 1 indicates the map of the project site and delineation of the project area.

2.1.1 Physical Environment of Abia State

Geology

Abia state has two principal geological formations in the state namely Bende-Ameki and the Coastal Plain Sands otherwise known as Benin Formation. The Bende-Ameki Formation of Eocene to Oligocene age consists of medium–coarse-grained white sand stones. The late Tetiary-Early Quaternary Benin Formation is the most predominant and completely overlies the Bende Ameki Formation with a southwestward dip. The Formation is about 200m thick. The lithology is unconsolidated fine-medium-coarse-grained cross-bedded sands occasionally pebbly with localized clay and shale.

The two principal geological Formations have a comparative groundwater regime. They both have reliable groundwater that can sustain regional borehole production. The Bende-Ameki Formation has less groundwater when compared to the Benin Formation. The numerous lenticular sand bodies within the Bende- Ameki Formation are not extensive and constitute minor aquifer with narrow zones of sub-artesian condition. Specific capacities are in the range of 3 - 6 m^3/hr. On the other hand, the high permeability of Benin Formation, the overlying lateritic earth, and the weathered top of this Formation as well as the underlying clay shale member of Bende-Ameki series provide the hydrogeological condition favouring the aquifer formation in the area.

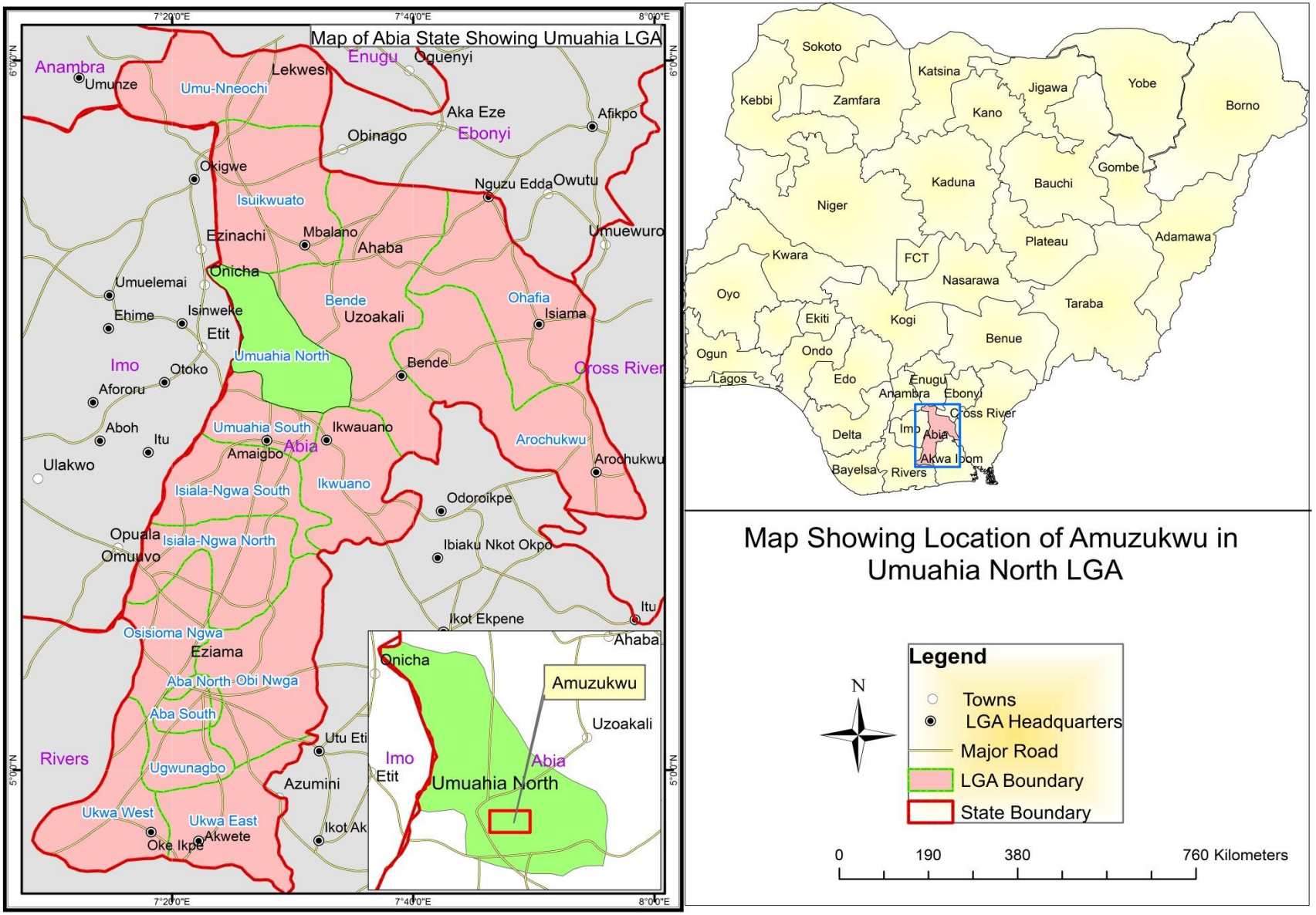

Figure 1 Map Showing Location of Amuzukwu in Umuahia North LGA

Landforms and Drainage

The topography of Abia State dominated by flat and low-lying land, generally less than 120m above sea level. The low-lying plain is the inland extension of the coastal plain from the Bight of Benin. The central part of the state is characterized by undulating land with many hills. The highland areas are part of the Enugu - Nsukka - Okigwe cuesta. This area has an average height of between 120m and 180m above sea level. From Okigwe (Imo State), this escarpment extends in a west-east direction and, on getting to Afikpo (Ebonyi State), veers southeastwards to Arochukwu where it terminates.

The principal rivers in Abia State are the Imo River and its tributary; the Aba River.Imo River originates from the northwestern part of the state and flows southwest through Abia and Imo state territories towards the Atlantic Ocean, passing through the southern parts of Ukwa-West and Ukwa-East local government areas. Other important rivers include lgwu, Azurnini Blue River and Kwa lbo River.

2.1.2 Physical Environment

Soils

The soils of Abia State fall within the broad group of ferrallitic soils of the coastal plain sand and escarpment. Other soil types include alluvial soils found along the low terrace of the Cross River and other rivers. The soils are not particularly fertile and are prone to leaching due to the heavy rainfall experience in the region. This leads further to sheet and gully erosion.

Mineral Resources

Abia State falls under the Niger-Delta state in Nigeria, thus the state is an oil producing state. Other minerals found in the state includes lead, iron ore, gypsum, limestone, kaolin, laterite, zinc and copper.

Ecological Issues

Abia state is prone to flooding and erosion, which can be attributed to the soil types found in the areas, the low-lying topography, increased rainfalls and poor sanitation, credited to behavioural practices of the people. In place like Aba, drainages are not maintained properly as such, roads are heavily flooded after the rains.

2.2 Overview of Umuahia

Umuahia comprises of two local government areas; Umuahia North and Umuahia South. These local governments are also composed of clans such as the Umuopara, Ibeku, Olokoro, Ubakala and Ohuhu communities. The Project area, Amuzukwu village falls under Umuahia North LGA.

Umuahia is the administrative headquarters of Abia State. Major occupation of the people includes civil service, trading and farming. There are several institutions in Umuahia and they

include,Government College, Umuahia, National Root Crops Research Institute – Umudike as well as Trinity College (theological).

Similar to other areas in the southeast, Umuahia experiences some ecological menace such as flooding and erosion. Extensive forest clearing, often by bush burning, and continuous cropping with little or no replenishment of soil nutrients, resulted in the disruption of the ecological equilibrium of the natural forest ecosystem.

Many of the gullies are at the head streams of the rivers that flow down the cuestas. The head streams carve their valleys deep into the deeply weathered red earth; developing dendritic patterns of gullies.

2.3Overview of Amuzukwu-Ibeku

Amuzukwu is a community located in Umuahia North LGA, of Abia State. The gully erosion site is specifically located at Amuzukwu – Mbom Road. It is geographically located within the coordinates N 05° 32' and N 05° 41'Latitude and E007° 28' and E007° 32' Longitude. Fig 2 shows the township map of Amuzukwu and neighbouring communities highlighting settlements and road networks.

Information garnered during the field visits and review of documents informed that the gully site in Umuelehe Azuahia in Amuzukwu village was a mining excavation site for laterite before the 1960s, which was explored tremendously. Laterites was excavated from Amuzukwu and hauled to Umuahia for vigorous infrastructural development and road construction works. This was followed by vast development of residential areas in the site area. However typical with most construction works done in Nigeria, the miners failed to neither restore the land nor re-vegetate the area. This activities lead to the formation of gully in the area. Runoffs from roofs and drainage systems were channelled to the already dilapidated area, which further exacerbated the formation of gullies.

The overexploitation of the area without substituting the loss of nutrients led to a variety of gully erosion and alternation of discharge**.**Alternation in discharge often shows in a decreased discharge amount or frequency. This can alter the flow of water and can further lead to diversion of flow through manmade channels, thus resulting to the formation of drainage basins or watershed.

Current situation

The gully issue was ignored for a long period of time thereby threatening the people, their properties and sources of livelihood. Most buildings have been abandoned and others destroyed as a result of the erosion. Some notable properties include the community's "Garri" Processing Plant, Schools, Health care centres and markets. The Umueleghe clan of Amuzukwu village is gradually cutting off from the rest of the Amuzukwu community. The area is gradually becoming inaccessible to members of the community. Field investigation revealed that the community has lost five (5) people as a result of the gully. The formed gully has also threatened the livelihood of most people, leading to emigration from this area.

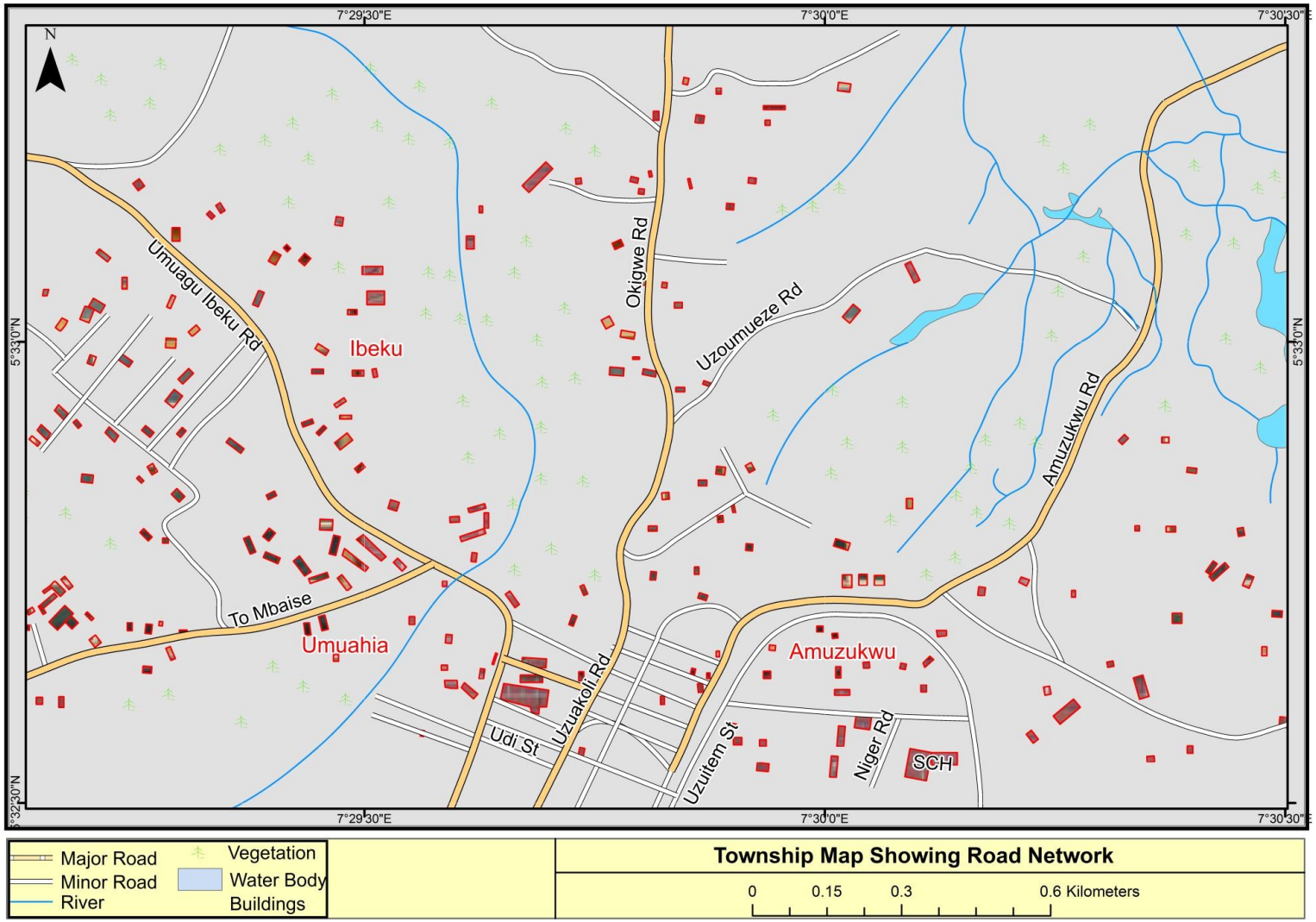

Figure 2 Map showing Road network and settlement in Amuzukwu

2.3.1 Physical Environment

This section gives a general description of the Physical, biological and socio-economic environment of the project area

Climate

Amuzukwu has a tropical climate. The average annual temperature in Amuzukwu is 26.3 °C. About 2137 mm of precipitation falls annually.

The difference in precipitation between the driest month and the wettest month is 305 mm. The average temperatures vary during the year by 2.9 °C.

Temperature

The driest month is December with 14 mm. Most precipitation falls in September, with an average of 319 mm. The warmest month of the year is March with an average temperature of 27.7 °C. In August, the average temperature is 24.8 °C. It is the lowest average temperature of the whole year.

Rainfall

The area experiences a high rainfall with corresponding high discharge of water as runoff, which encourages gully erosion. It has a peak period between July and September. In a study conducted by Jimoh (2005), rainfall events were found to be highly correlated to erosion in all the representative land surface types.

2.3.2Biological Environment

Vegetation

Similar to most state of southern Nigeria, the vegetation in Abia State is ordinarily considered part of tropical rain forest, which is the dominant natural vegetation in most parts of southern Nigeria. The northern part of the State has rich Savannah vegetation. Economic trees found in the state include; oil palm, kola nut, iroko, rubber, palm, plantain, bamboo. Some other crops cultivated in the area are indicated in table 2 and this goes to show the how fertile the aea is in terms of farming activity.

The vegetation types encountered within the Study Area are as follows:

- Areas of fallow bush of varying ages
- Fields used for rotational subsistence farming
- Degraded secondary rainforest as well as statutory and communal forests

All flora habitats surveyed were found to comprise shrubs, grasses, sedges and a mixture of mature trees and re-growing juvenile trees.

Table 2 some common cultivated plants found within the project community

S/NO	COMMON NAME	BOTANICAL NAME
1.	Maize /corn	***Zeamays***
2.	Cassava	***Manihotesculenta***
3.	Banana	***Musasapientum***
4.	Water leaf	***Talinumtriangulare***
5.	Okro	***Abelmoschusesculentus***
6.	Pineapple	***Ananascomosus***
7.	Guava	***Psidiumguajava***
8.	Cocoyam	***Colocasiaesculenta***
9.	Pumpkin	***Cocurbitapepo***
10.	Melon	***Citrullusvulgaris***
11.	Pepper (small)	***Capsicumannuum***
12.	Mango	***Magnifera indica***
13.	Palm tree	**Arecaceae**
14.	Bamboo	***Arundinarieae, Bambuseae***
15.	Pawpaw	***Caricapapaya***
16.	Bitter leaf	***Vernoniaamygdalina***

Fauna

The project area boasts of various domestic and wild animals. Some of the domestic animals found around the project area include: Fowl, Cattle, Goat, Sheep, Poultry and Pig.

Wildlife species found in the project area includes grass cutters, porcupines, antelope, warthog etc.

2.3.3 Socio-economic Environment

Infrastructural Development

The study intends to identify and document the demographic data of the project communities such as population, literacy level, occupation, dependency level, housing, public and social amenities. The project area is a semi-urban environment located within the Umuahia the state capital most of the public amenities are located within the state capital and is assessable to the membes of the community.

A total of 35 health facilities (primary, secondary) exist within the LGA most of which are public PHC facilities. There are 3 Secondary Healthcare Facilities and no tertiary healthcare facility located within the

LGA. (FMH, 2011). The road network within the LGA is mostly tarred. The roads leading to Amuzukwu community are tarred through state and LGA efforts. However, erosion has cut off the major road linking the community to other part of neighbouring community (Ameke-mbom village Road). This consequently have deprived them access to Market, schools and even hospitals on the other part of Amuzukwu community.

There is Global System for Mobil (GSM) telecommunication facilities of various networks available in the area. The Amuzukwu community have a village market located close to the village square. This market opens every four days, however due to the proximity of the community to the state capital, inhabitants preferred to go to the main market in Umuahia city. Some of the markets located within the LGA include, Spare parts market, timber market, New Ultramodern Market, etc.

These data will be useful not only in establishing the importance of the rehabilitation of the Amuzukwu Erosion site but equally in quantifying the environmental and social impacts of the planned works which will help determine the management plans for the said project. More importantly, the baseline data will be useful for monitoring and evaluating the post implementation condition of the community and by implication the success of the project.

Abia State was carved out from Imo State in 1991. The people are of the Igbo ethnic group. The traditional language spoken is the Igbo language. Majority of the people are Christians.

2.4Socio-economic Assessment

The socio-economic assessment studies were aimed at examining the socioeconomic conditions of the people living around the project site in Amuzukwu-Ibeku, Umuahia North LGA of Abia State. This is to ensure that the potential impacts of the proposed rehabilitation of the Amuzukwu Gully Erosion site project is captured and described while proffering solutions to possible negative impacts to human habitat, health and livelihoods.

The specific objectives of the study include:

- To elicit information about the existing socioeconomic and demographic characteristics of the inhabitants living within the community
- To document the distributional characteristics of the socioeconomic components in the project area
- To analyse the patterns of the relationships of the socioeconomic components
- To discuss and deduce the effect of the patterns on the environment of the proposed Project through the perceptions of the respondents
- To provide a baseline data for the assessment of the socioeconomic impacts of the proposed project
- Suggest mitigation measures and environmental management plan for the proposed project

2.4.1Methodology

The general methodology used for the socio-economic impact assessment employed the collection of primary and secondary source data. The primary sources data gathering comprised of questionnaire administration, group interviews Ground trothing/Reconnaissance survey according to the questionnaire reported in Annex 4, for identification and disclosure (awareness creation), discussions and direct observations. Structured questionnaires were administered to people in residential areas, administrative offices, commercial establishments, schools, families, youth leaders etc. Data collected were analysed using Microsoft Excel 2007. Secondary data were obtained from the National Population Commission and desktop literature review.

A random sampling survey was carried out within the Amuzukwu community. Questionnaires were administered to a total of 113 respondents.

2.4.2Socio-Economic Data Analysis

Population and Gender Distribution

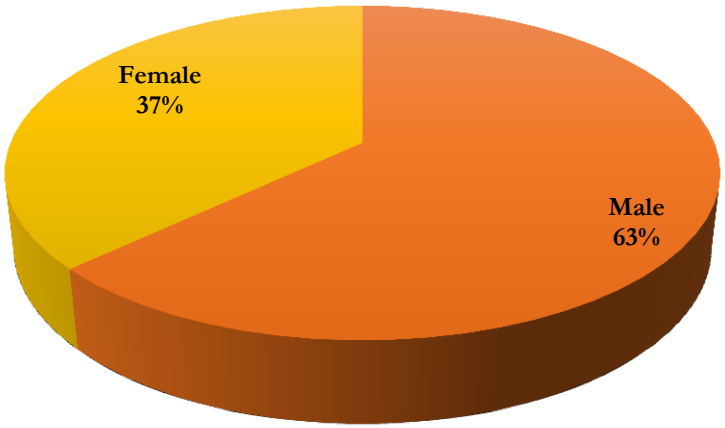

Figure 2.1 Gender Distribution of Respondents - Overall Mean

The survey shows that 63% of the respondents were males while 37% were females.

Age Distribution of Respondents

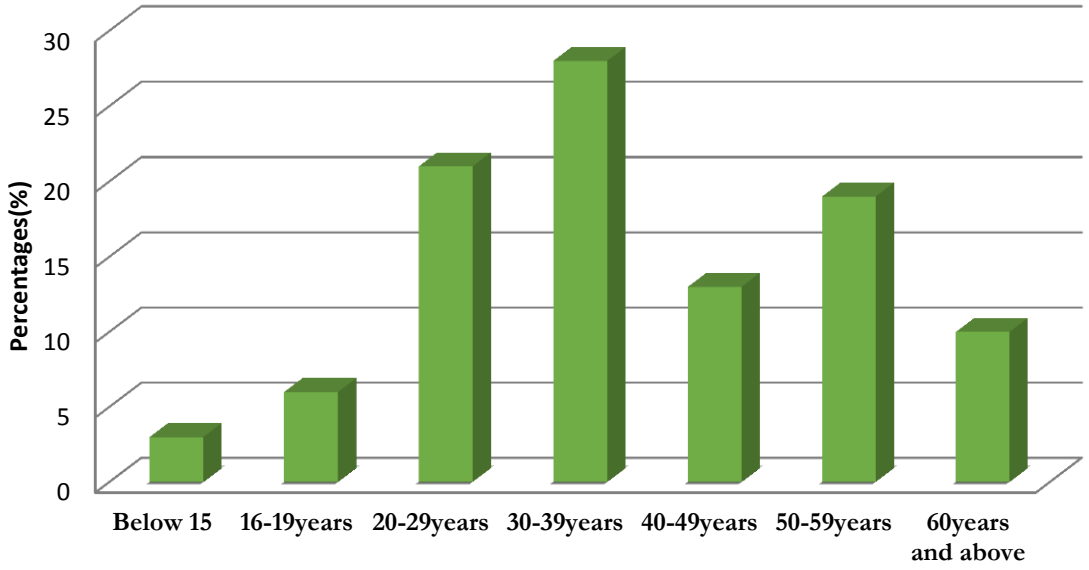

Figure 2.2 Age Distributions of Respondents within the Project Area

The overall mean result as shown on Figure 2.2 shows that about 3% of the respondents are 15yrs old and 21% fall between 20 and 29 years old, while 28% are between 30 and 39 years old; those between 50 and 59 years old are 19% while those that are 60 years and above are 10%. This shows a good representation of all age brackets in field survey especially the youths (20-39years). The younger population is predominant around the residential areas while the more elderly are visible in the around the village square and Market.

Marital Status of Respondents

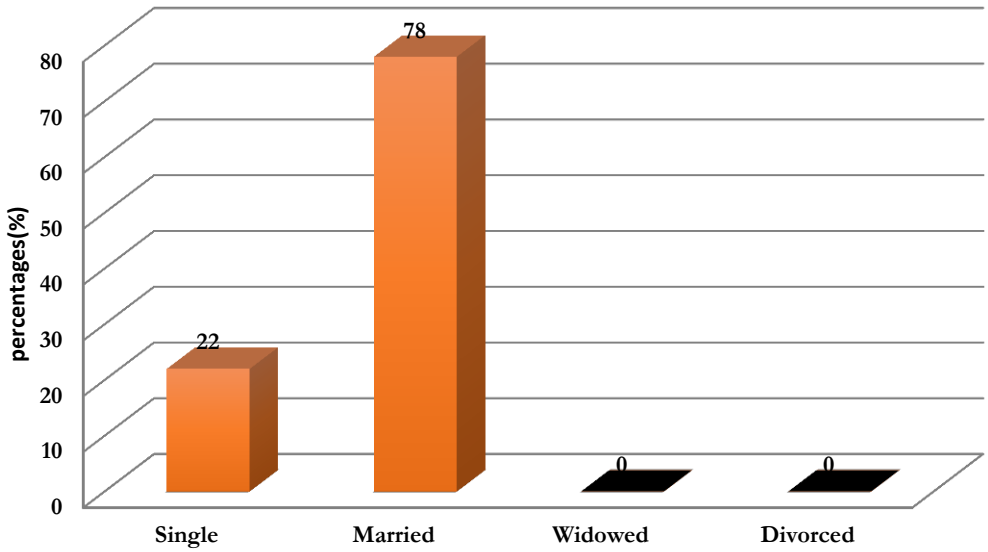

Figure 2.3 Marital Statuses of Respondents within the Project Area

The surveys result in figure 2.3 shows that the married persons are predominant among the respondents in the project areas (78%), followed by single persons (22%). No widow/ widower or divorced persons were among the respondents. This goes to show that more matured people were more eager to respond than the younger ones as they seem to have more interest.

Religion of Respondents

The overall mean result show that Christianity is the predominant religion in the area with a representation of about 99%. However, African traditional religion, Islam and other forms of religious belief forms the remaining 1% of the respondents.

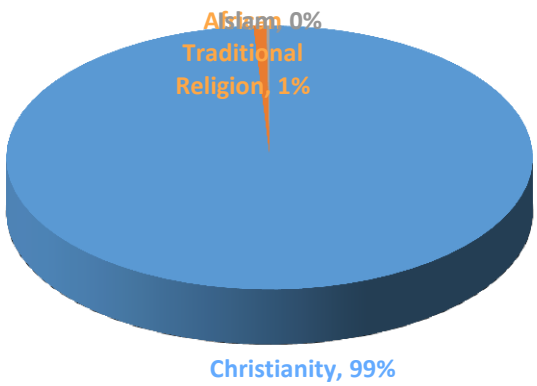

Figure 2.4 Religions of Respondents

Occupation

The result of the survey shows that majority of the sampled population depend on Trading (44%) as their primary occupation. While 12% of the respondents are unemployed, 11% work with privately owned companies/ businesses. 27% of the respondents within the community are civil servants.

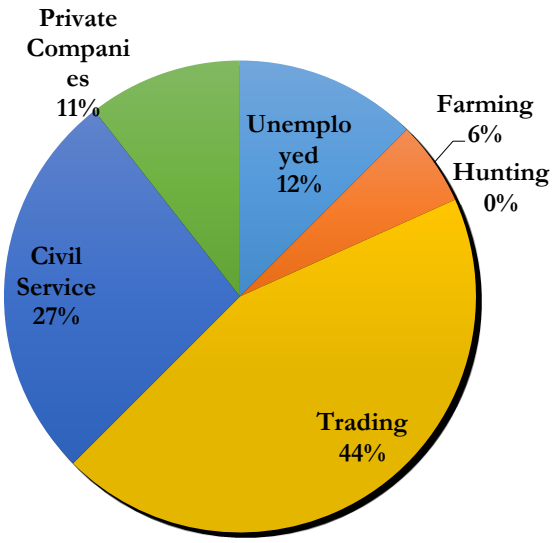

Figure 2.5 Occupation Distributions

Literacy Level

In general, the survey shows that there is a reasonably high literacy level within the project area. About 5.3% of the population does not have any formal education and this is mostly elderly people, 16% have only primary school education, 26.2% are secondary school leavers while the rest are graduates at various tertiary institutions and mostly among the younger generation.

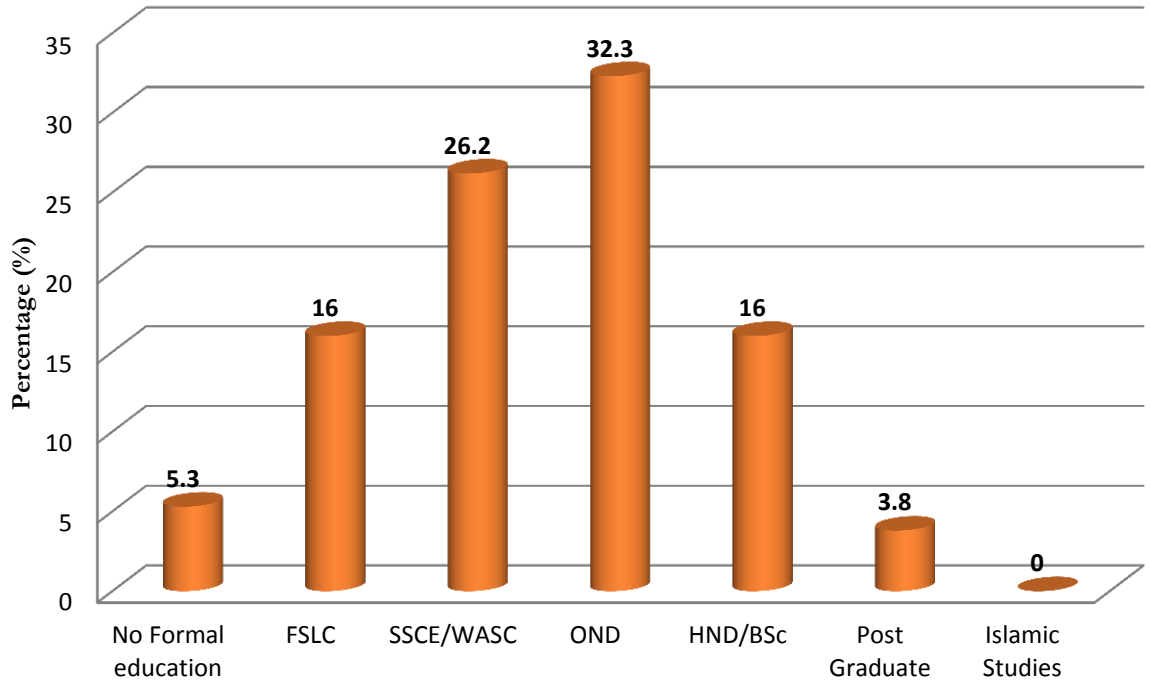

Figure 2.6 School and Literacy Level of the Project Area

Sources of Water for Domestic Use

28% of respondents get domestic water from privately owned boreholes while 49% make use of water from commercial boreholes while 23% of respondents use water from wells.

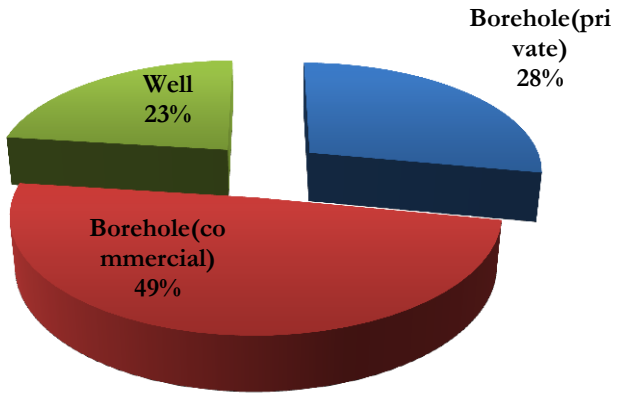

Figure 2.7 Source of Water for Domestic Use

Household Waste Disposal

All the respondents in the area dispose their household waste into the gully or along the illegal dumpsite at the edge of the erosion**.**

Desirability of the Project

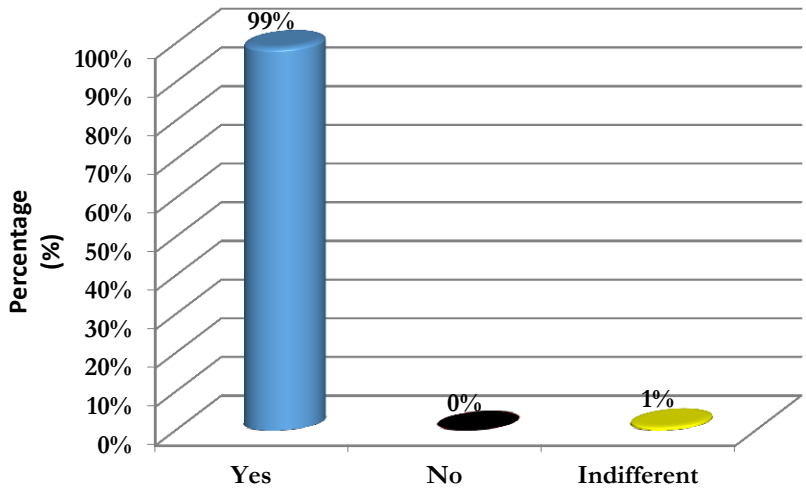

Figure 2.8 Desirability of the Project

Most of the respondents showed high level of acceptance of the project stating that it is a high risk for people living on the part of the community. They also lamented that it has denied them several social amenities and relationship with other members of neighbouring communities.

Health Status Survey

Field survey revealed Malaria is the prevalent disease in the project area. that there are a good number of available healthcare centers (Primary, Secondary and Tertiary) within Umuahia but the Erosion affected part of Amuzukwu does not have any of such due to cut off by the erosion. Malaria and Typhoid where the most common disease conditions within this area.

2.4.3Secondary Data Collection

Secondary data was gotten from literature and publications relevant for this section. This was used to compare with the results gotten from the field survey.

Tables below shows the Secondary data obtained from the National Population Commission

Table 3 Distribution of Households by type of housing unit

CATEGORIES	Umuahia North	Abia State
House on a separate stand/Yard	22,094	41,253
Traditional/hut structure made of Traditional Material	310	17,396
Flat in Block of Flats	3,217	79,572
Semi Detached House	1,018	19,317
Rooms/Let in House	1,661	71,883
Informal/Impoverished Building	44	1,501
Other	59	3,835
TOTAL	28,394	605,987

Source: National Population Commission (2006)

In Comparison to secondary data provided above majority of the households as seen during field observation revealed that the respondents either live in Flats or Room/Let in Houses.

Table 4 Distribution of Households by Source of water Supply for Domestic Use

CATEGORIES	Umuahia North	Abia State
Pipe borne inside dwelling	520	13,975
Pipe borne outside dwelling	2,105	52,723
Tanker supply water vendor	663	19,304
Well	159	13,458
Borehole	11,985	242,248
Rain Water	351	21,295
River/Stream	12,379	234,992
Dugout/Pond/Lake/Dam	98	2,632
Other	134	5,360
TOTAL	28,394	605,987

Source: National Population Commission (2006)

None of the respondents in the project area have access to pipe-borne water. This is because a functional water supply network does not exist and most people make use of private and commercial boreholes.

Table 5 Distribution of Regular Households by type of Toilet Facilities

CATEGORIES	Umuahia North	Abia State
Water Closet	**6,206**	**169,152**
Pit Latrine	**20,870**	**314,875**
Bucket/Pan	**383**	**18,681**
Toilet Facility in another (different) dwelling	**104**	**4,039**
Public Toilet	**501**	**77,502**
Nearby Bush//beach/field	**290**	**20,323**
Other	**40**	**1,415**
TOTAL	**28,394**	**605,987**

Source: National Population Commission (2006)

When compared to primary data, information for use of water closet, pit latrine and Bush corresponded to that provided from Secondary data. However, there is no public toilet within the community.

Distribution of Regular Household Method Solid Waste Disposal

Table 6 Distribution of Regular Household Method for solid Waste Disposal

CATEGORIES	Umuahia North	Abia State
Organized Collection	**1,916**	**54,769**
Buried by Household	**3,323**	**66,989**
Public Approved Dump site	**5,554**	**208,644**
Unapproved Dump site	**13,130**	**187,366**
Burnt by Household	**3,519**	**77,736**
Other	**952**	**10,483**
TOTAL	**28,394**	**605,987**

Source: National Population Commission (2006)

Information provided from secondary data on solid waste disposal shows that Amuzukwu contributes highly to the data for unapproved dumpsites

CHAPTER THREE: PROJECT DESCRIPTION

3.1 Introduction

This chapter presents a description of the proposed development project based on the feasibility reports and engineering designs for the planned rehabilitation of the Amuzukwu gully erosion. The proposed rehabilitation works is part of the intervention programme of The World Bank (NEWMAP sub-project), which is aimed at reclaiming of the already degraded part of the region for subsequent utilization for either agricultural purposes or other developmental projects. Considering the economic viability, cost benefit analysis, culture of the people, the rehabilitation works will be done as follows:

- Filling of the parts of the gully to reduce the drop.
- Construction of peripheral drains around the crest of the gully and upstream major Channel before the chute channel.
- Construction of a collection chamber.
- Construction of a transition channel upstream of the chute channel.
- Construction of a reinforced chute channel.
- Construction of a USBR Type III basin.
- Protection works at the outflow section of the basin.
- Construction of 2 nos. check dam
- Re-vegetation of the area.

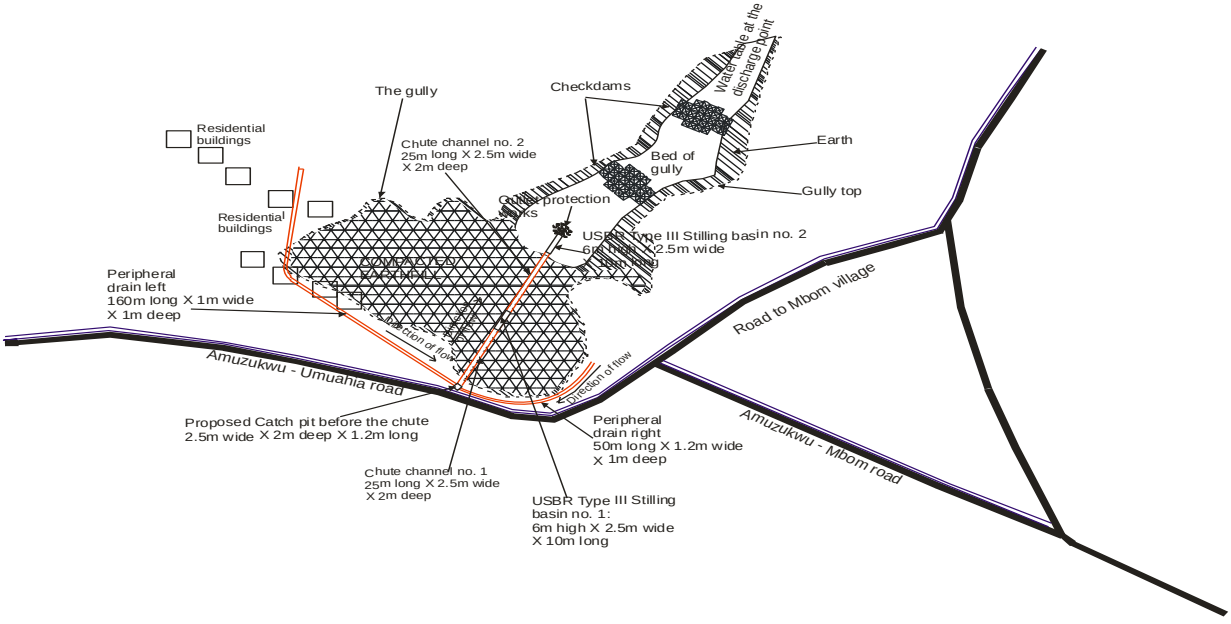

Figure 3 Sketch of the proposed area and plan of works

3.2 Amuzukwu Gully Erosion

Specifically, the gully erosion site is located at Umuelegh-Azuahi along Amuzukwu – Mbom Road in Amuzukwu Ibeku, Umuahia North Local Government, Abia State. It is geographically located within Latitude N 05° 32' and N 05° 41' and Longitude E007° 28' and E007° 32' of the state. Figure 4 shows the location of the gully erosion while figure 5 shows the watershed within the catchment area.

Field investigation indicates that the gully erosion developed as a result of excavation of laterites from Amuzukwu, which was put to use in the infrastructural development and road construction works to Umuahia. However typical with most construction works done in Nigeria, the miners failed to neither restore the land nor re-vegetate the area. Many years after, more human activities sprang up in the area; houses were built for their habitation while road infrastructures and other basic amenities were constructed to assist the indigenous populace. These activities were not properly handled and monitored which gradually encouraged the formation of a gully in the area. Figure 8 shows the map of the erosion area and its surrounding environ. As seen in the map there are buildings located around the erosion area and even some that have been swallowed up by the gully erosion. A stretch of water body runs across the erosion site which has even encouraged the further wearing off of the land. Figure 9 indicate the watershed map of the area.

Figure 4 New land slide at the erosin site

Figure 5 Gully head

Figure 6 The Erosion site

Figure 7 Embankments to control erosion

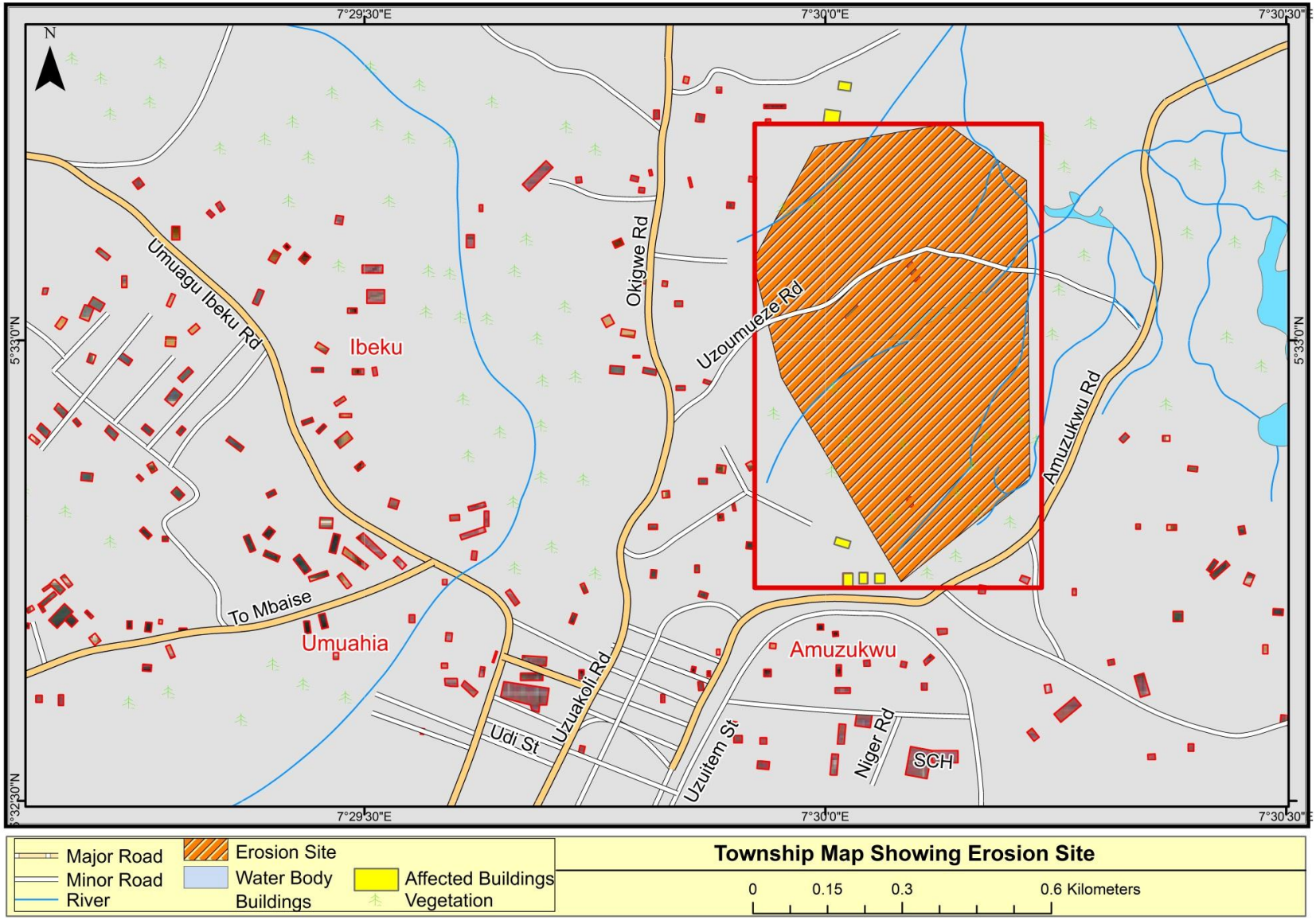

Figure 8 Map Showing Erosion Site and Environs

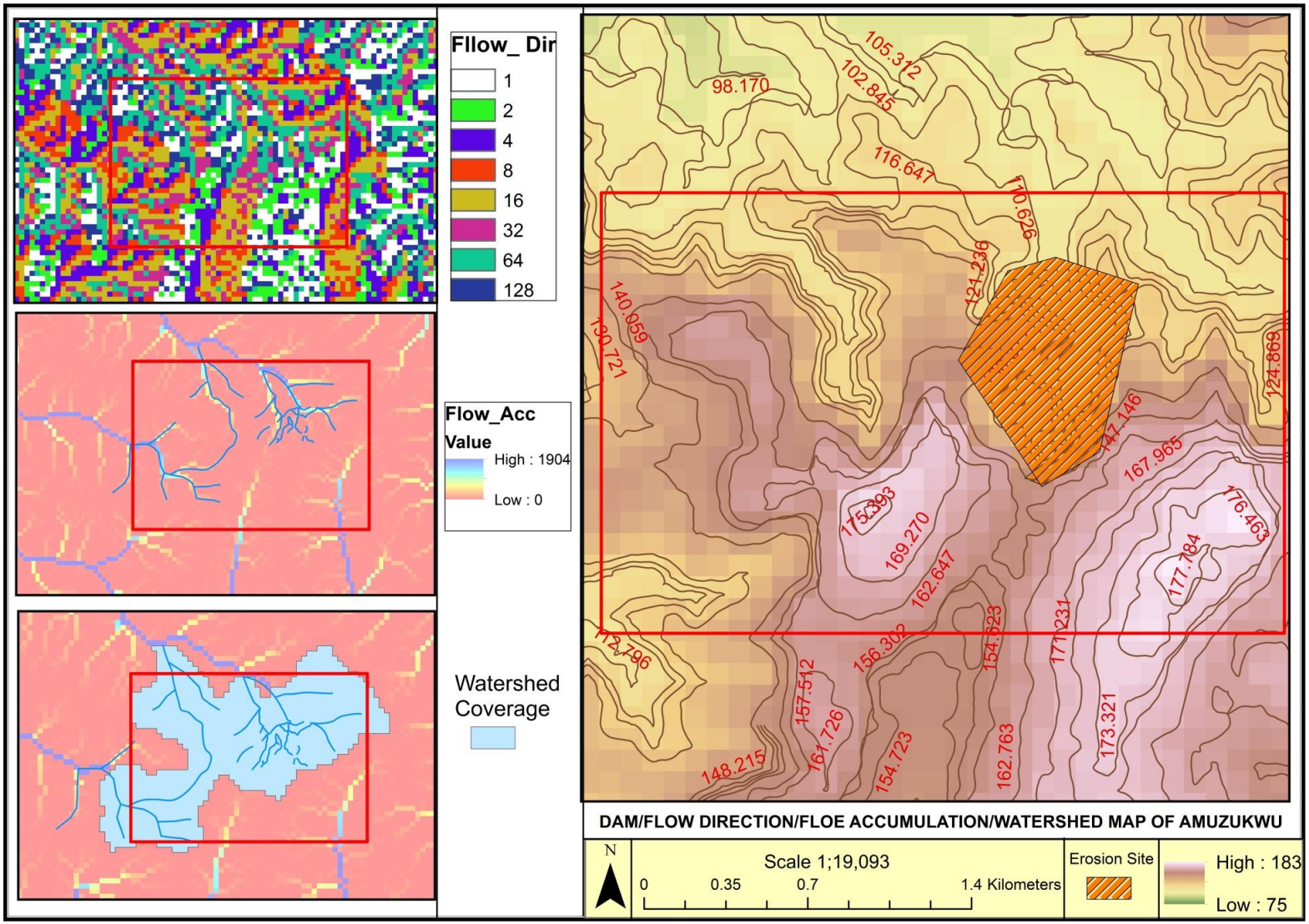

Figure 9 Watershed Map showing Flow direction and Accumulation

3.2.2 Watershed and discharge capacity of the gully

Amuzukwu gully erosion has the length of 212m, an average depth of 23m and an average width of 47m. The left side of the watershed gully head is 0.1km^2 and that of the right side is 0.196km^2. The discharges corresponding to these areas, especially the gully head one is to be estimated using the Rational Formula. The results obtained for 50 and 100 years return periods are:

Table 7 Discharge capacity of Gully head

Return Period	**50-Year**	**100-Year**
Discharge (m^3/s) at Gully Head (Left)	3.5	4
Discharge (m^3/s) at Gully Head (Right)	5.5	6
Discharge (m^3/s) for design of chute and stilling basin		10

3.2.3 Geology of the Soil

The project site is characterized by the following distinct and typical features: - rolling terrain with less than moderate vegetal cover, reddish brown sandy clay derived from sandy stones and shale grading into yellowish whitish silt stones, sand stones and clay.
The rolling terrain causes precipitation to be redistributed from upper to lower slope position. Soil quality differences occur in different slope position because of erosion and runoff. Rolling terrain changes micro-meteorological characteristics.

3.2.4 Geotechnical investigations

Geotechnical investigation was carried out at Amuzukwu gully erosion site during the feasibility studies. The data from the report indicated that the top part (lateritic soil) contains more fines (silt/clay) than the bottom stratum. It is apparent that the entire sequence is sandy, with a small percentage of silt/clay. From the report it was established that the moderate density values from the feasibility showed that the soil is loose; a condition that favours easy soil dispersal and erosion. This makes the soil easily erodible, a point that is buttressed by the high void ratios porosities.

3.3 Rehabilitation works/Design solutions

The proposed rehabilitation works are indicated in the sections below.

3.3.1 Filling and Compaction at Gully Head with Imported Materials:

The gully will be filled up to a length of 130m, with laterite from an approved borrow pit at Otampa, spread in layers not exceeding 200mm and compacted to 95% of optimum standard. The slope of the fill will be 2h:1v.

3.3.2 Construction of peripheral Drains

Peripheral drains will be designed to capture all runoff from the two gully heads and channel it into the catch pit and then into a chute channel. The hydraulic sizing of the peripheral drainage channel and other hydraulic structures, which should be normally based on the discharge from the hydrologic study, has been determined. The design discharge was done with 3.5m^3/s for the left side and 5.5m^3/s for the right side for a 50 year Return Period. While the design of the chute channel and the basin was done with a discharge of 10m^3/s which represents the design discharge for a 100 year return period for both sides of the gully.

Based on hydraulic analysis, the peripheral drains will have dimensions as follows:

Left side:

Length: 160m x Width: 1m x Depth: 1m

Right side:

Length: 50m x Width: 1.2m x Depth: 1m.

These peripheral channels will control the flow into a catch pit 2m wide x 1.2m long x 3m deep and then to the first chute channel 25m long x 2.5m wide x 2m deep.

3.3.4 Construction of a collection chamber

This was done inconsideration of the strength and stability of different parts of the structure. The various forces which act on the structure are mainly water pressure, force due to over flow and effect of water flow below the structure i.e seepage and sub-surface flow. In addition the dimension of the structure is such that the internal stress developed in the structure must be resisted by the construction material.

3.3.5 Construction of a transition channel upstream of the chute channel

The maximum channel slope upstream of the chute channel shall not be greater than the critical slope (Sc). The minimum length shall be 100 feet. This length can be used as a transitional area from the existing upstream channel to the chute channel. If this channel is a grassed waterway, the velocity value shall be used to compute critical slope. If no upstream channel exists, the structure should be flood routed to show the pool elevation upstream of the inlet apron is less than or equal to the weir head elevation. High pool elevation will force a greater flow rate of water over the weir that may cause failure of the chute.

3.3.6 Construction of reinforced Chute Channels

The fill of the slope at 2h:1v will bring down the first chute from a height of 151.936m to the height of 125.25m where the first USBR Type III Stilling Basin will be constructed. Then, another chute from a height of 127.00m to a height of 102.00m for the construction of the second USBR Type III Stilling basin, at the bed of the gully.

Under the chute channel, the imported fill material shall be compacted to 100% standard in layers of 100mm maximum for manual compaction, and 150mm for mechanical compaction to limit settlement in the fill material.

The length of the chute channels will be 50m. In the case of a significant settlement under the chute channels, the channels could crack and suffer from damages. For these reason the following precautionary measures will have to be adopted:

- Divide the channels in successive stretches of 10m length each, and place between them an expansion joint, provided with a water-stop along the base in order to prevent cracking in this rigid structure in case of severe settlements in the supporting fill, while ensuring perfect water tightness due to the presence of the water-stop joint.

- Each stretch of 10m lengths will have an anchor (fortification) penetrating into the supporting soil in order to render it more resistant to sliding along the supporting slope, which has a gradient of 2h/1v.
- The first expansion joint will be placed at the junction between the collector drainage channel and the chute. Others shall be placed between the chute and the stilling basin. The expansion joints will be provided with water-stop extending along the whole contact of the structures.

3.3.7 Construction of USBR Type III Stilling Basins.

- Two USBR Type III stilling basins will be constructed. The first stilling basin of 10m length by 2.5m width and 6m depth is to be provided at the toe of the chute channel at height of 124.254m. The second stilling basin of 10m length by 2.5m width and 6m depth will be provided at the toe of the second chute channel at height of 102.00m. The first USBR Type III stilling basins shall be embedded by 2m into the backfill.
- The stilling basins shall be placed on a layer of 150mm – 200mm thick gravel and geotextile filter to prevent high water pressure under the basin foundation.
- Chute blocks with widths and heights of 0.25m and spaced at 0.25m from each end will be provided at the intersection between the chute channels and the USBR Type III Stilling basins as detailed in the engineering drawings. Also, 3 nos. baffle blocks will be provided half way of the basin with dimensions 357mm wide X 600 high and spaced at 357mm. At the end of the USBR Type III Stilling Basins, sills will be provided with heights of 0.4mwide, 0.8m wide and 2.5m long
- The outlet of the second stilling basin will be protected with 250mm boulders (rip-rap) laid on geotextile filter with coverage area as in the design drawings.

3.3.8 Protection works at the outflow section of the basin

Basin outlets will be adequately protected from scour caused by the exit velocity, turbulence, and suction of the water leaving the outlet. The outlets of pipes and structurally lined channels are points of critical erosion potential. Storm water transported through man-made conveyance systems at design capacity generally reaches a velocity exceeding the capacity of the receiving channel. To prevent scour at storm water outlets, a flow transition structure is needed which will absorb the initial impact of the flow and to reduce the flow. To protect the drain outflow section either Riprap/Concrete apron or Plunge pool will be used.

Apron: This structure protects and stabilizes the fill slope around and above the culvert. The apron is generally lined with riprap, grouted riprap or concrete. It should be constructed at a zero grade for a distance that is related to the outlet flow rate and the tail-water level.

Plunge Pool: Where flow is excessive for the economical use of an apron, excavated stilling basins or plunge pools may be used. The plunge pool allows the dissipation of energy at the outlet of the pipe and into the channel. If the pipe is a stream crossing, fish passage will be an issue and permit from the relevant authority will be required. The plunge pool design, access and elevation of the pipe will need to be adequate for a constant flow. If the drainage pipe discharges into a natural vegetated filter area, an energy dissipator will also be required but if the outlet

drains into another conveyance structure such as a ditch or constructed swale, only a plunge pool will be needed.

3.3.9 Construction of 2nos Check Dams

After studying the longitudinal profile of the gully, the number of check dams for each portion of the main gully channel is determined to be two. The spaces and points between check dams should be based on the compensation gradient and the effective height for the check dams.

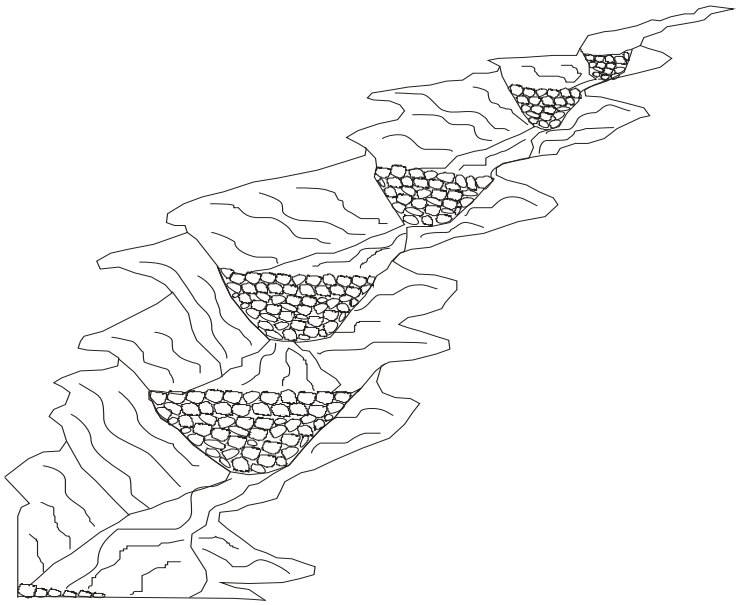

Figure 10 Schematic View of Check Dam Placement

3.3.10 Re-vegetation with local/domesticated grass and trees:

The entire gully shall be re-vegetated using local/domesticated grasses and cover crops (e.g. Elephant grass, Guinea grass, Centro, etc.) and trees (e.g. Bush Mango, Bamboo, Cashew, *Gmelina,* etc.). There should be no farming in the area to preserve the site for regeneration of bio-diversity.

CHAPTER FOUR: POLICY, LEGAL INSTITUTIONAL AND REGULATORY FRAMEWORK

4.1 Introduction

A number of national and international environmental guidelines are applicable to the operation of the NEWMAP. In Nigeria, the power to enforce all activities that might have impacts on the environment is vested in the Federal Ministry of Environment (FMEnv). Internationally, agencies such as the World Bank, IFC and other financial organizations usually set environmental criteria for projects, which must be met by project proponents before the agencies invest in them.

4.2 Relevant Regulatory Policies of Nigeria

4.2.1 National Policy on Environment

*E*nvironmental consciousness and awareness regarding the adverse effects of development projects, including agricultural projects, resulted in the articulation of a national framework for environmental protection and national resources conservation. Decree No. 58 of 1988, as amended by Decree No. 59 of 1992, established the Federal Environmental Protection Agency (FEPA) as the main government structure for environmental matters in the country. The FEPA put in place the 1989 National Policy on the Environment, revised in 1995, with sustainable development as its goal. International agencies such as the World Bank, and other development partners usually set environmental criteria for projects they are involved in. The stated goal of the National Policy on the Environment is to achieve sustainable development in Nigeria, and in particular to:

- Secure a quality of environment adequate for good health and well-being;
- Conserve and use the environment and natural resources for the benefit of present and future generations;
- Restore, maintain and enhance the ecosystem and ecological processes essential for the functioning of the biosphere to preserve biological diversity, and the principle of optimum sustainable yield in the use of living natural resources and ecosystems;
- Raise public awareness and public understanding between the environment and development and encourage individual and community participation in environmental improvement efforts; and,
- Cooperate in good faith with other countries, international organizations and agencies to achieve optimum use of trans-boundary natural resources and the prevention or abatement of trans-boundary environmental degradation.

4.2.2 The Federal Ministry of Environment

The act establishing the Ministry places on it the responsibility of ensuring that all development and industry activity, operations and emissions are within the limits prescribed in the National Guidelines and Standards, and comply with relevant regulations for environmental pollution

management in Nigeria as may be released by the Ministry. To fulfil this mandate a number of regulations/instruments are available (See section on National Legal Instruments on Environment), however the main instruments in ensuring that environmental and social issues are mainstreamed into development projects is the Environmental Impact Assessment (EIA) Act No. 86 of 1992 See Annex 1. With this Act, the FMENV prohibits public and private sectors from embarking on major prospects or activities without due consideration, at early stages, of environmental and social impacts. The act makes an EIA mandatory for any development project, and prescribes the procedures for conducting and reporting EIA studies.

As part of the effective utilization of the EIA tool, the Ministry has produced Sectoral guidelines detailing the necessary requirements of the EIA process from each Sector. One of these Sectoral Guidelines that apply to the proposed project is the 'Sectoral Guidelines on Infrastructure Development.'

Procedurally, in Nigeria, it is worthy to note that before commencement of an EIA, the FMENV issues a letter of intent on notification by the proponent, approve the terms of reference, ensure public participation, review and mediate.

The possible technical activities expected for a proposed project include screening, full or partial EIA Study, Review, Decision-making, Monitoring Auditing and Decommissioning/Remediation post-closure.

4.2.2.1 National Legal Instruments on the Environment

Environmental Impact Assessment Act No. 86, 1992 (FMEnv)

This Act provides the guidelines for activities of development projects for which EIA is mandatory in Nigeria. The Act also stipulates the minimum content of an EIA and is intended to inform and assist proponents in conducting EIA studies as well as a schedule of projects, which require mandatory EIAs.

According to these guidelines:

- **Category I** projects will require a full Environmental Impact Assessment (EIA).
- **Category II** projects may require only a partial EIA, which will focus on mitigation and Environmental planning measures, unless the project is located near an environmentally sensitive area--in which case a full EIA is required.
- **Category III** projects are considered to have "essentially beneficial impacts" on the environment, for which the Federal Ministry of the Environment will prepare an Environmental Impact Statement.

Other National Legal Instruments on Environment

- Federal Environmental Protection Agency (Amendment) Act No 59 of 1992
- The National Guidelines and Standards for Environmental Pollution Control in Nigeria

- The National Effluents Limitations. Regulation 1991
- The National Environmental Policy (Pollution Abatement in Industries and
- Facilities Generating Waste) Regulations 1991
- The Management of Solid and Hazardous Wastes. Regulations 1991
- National Guidelines on Environmental Management Systems (1999)

- National Guidelines for Environmental Audit
- National Policy on Flood and Erosion Control 2006 (FMEnv)
- National Air Quality Standard Decree No. 59 of 1991
- National Environmental Standards and Regulations Enforcement Agency Act 2007 (NESREA Act)
- The constitution of the Federal Republic of Nigeria 1999

4.2.3 Other Acts and Legislations

Land Use Act of 1978

The land-use Act of 1978 states that "…It is also in the public interest that the rights of all Nigerians to use and enjoy land in Nigeria and the Natural fruits thereof in sufficient quality to enable them to provide for the sustenance of themselves and their families should be assured, protected and preserved'. This implies that acts that could result in the pollution of the land, air, and waters of Nigeria negates this decree, and is therefore unacceptable.

Furthermore, the Land Use Act of 1978 (modified in 1990) remains the primary legal means to acquire land in the country. The Act vests all land comprised in the territory of each state in the Federation in 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 this Act.

According to the Act, administration of land area is divided into urban land which will be directly under the control and management of the Governor of each State; and non-urban land, which will be under the control and management of the Local Government. State Governors are given the right to grant statutory rights of occupancy to any person or any purpose; and the Local Government will have the right to grant customary rights of occupancy to any person or organization for agricultural, residential and other purposes.

Forestry Act

This Act of 1958 provides for the preservation of forests and the setting up of forest reserves. It is an offence, punishable with up to 6 months imprisonment, to cut down trees over 2ft in girth or to set fire to the forest except under special circumstances. Nigeria is at present a wood deficit nation. In order to ameliorate the situation, the policy on forest resources management and sustainable use is aimed at achieving self-sufficiency in all aspects of forest production through the use of sound forest management techniques as well as the mobilization of human and material resources. The overall objectives of forest policy are to prevent further deforestation and to recreate forest cover, either for productive or for protective purposes, on already deforested fragile land.

Specifically, the National Agricultural Policy of 1988 in which the Forestry Policy is subsumed, provides for:

- Consolidation and expansion of the forest estate in Nigeria and its management for sustained yield.
- Regeneration of the forests at rates higher than exploitation.
- Conservation and protection of the environment viz: forest, soil, water, flora, fauna and the protection of the forest resources from fires, cattle grazers and illegal encroachment.

- Development of Forestry industry through the harvesting and utilization of timber, its derivatives and the reduction of wastes.
- Wildlife conservation, management and development through the creation and effective management of national parks, game reserves, tourist and recreational facilities, etc.

Nigeria Inland Waterways Authority (NIWA)

Nigeria Inland Water Authority (NIWA) Act 13 of 997 established NIWA whose functions are among others are to:

- Provide regulations for inland navigation;
- Ensure the development of infrastructural facilities for a national inland waterways network connecting the creeks and the rivers with the economic center's using the river-ports as nodal points for inter model exchange;
- Ensure the development of indigenous technical and managerial skill to meet the challenges of modern inland waterways transportation; and
- Carry out environmental impact assessment of navigation and other dredging activities within the inland water and its right-of-ways.

4.2.4 State Legislations

Some of the functions of the State Ministries of Environment include:

- Liaising with the Federal Ministry of Environment, FMENV to achieve a healthy or better management of the environment via development of National Policy on Environment
- Co-operating with FMENV and other National Directorates/Agencies in the performance of environmental functions including environmental education/awareness to the citizenry
- Responsibility for monitoring waste management standards,
- Responsibility for general environmental matters in the State, and
- Monitoring the implementation of ESIA studies and other environmental studies for all development projects in the State.

Some laws in the state include:

Abia State Basic Environmental Law No. 1of 2004 amended in 2013

This law establishes the basic environmental sanitation practice (regulation and enforcement) in Abia State. The law spells out the Abia State Environmental Protection Agency (ASEPA) as a parastatal under the Office of the Governor, Government House Abia state, the individuals who shall by appointment (by the Governor) see to its management, the agency as an authorization, permission, registration and approval granting body as regards sitting of base stations and any other associated operations as well as penalties for any who contravenes the provisions of the same law which upholds basic environmental sanitation practice in Abia State.

Abia State Policy on Environment (2010)

This policy emphasizes state government efforts to sustainable management of the Abia environment with regards to Erosion control. The state government commits to:

- Seek the intervention of the Federal Government of Nigeria and relevant partner agencies in the control of Erosion, to compliment the effort of the state.
- Sensitize communities on erosion control efforts.
- Procure necessary refuse disposal equipment like trucks, pay loaders, giant bins etc.
- Involve households, communities, local governments and states in the joint clearance of drainages.
- Sensitization of households on waste disposal practices and management.
- Sponsor relevant environmental bills to the state assembly for enactment.
- Involve LGAs, communities, and civil society organizations (CSOs) in the enforcement of environmental laws.
- Embark on aggressive afforestation programmes involving LGAs, communities and civil society organizations (CSOs) in the state.

Abia State Flood and Erosion Control and Soil Conservation (2010)

This policy is to promote sustainable land use management by minimizing soil erosion and flooding hazards; achieving this through reducing soil exposure to rainstorms; reduction of surface run-offs and paved surfaces and restoration of degraded land mass.

Abia State Flood Control and Water Conservation (2010)

This policy is to forecast, prevent, monitor and manage flooding. Optimal utilization of floodwater for agricultural and other purposes as well as management of floodplains.

Abia Riverine Area Management Policy (2010)

This policy is to minimize riverine erosion and other forms of riverine degradation such as riverbank failures, landslides and alluvial deposits.

Abia State Watershed Management Policy (2010)

This policy enables the commencement of co-ordinated/holistic/integrated management of natural resources: Land, water, vegetation, etc. on a watershed basis to ensure resource conservation through the minimization of land and soil degradation and maintenance of water quality and yield for environmental sustainability.

Abia State Flood and Erosion Control Management Support System (2010)

This policy aims at supporting a reliable up-to-date database and integrated management system as tools to support all erosion and control programs.

Abia State Environmental Protection Agency Law

This law focuses on the protection of the rural and urban environment in the Abia state. It was made to support the observation of a sanitation day being the last Saturday of the every month.

4.3 The World Bank Environmental and Social Safeguards

The World Bank has in place a number of operational and safeguards policies, which aim to prevent and mitigate undue harm to people and their environment in any development initiative involving the Bank. The Nigerian EIA Act and the World Bank safeguard policies are similar; designed to help ensure that projects proposed for Bank financing are environmentally and socially sustainable, and thus improve decision-making. The Bank has twelve safeguards policies and these are:

Environmental:

- OP 4.00 Use of Country Systems
- OP 4.01 Environmental Assessment;
- OP 4.04 Natural Habitats;
- OP 4.36 Forests;
- OP 4.09 Pest Management;
- OP 4.11 Physical Cultural Resources
- OP 4.37 Safety of Dams;

Social:

- OP 4.12 Involuntary Resettlement;
- OP 4.10 Indigenous People;

Legal:

- OP 7.50 Projects on International Waterways;
- OP 7.60 Projects in Disputed Areas

Others:

- Access to Information Policy
- Piloting the Use of Borrower Systems

This section focuses on the World Bank Environmental and Social Safeguard Policies as applicable for to the Project.

Environmental Assessment (EA) (OP/BP 4.01)

Environmental Assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental and social impacts associated with Bank's lending operations early on in the project cycle. In World Bank operations, the purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted and their concerns addressed. This policy is triggered if a project is likely to have potential adverse environmental and social risks and impacts in its area of influence. The EA has various tools that can be used, including amongst others Environmental & Social Impact Assessment (ESIA) or Environmental and Social Management Plan (ESMP).

Natural Habitats (OP/BP 4.04)

Any project or sub-project with the potential to cause significant conversion (loss) or degradation of natural habitats, whether directly (through construction) or indirectly (through human activities induced by the project).

Involuntary Resettlement (OP/BP 4.12)

This policy can be triggered if the project will involve involuntary taking of land and involuntary restrictions of access to property, protected areas, etc. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. It promotes participation of displaced people in resettlement planning and implementation. The main objective of this policy is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments (RFP) or (RAP per site when known) prior to Bank appraisal of proposed projects.

4.4 Applicable International Conventions, Treaties and Agreements

Nigeria is signatory to some international agreements and Protocols concerning the environment, notably:

- International Union for Conservation of Nature and Natural Resources (IUCN) Guidelines
- Convention of Biological Diversity
- Convention Concerning the Protection of the World Cultural and National Heritage Sites (World Heritage Convention)
- United Nations Framework Convention on Climate Change (1992)

CHAPTER FIVE: SUMMARY OF POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS FOR THE AMUZUKWU EROSION GULLY SITE

5.1 Introduction

The proposed Rehabilitation of the Amuzukwu Erosion Gully will lead to several changes in the environment and socio-economic aspect of the project area. A good number of these changes will be beneficial, especially the impacts of rehabilitating degraded land and reducing longer-term erosion vulnerability in Amuzukwu community.

5.2 Associated and Potential Environmental Impacts

For the identification and rating of key issues and impacts that are likely to occur during the phases of this rehabilitation project and the significance of the associated impacts, a "5-Step Tool" was used.

Rating of Impacts

Five steps were followed sequentially in order to rate the impacts of the various activities of the projects as shown below:

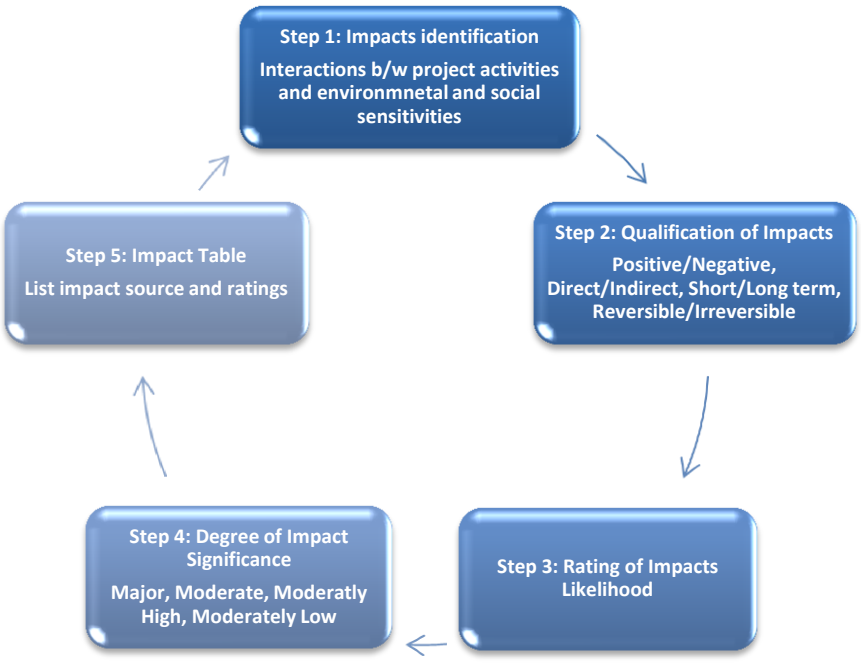

Figure 11 Impact Rating Tool

Step 1: Identification of Potential Impacts

Expected impacts were determined based on anticipated interactions between project activities and major environmental and social sensitivities. The environmental and social sensitivities likely to be affected by project activities include the following:

Environmental Components

- ✓ Air (physical and chemical properties)
- ✓ Noise - vibrations, sound waves etc.
- ✓ Surface Water
- ✓ Ground Water and Hydro-geology
- ✓ Soil
- ✓ Topography and Landscape
- ✓ Climate Change
- ✓ Terrestrial Habitats

Social Components

- ✓ Air (odour)
- ✓ Noise – nuisance
- ✓ Visual Sensitivity
- ✓ Economic Activities
- ✓ Employment
- ✓ Public Health
- ✓ Occupational Health and Safety
- ✓ Education
- ✓ Land Use
- ✓ Property Rights
- ✓ Transport and Traffic
- ✓ Religious Activities
- ✓ Leisure and social activities
- ✓ Community Affairs and Grievance Redress
- ✓ Power (electricity)

Step 2 and 3: Qualification of Impacts

Qualification of impacts was based two assessment characteristics:

Step 2: Likelihood of occurrence – This is an assessment of the probability of the effect occurring. *Step 3: Potential consequence* – This is the actual result and scale that an effect might have. The application of each of the two characteristics is described in table 8.

Table 8 Likelihood of Occurrence of Impact

Impact Probability	Likelihood	Frequency
High probability (80-100%)	A very likely impact	Very frequent impacts
Medium high probability (60-80%)	A likely impact	Frequent impacts
Medium probability (40-60%)	A possible impact	Occasional impacts
Medium low probability (20-40%)	An unlikely impact	Few impacts
Low probability (0-20%)	A very unlikely impact	Rare impacts

The magnitude of the potential changes to the physical and social environment caused by the impact of an activity or hazard, and the level of sensitivity of the receiving environment determine the potential impact of the activity. This is shown in table 9 below:

Table 9 Potential Consequence Classification Matrixes

	Magnitude of Effect		
Receptor Sensitivity	Low change	Medium change	High change
Low receptor sensitivity	Trivial effect	Slight effect	Substantial effect
Medium receptor sensitivity	Slight effect	Substantial effect	Big effect
High receptor sensitivity	Substantial effect	Big effect	Massive effect

The rating of the potential consequences of an impact and its effects are shown in table 10 below:

Table 10 Potential Consequences

Potential Consequence	Effect
Extreme consequence	A massive effect
Great consequence	A big effect
Considerable consequence	A substantial effect
Little consequence	A slight effect
Hardly any consequence	A trivial effect

Step 4: Degree of Significance

The table below shows the impact significance with associated impact ratings.

Table 11 Degree of Impact Significance

Impact Significance	Impact Ratings
Major significance	Major Impact
Moderate Significance	Moderate Impact
Minor Significance	Minor Impact
Negligible Significance	Negligible Impact

Step 5: Impact Assessment Matrix

Table 12 Impact Assessment Matrices

	Potential consequences					
Likelihood	Positive	Negative				
		Hardly any	Little	Considerable	Great	Extreme
High		Moderate	Moderate	Major	Major	Major
Medium		Minor	Moderate	Moderate	Major	Major
Medium		Minor	Minor	Moderate	Moderate	Major
Medium		Negligible	Minor	Minor	Moderate	Moderate
Low		Negligible	Negligible	Minor	Minor	Moderate

After the rating of each impact, the determination of mitigation measures followed (*refer to section on ESMP*). Only moderate and major impacts were considered for impact mitigation. Continuous improvement practices will address low impacts. The positive impacts shall be monitored and enhanced when expedient.

5.3 Associated and Potential Impacts Determination

The results of the evaluation of the interactions between the proposed activities and their impacts on environmental and social sensitivities are shown in subsequent pages of this chapter. The identified negative impacts were rated as **minor, moderate and major**. Beneficial impacts arising from the project were rated as positive. Hence, no further classifications were made on the beneficial impacts.

5.4 Methodology for Assessing and Analyzing the Social Impacts

The socio-economic impacts were identified through:

1) Technical identification of the scope and nature of project activities required,
2) Previous experience on similar jobs,

3) Concerns raised by stakeholders during focused group discussions and public and stakeholder consultations,
4) Interactions with professionals and experts in the field by the ESMP team,

The impacts and discussions on them are presented in this section with regard to the various project phases:

5.5 Broad Beneficial Impacts of the Rehabilitation of the Amuzukwu Erosion Gully Site

The implementation of the Rehabilitation of the Amuzukwu Erosion Gully Site is envisaged to largely impart positively to the people of the community and stakeholders at large. The potential positive impacts will depend on the proper implementation of the project components and sub-components.

The beneficial environmental and social impacts will include:

Beneficial Impacts

- Rehabilitation of the erosion menace in the community
- Repair of the watershed gullies
- Connection and restoration of access to houses already cut off by the erosion
- Provision of employment opportunities for both skilled and unskilled workers.
- Encourage community development programs.
- Reintegration of community and diversification of sources of livelihood.
- Reduction of mortality rate.
- Promotion of afforestation programs (with all its benefits)
- Minimization of flooding and control of coastal overflow.
- Reduced fear perception of loss of property, inhabitation and ancestral origins of the communities.
- Control and Reduction of water body sedimentation rates due to erosion.
- Reduction in mortality/morbidity from landslides.
- Initiation/ kick-off of rapid production systems and agricultural practices.
- Increase in social interactions
- Improved livelihood enhancing activities
- Gender Issues: Construction activities will encourage economic activities, especially for women. Since there would be a large workforce, petty traders and food-spots owners will benefit immensely from the demand on site.
- Promotion of goodwill and community appreciation of the NEWMAP intervention in Abia State and Nigeria at large.

Identified Potential Impacts (by Project Phases)

Pre-Construction Phase

A. Environmental Impacts

Positive

- Prior to the commencement of rehabilitation works, a feasibility study and environmental assessment are required to describe the proposed project needs, aid project design, and ensure environmental and socio-economic sustainability of the project and the project community.
- The project will undertake a stakeholders/public consultation exercise to sensitize the stakeholders in the project command area and beyond on the environmental safeguards components of the project. The public consultation process is seen to be a positive impact, as it will form a basis for project design and implementation decisions-making.

Negative

a. Air Quality

- The pre-construction phase will give rise to fugitive dusts and frequent exhaust emissions into the atmosphere as equipment is delivered to the Amuzukwu Gully Erosion Site and along access roads where the proposed rehabilitation works will take place

b. Soil

- Leakages may occur from stacked equipment containing oil such as engine oil. This could result in the seeping-through of oil into the soil, thereby leading to possible contamination of soil, surface water and ground water.
- Soil compaction and soil structure changes may occur due to influx and stationary positioning of heavy duty equipment and vehicles

c. Noise and Vibration

- During the pre-construction activities the WHO/FMEnv permissible noise level (90dB) may be exceeded due to mobilization of heavy machinery to the rehabilitation site.

B. Social Impacts

Positive

- The project will undertake a stakeholders/public consultation exercise to sensitize stakeholders in the project command area and beyond on the social safeguards to ensure project sustainability. The public consultation process is seen to be a positive impact, as it will form a basis for project concept decision-making and implementation.

Negative

a. Land Acquisition

- Possible unresolved issues during land acquisition process from members of the community which may result in conflict between contractors and land owners.
- Hostile and unfriendly community attitudes during land acquisition process.
- Decrease in accruable income from land

b. Noise

- Noise from heavy-duty project vehicles and equipment may exceed the WHO/FMEnv acceptable noise level limits, resulting in nuisance.

c. Others

- Possible disruptions of movement of residents within the project area to places of work, and businesses, as a result of movement of equipment and materials along access roads, resulting in loss of man-hours and negative perception of the project amongst road users and residents.
- Properties particularly farmlands may be accidentally damaged or destroyed during the movement of heavy duty vehicles and equipment.
- Accidents involving vehicles or pedestrians may occur during vehicle and equipment movement to site.

C. Occupational Health and Safety

Positive

- During the pre-construction phase, Occupational Health and Safety (OHS) awareness programs will be conducted. Awareness programs and interactive sessions will benefit primarily the contractors' personnel, schools, residents and businesses. Guidelines on safe practices and safe behaviours will be made available to these groups in order to minimize the occurrence of occupational incidents or accidents in the course of implementing project activities

Negative

- During the pre-construction phase air pollution from exhaust fumes of vehicles and release of fugitive dust as a result of equipment moving to the work area may occur. This will pose an occupational health risk (*respiratory infections and diseases*), especially for people residing in and carrying out activities around the project rehabilitation area and also, contractor personnel, and personnel conveying equipment.
- Exposure to noise pollution, injuries and accidents during movement of equipment to the work areas.

Construction Phase

A. Environmental Impacts

Positive

- Rehabilitation works will commence in the Amuzukwu gully erosion site.
- Channelization of flood waters: Drainage channels will be constructed, to channel storm water to collector drains at the gully head.
- Construction of suitable sized and aligned collector drains at the gully head to collect and lead the storm water/runoff from the roads into drop structures.
- A chute will be constructed to channel water into the stilling basin. This will enable the controlled flow of water from the collector drain to the stilling basin.
- The phase will allow for recovery works for land located within the gully, so as to safeguard residential properties at risk of erosion.
- Re-vegetation activities will be carried out, to provide cover for the eased out slopes, channels, chute and the stilling basin. The structured vegetation to be applied include sand bags, erosion resistance trees, plants and grasses in other to make the area environmental friendly and to improve the aesthetic of the project area.
- Stabilization (even out/ uniformity) of the slopes, where feasible to prevent further collapse of the slopes

Negative

a. Climate Change

- Climate change impacts need to be assessed from two perspectives. Firstly the impact of the project on climate change and secondly the impact of climatic change on the project scheme and its infrastructure.
- Green House Gas (GHG) emissions from vehicular and construction equipment would be generated during the pre-construction, construction and subsequently, operational phases of the project. These emissions would be the primary impact of the project on climate change. GHG emissions are considered based on three

"scopes" – Scope 1 (direct emissions), Scope 2 (indirect emissions) from the consumption of purchased energy [Purified Motor Spirit {PMS}, diesel] and Scope 3 (other indirect emissions)

b. Air Quality

- Emission of Green House Gases, Dust and Particulates: Emissions from exhaust fumes will originate from mobile sources including vehicles, trucks and heavy equipment during construction works.
- Excavation, grading, compaction, filling and other civil works will lead to the increase in fugitive dust.
- Civil works will cause changes in the air and atmospheric conditions of the project area and surrounding environment. Fugitive dusts, machinery exhaust fumes [nitrogen oxides (NOx), carbon monoxide (CO), sulphur oxides (SOx), hydrocarbons and suspended particulates], and dusts from rehabilitation/construction activities will impact negatively on air quality. Air pollution from machineries will be short term, moderate and localized.

c. Soil

- Construction machinery stationed and moving around the area can create soil compaction, which may harm the soil's future potential as farmland, impair drainage and increase the risk of flooding.
- Excavation and compaction activities through construction works will alter the soil properties including loss of valuable topsoils.
- Increased sedimentation and runoff during the construction activities such as grading, levelling and filling of the roads etc.
- Accidental spillage of chemicals and fuels from the operation and maintenance of construction vehicles and equipment will pose negative impacts to surface and future groundwater quality.

d. Water Quality and Hydrology

- Increased pressure on water resources during construction works
- During construction works, seepage of fuel from machineries and effluent discharge into the watershed may occur, thus impacting on the water quality
- During the rehabilitation works, there may be potential for sediment/contaminant laden water runoff to impact on water quality. The contaminants in water runoff may have the potential to enter existing drainage channels and into local watercourses, affecting downstream users and aquatic life.
- Flood draining activities may introduce chemicals into water bodies leading to possible changes in water colour and pH levels, pollution (BOD, COD, etc.), turbidity and eutrophication in surface water.

e. Noise and Vibration

- The project area is a built-up area with residential houses, schools, market and a hotel. The civil works will generate noise and vibrations on site and surrounding environment. Most activities associated with road project starting from the pre-construction phase to the construction phase would generate relatively high levels of noise and would be mainly from heavy equipment. The noise levels generated by construction equipment would vary significantly, depending on such factors as type, model, size, and condition of the equipment, operation schedule, and condition of the area being worked. Accordingly, potential impacts of site monitoring and testing activities on ambient noise level would be expected to be temporary and intermittent in nature.
- Vibrations resulting from construction equipment may cause further soil destabilization and consequent erosion.

f. Waste

- Construction activities will lead to the production of solid wastes - soil excavated debris, metal scraps, plastics, wood, waste concrete, papers and cartons, etc.
- Increased generation of liquid waste – concrete washings, canal watering, etc.
- Construction crews may generate solid and liquid wastes (sewages). Uncontrolled and untreated, these wastes are major sources of pollution, disrupting the ecosystem and contributing to local (and sometimes much broader) health problems.

g. Flora and Fauna

- Alteration of habitat and biodiversity may occur, due to human activities and disturbance on the natural habitat. Site clearing will lead to loss of species diversity and abundance, including soil organisms, fungi, invertebrates, and bacteria. It will also lead to loss of food sources, fauna habitat, breeding grounds and nesting sites.
- Reduction in the number of native wildlife
- During mobilization of equipment, construction activities such as grading, dredging, filling, excavation etc., Weed invasion/proliferation of opportunist species (weeds & pests) may occur.

h. Topography

- Scarification of natural landscape of the project site.

B. Social Impacts

Positive

a. Employment

- Employment of skilled and unskilled labour will be promoted. Artisans and professionals from the project area will be provided contractual employment during this phase. This will help promote community goodwill.

b. Economic Benefits

- This phase will encourage economic activities within and around work areas. Petty traders, food vendors and other small businesses will benefit from the demands at the work site.

c. Waste Management

- The construction phase will see to the implementation of a viable waste management plan for project activities.

d. Occupational, Health and Safety

- Occupational health and safety efforts will be intensified during the construction phase as signage, warning and hazard signs will be put up to inform residents and others, about the on-going rehabilitation works in sensitive areas.
- The phase will encourage the conduct of Occupational Health Risk Assessment (OHRA), Job Hazard Analysis (JHA), Hazard Communication Program (HAZCOM), OHS trainings and other proactive safety strategies (fulfilling the social and fiscal imperatives) which will help reduce the occurrence of on-site incidents/accidents and the resultant burden of direct or indirect compensation costs.

Negative

a. Impact on Livelihood/Community Activities/Social Stress

- During the rehabilitation works there are bound to be restriction in movement, which will affect residents and business owners in the project area.
- There may be occurrences of traffic congestion on access roads as a result of intermittent movement of equipment and materials into and from the rehabilitation work area. There is high likelihood that when moving these equipment and personnel

along these roads, the transport activities of the community could be disrupted and this could have impact on the socio-economic activities of the community.

- Flooding in other areas may occur during construction activities (construction of drainage), which can lead to destruction of lands, and properties.
- Human displacement: Civil works, re-vegetation activity, and watershed management may require the relocation of surrounding residents and their sources of livelihood.

b. Social Vices

- The project will attract a significant workforce. Associations between workers and local residents may lead to casual sexual relationships, thereby increasing the risks of sexually transmitted infections *(STIs*) and *HIV/AIDS*
- Vices such as theft, drug use, casual sex *(with minors, prostitutes, etc.*), small scale gambling, rape, etc., may arise due to the influx of project workforce into the area.

c. Health and Safety

- Incidences of respiratory conditions and respiratory diseases (silicosis, asthma, bronchitis, upper respiratory infections may occur due to air contamination by exhaust fumes and dust resulting from civil works.
- Possible spread of water borne diseases (e.g. Cholera, Dysentery, Amoebiasis, Salmonellosis etc) may occur during flood draining activities
- Possible outbreak of HIV/AIDS and other STDs.
- During construction activity through creation of pools of stagnant water there may be an increase in malaria cases
- Exposure of workforce to attack by poisonous insects, reptiles (snakes) and other dangerous wild animals. These attacks could result in injuries, poisoning or even death.
- The frequency and incidence of occupational hazards may rise with during construction activities.
- Accidents may occur during the construction phase as a result of increased vehicular movements

d. Noise and Vibrations

- This phase will cause noise and vibration nuisance.

e. Waste

- The construction phase will give rise to increased generation of waste from construction activities

f. Conflict

- Conflict may arise between community members and contractor. This may hinder or slow down project implementation activities.

g. Traffic

- Existing travel patterns will be negatively impacted during the construction phase of the project.

C. *Occupational Health and Safety*

Negative

- In the course of rehabilitation works, there would be a moderate to severe likelihood of the occurrence of workplace hazards. Activities using heavy and light equipment such as graders and bulldozers could predispose personnel to hazards. "Unsafe behaviours" and "unsafe conditions" will pose serious occupational health and safety risks.
- Contact with natural hazards such as animals, insects, poisonous plants.

Operational Phase

A. Environmental Impacts

Positive

- Repair of watershed gullies and rehabilitation of erosion menace. Proper erosion and watershed management as flood waters and run-off will be efficiently controlled.
- Provision of proper and well-designed road drainage systems
- Stabilization of the Amuzukwu gully erosion site, this preventing further erosion from occurring.
- Aesthetic modifications will promote good ambience within the Amuzukwu gully erosion site.
- Availability of water (in the stilling basin) for agricultural use.
- Control and reduction of water body sedimentation rates due to erosion.
- Promotion of afforestation programs

Negative

a. Air Quality

- Vehicular emissions and particulate matter generated during the operational phase are expected to increase due to an increase in road users. This will affect ambient air quality levels.

b. Noise

- The increase in road users will cause noise nuisance to local residents

c. Water Quality

- Roadway runoff, wastes (municipal solid wastes, agricultural wastes, effluent, and hazardous wastes etc.) may cause turbidity, changes in watercolour and in pH levels.

d. Odour

- Release of foul smell from the collector drains, chute and stilling basin as a result of runoff/storm water containing decaying matter.

e. Blocked Drains

- There may be sediment laden run-off/storm water which may block the collector drains whereby affecting water flow.

B. Social Impacts

Positive

a. Livelihood

- Proper erosion and watershed management as flood waters and run-off will be controlled.
- With the rehabilitation of the Amuzukwu gully erosion site, the risk of land and properties being carried away will be significantly reduced. Reduced fear perception of loss of property, inhabitation and ancestral origins of the communities.
- Increase in project area development and business opportunities
- Improved access between communities and inter-state movement thus increasing social interactions. Reintegration of community and diversification of sources of livelihood.
- Initiation/ kick-off of rapid production systems and agricultural practices.
- Reduction in mortality/morbidity from landslides.

b. Infrastructure

- Creation of engineered travel routes and access roads
- Provision of proper and well-designed road drainage systems

c. Education

- The rehabilitation in the Amuzukwu gully site area will lead to educational and social tourism to the project (for example university students studying various the fields of erosion and watershed management and engineering), and Industrial Training and those requiring hands-on experience.

- Increase in community development programs

d. Traffic

- Increase in traffic within the roads and access roads of the project

e. Control

- Control and monitoring of human activity e.g. farming, sand digging, building etc within the recovered areas and eased out side slopes

Negative

a. Loss of Employment

- At the end of the project lifetime the project workforce will be demobilized. This will bring about loss of jobs for the project workers. This will translate to loss in income and business opportunities. Most of the small scale businesses that provided goods and services to the road crew members will either windup or experience significant reduction in the volume of business with the demobilization of the project and this too will translate to loss of income

b. Air Quality

- Increase vehicular emissions from road users

c. Waste

- Indiscriminate dumping of waste may lead to blocking of drainage channels and sanitation issues.

d. Conflict

- There may be land use conflict in managing the erosion site, e.g. ecological.

e. Noise

- Noise nuisance from vehicles on access roads is very likely.

f. Health and Safety

- The stilling basin could become a breeding site for disease vectors e.g. flies and mosquitoes. Possible spread of water borne diseases (e.g. Cholera, Dysentery, Amoebiasis, Salmonellosis etc) may occur.

- Increase in respiratory problems amongst local residents as a result of increase in road users.
- Increase in vehicular accidents along constructed/rehabilitated access roads.

C. *Occupational Health andSafety*

Positive

- Implementation of site-specific occupational health and safety management plans (OHSMPs)
- Monitoring for occupational health and safety risk assessment (OHSRA) report data.
- Continuous job hazard analysis and process hazard analysis (JHA and PHA)
- Implementation of a hazard communication program (HazCom)
- Reduced direct and indirect costs as a result of pro-active safety strategies.
- OHS Training
- PPE availability

Negative

- There may be flood risk associated with the stilling basin. This is likely to occur when the impoundment level of the stilling basin exceeds the safety level.
- Injury of workers and the public during the operation and maintenance activities

Based on identified potential impacts from the rehabilitation works, the impacts were rated and shown in the table below;

Table 13 Identified Potential Impact Rating- Pre-Construction

Project Phase	Component	Sub-component	Potential Impact	Description	Likelihood	Consequence	Rating
Pre-construction Phase	**Environment**	**Air**	Fugitive dust and exhaust fumes from vehicles	Direct Negative Short-term/long-term Local/widespread Reversible	Medium	Considerable	**Moderate**
		Soil	Soil compaction and soil structure changes due to influx and stationary positioning of heavy duty equipment and vehicles	Direct Negative Short-term Local Reversible	Medium Low	Considerable	Moderate
			Leakages from stacked equipment and subsequent seeping through of contaminated oils and chemicals	Direct Negative Short-term Local Reversible	Medium	Considerable	**Moderate**
		Noise	Increase above permissible noise level, (90dB) due to movement of vehicles, equipment and machines to the gully erosion site	Direct Negative Short-term Local/widespread Reversible	Medium	Considerable	**Moderate**
		Vegetation	De-vegetation – Loss of flora and fauna	Direct Negative Short-term Local/widespread Reversible/Irreversible	Medium	Little	**Minor**

Project Phase	Component	Sub-component	Potential Impact	Description	Likelihood	Consequence	Rating
Pre-construction Phase	**Social**	Land Acquisition	Conflict between contractor and land owners, due to unresolved issues during land acquisition process	Direct Negative Short-term Local Reversible	Medium	Considerable	Moderate
			Decrease in accruable income due to sale of land	Direct Negative Short-term/Long-term Local Reversible	Medium	Considerable	Moderate
		Traffic	Traffic congestion/travel delay	Direct Negative Short-term Local/widespread Reversible	Medium	Considerable	Moderate
		Noise	Nuisance to surrounding residents/ communities	Direct Negative Short-term Local Reversible	Medium	Considerable	Moderate
		Others	Accidental destruction of property such as farmlands	Direct Negative Short-term Local Reversible	Medium low	Little	Minor
			Grievances	Direct/Indirect Negative Short-term Local Reversible	Low	Little	Minor
			Accidents involving vehicles or pedestrians	Direct/Indirect Negative Short-term Local	Medium Low	Considerable	Minor

				Reversible			
			Blocked access route to places of work, residence and business	Direct/Indirect Negative Short-term Local Reversible	Medium Low	Considerable	Minor
Pre-Construction	**Occupational Health and Safety**	Air	Exposure to respiratory disease risks from dusts, exhaust fumes of equipment and vehicles	Direct Negative Short-term /long-term Local/wide spread Reversible	Medium	Considerable	Moderate
		Health and Safety	Exposure to injuries and accidents during movement of equipment	Direct Negative Short-term /long-term Local/wide spread Reversible	Medium	Great	Major

Table 14 Identified Potential Impact Ratings- Construction Phase

Project Phase	Component	Sub-component	Potential Impact	Description	Likelihood	Consequence	Rating
Construction Phase	**Environment**	Climate Change	GHG Emissions	Direct /indirect Negative short-term/Long-term Local/widespread Irreversible	Medium low	Considerable	Minor
		Air	Cement dust, fugitive dust, welding fumes, exhaust fumes, hazardous gases (NOx, CO, SOx, $PM_{2.5}$, PM_{10})	Direct Negative short-term/Long-term Local/widespread Irreversible	Moderate	Considerable	Moderate
		Soil	Destabilization of soil structure/ Increase of erosion site	Direct Negative short-term Local Reversible	Medium	Considerable	Moderate
			Compaction of top soil due to movement of heavy vehicles and equipment	Direct Negative short-term Local Reversible	Medium-high	Considerable	Moderate
			Contamination of soil by oil spills, fuel, etc.	Direct Negative short-term Local Reversible	Medium-low	Considerable	Minor
		Water quality/hydrology	Discharge of sediment laden run-off into water bodies	Direct/Indirect Negative Short-term/Long-term Local/Widespread Reversible	Medium	Considerable	Moderate

Project Phase	Component	Sub-component	Potential Impact	Description	Likelihood	Consequence	Rating
			Contamination from (oils, fuel, chemical substances etc)	Direct/indirect Negative short-term/long-term Local/widespread Reversible	Medium	Considerable	Moderate
Construction Phase	**Environment**	Water quality/hydrology	Contamination by human faecal wastes	Direct/indirect Negative short-term/long-term Local/widespread Reversible	Medium	Considerable	Moderate
		Noise and Vibration	Noise pollution and vibration nuisance as a result of on-going rehabilitation works.	Direct Negative short-term Local Reversible	Medium-high	Considerable	Moderate
			Soil destabilization due to vibrations from construction equipment use	Direct Negative short-term Local Reversible	Medium low	Considerable	Minor
		Waste	Increased generation of solid and liquid wastes	Direct Negative short-term Local Reversible	Medium	Considerable	Moderate
		Biodiversity	Loss of flora and fauna	Direct Negative short-term /Long term Local Reversible/irreversible	Medium High	Considerable	Moderate

Project Phase	Component	Sub-component	Potential Impact	Description	Likelihood	Consequence	Rating
Construction Phase	**Social**	Socio-economic activities	Disruptions to resident activities within the project area	Direct Negative short-term Local Reversible	Medium	Considerable	Moderate
			Blocked access route/Restricted access	Direct Negative short-term Local Reversible	Medium	Considerable	Moderate
Construction Phase	**Social**	Public	Negative perception among residents and commercial establishments etc about the project.	Direct Negative short-term Local Reversible	Medium	Little	Minor
			Possible human displacement	Indirect Negative short-term Local Reversible	Medium	Great	Moderate
		Traffic	Delay in travel time	Direct Negative short-term Local Reversible	Medium low	Little	Minor
		Education	Noise disturbances to the serene learning environments. (name of school)	Direct Negative short-term Local Reversible	Medium	Considerable	Moderate

Project Phase	Component	Sub-component	Potential Impact	Description	Likelihood	Consequence	Rating
		Health and Safety	Increase in sexual activities leading to possible spread of STIs	Indirect Negative short-term Local/widespread Reversible	Medium high	Great	Major
			Incidence of respiratory diseases due to air contamination by fugitive dusts and exhaust fumes	Direct Negative short-term Local Reversible	Medium	Considerable	Moderate
			Residents and workforce exposed to accidents and injuries	Direct Negative short-term Local Reversible	Medium	Great	Moderate
			Incidence of water borne diseases (e.g. dysentery, cholera)	Direct Negative short-term Local Reversible	Medium	Considerable	Moderate
Construction Phase	**Social**	Behaviour	Occurrence of social vices (e.g. theft, drug use etc)	Indirect Negative short-term Local Reversible	Medium	Considerable	Moderate
		Noise	Nuisance due to increase in noise levels	Direct Negative short-term Local Reversible	Medium	Little	Minor
		Project Performance	Conflict between community members and contractor	Direct Negative short-term	Medium	Considerable	Moderate

Project Phase	Component	Sub-component	Potential Impact	Description	Likelihood	Consequence	Rating
				Local Reversible			
			Grievance and resistance from communities	Direct/Indirect Negative Short-term/long-term Local Reversible	Medium	Considerable	Moderate
Construction Phase	**Occupational Health and Safety**	Personnel safety	Injuries, falls, accidents, explosions, fires, leakages, accidents etc.	Direct/Indirect Negative Short-term/Long-term Local/widespread Reversible	Medium high	Considerable	Moderate

Table 15 Identified Potential Impact Rating- Operation Phase

Project Phase	Component	Sub-component	Potential Impact	Description	Likelihood	Consequence	Rating
Operational Phase	**Environment**	Air	Exhaust fumes from road users	Indirect Negative Short-term/long-term Local/widespread Irreversible	Medium	Considerable	Moderate
		Noise	Nuisance due to increase in noise levels	Indirect Negative Short-term/long-term Local Reversible	Medium	Considerable	Moderate
		Water quality and hydrology	Contaminated (*with human waste*) water run-off into surface water etc.	Indirect Negative Short-term/long-term Local/widespread Reversible	Medium	Considerable	Moderate
		Water flow	Blocked drains (with sediment) impeding water flow	Indirect Negative Short-term Local Reversible	Medium	Considerable	Moderate
	Social	Employment	Loss of employment (engaged contract staff on the project)	Indirect Negative short-term Local Reversible	High	Little	Moderate
		Health and Safety	Increase in water borne diseases (malaria, typhoid, cholera)	Indirect Negative short-term Local	Medium	Considerable	Moderate

Project Phase	Component	Sub-component	Potential Impact	Description	Likelihood	Consequence	Rating
				Reversible			
			Increase in vehicular related accidents	Indirect Negative short-term Local Reversible	Medium	Considerable	Moderate
			Increase in respiratory problems amongst local residents due to increase of road users	Indirect Negative short-term Local Reversible	Medium	Considerable	Moderate
	Occupational Health and Safety	Personnel safety	Injury of workers during operation and maintenance activities	Direct Negative short-term/Long-term Local/widespread Reversible	Low	Considerable	Minor

CHAPTER SIX ANALYSIS OF ALTERNATIVES

6.1 Introduction

Various alternatives to the project are discussed in the sections below.

1. The use of rock lined chute
2. The use of wood drop structure
3. Do nothing Alternative

6.2 Option one: Rock Lined Chute

Figure 12 A Rock lined chute

The rock lined chute is used to lower surface water into the open channel where a gully has developed. The chute is sized according to drainage area and site factors. Proper sizing of the rock to withstand the expected velocity of water in the chute is the key factor. For the installation of this structure a good source of rock must be available in the area.

Rock chutes are an essential item in the stabilization of gullies. Wherever practical erosion problems should be stabilized synthetic material should only be used in circumstances where natural based solutions fail to achieve the required stability.

Most rock chute failure occur from either

- Poor construction practices
- Water passing around or the use of inadequately sized rock (as a result of either a design or construction problems).

The critical components of the rock chute design are:

- Control of flow entry into the chute;
- Determination of an appropriate rock size; and
- The design of energy dissipation measures at the base of the chute to prevent undermining of the chute and damage to the gully banks.

The upper surface of the rock chute must blend with the surrounding land to allow water to freely enter the chute without being diverted along the edge of the rock lining.

The rock size must be based on the flow conditions down the chute, the slope of the chute, the shape of the rocks (i.e. round or angular), and the degree of variability in rock size. The recommended mean rock size for long, straight chutes may be determined.

Constraints

- The non-availability of rocks in the area could be step back in the use of this alternative

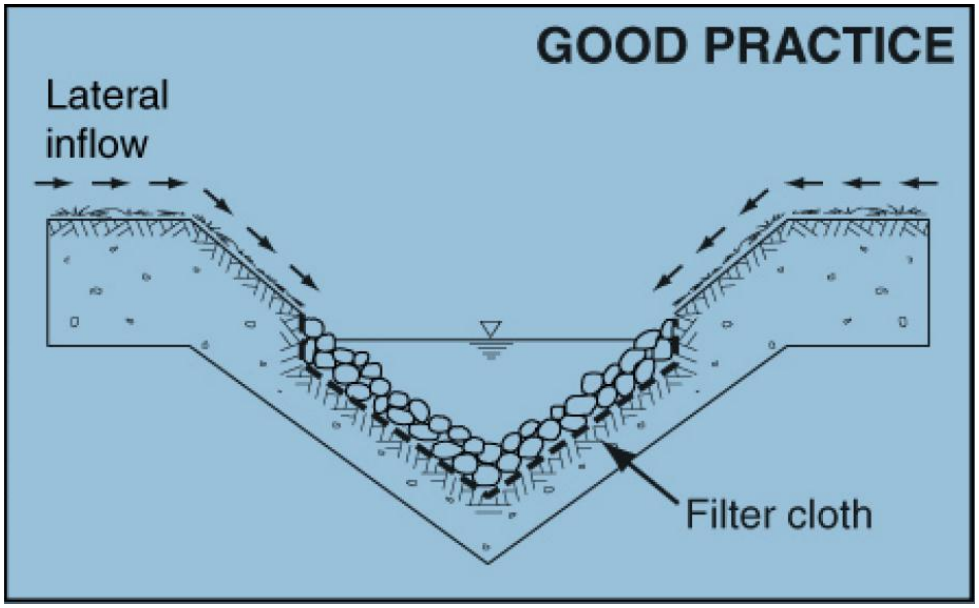

Figure 13 Schematic diagram of a rock lined chute

6.3 Option Two: Wood Drop Structure

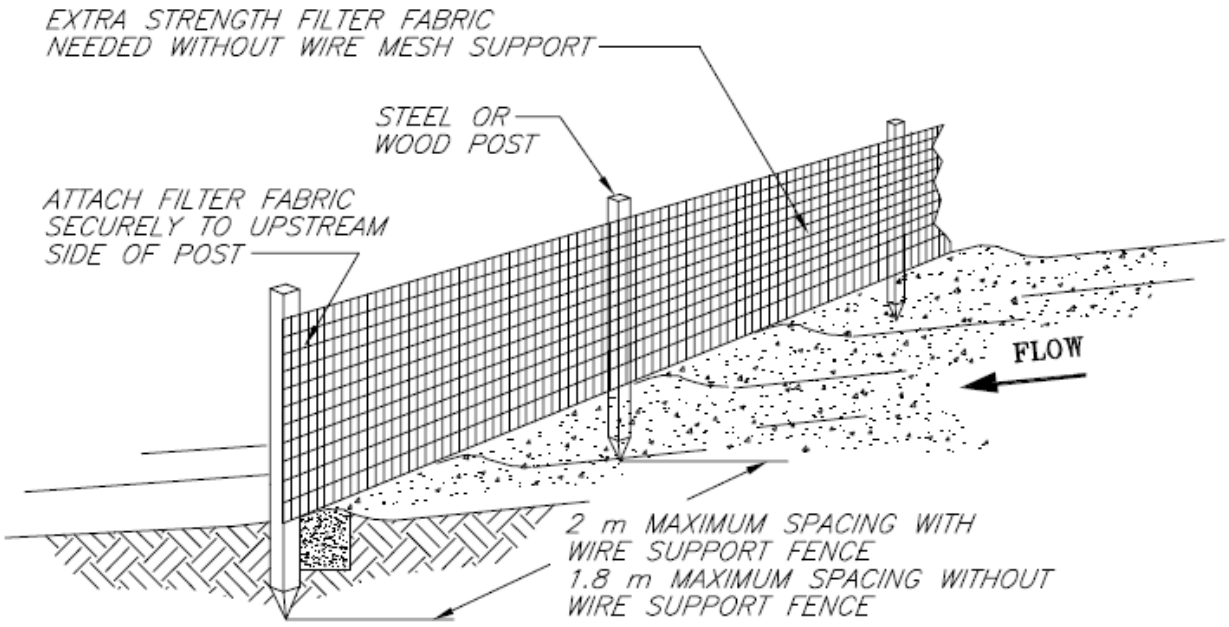

Figure 14 Schematic diagram of a wood Drop structure

Wood has been used in various ways to control soil erosion. Over the past few years, the wood drop structure has been used with much success.

The wood must be adequately treated to withstand contact with the soil in a wet condition and adequate drainage around this structure required.

Constraints

- As the gully is deep and very wide its encroachment would be continuous with the use of this alternative. Since trapping of sand would be a dependent factor.

6.4 Option three: ***Do nothing***

The "do-nothing" option would involve maintaining the status quo. This would mean that no further rehabilitation of the erosion site will be done. This would actually lead to degradation of un-eroded areas thereby causing more harm than good to the immediate environment.

6.5 The Preferred Option

Option one is the preferred option in this case as this option is more sustainable and environmentally friendly (it will not require the destruction of other natural resources which will favor erosion, such as felling of trees, like in the case of option two). In the context of engineering advantages, materials needed in the application of option one will provide for higher resistance to rushing water and erosion of topsoil. Stabilization of the gully head and the ravine of the erosion site will be easily achieved and serve long term purposes if this option is applied.

The project involves a multi-disciplinary approach and therefore will require a combination and interplay of best practices as the need arises. Therefore, in cases where a particular engineering option may not be the best approach, it would be technically right to apply alternatives as they best fit into the engineering designs. This would simply mean in cooperating one or two other engineering modification options to support the preferred option.

CHAPTER SEVEN: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

7.1 Overview

The range of environmental, social and occupational health and safety issues associated with the rehabilitation works for the Amuzukwu Gully Erosion Site Project will be described in a *matrix table format* for the environmental and social management plan (ESMP). The table also includes a column for *Monitoring Indicators* and *Monitoring Frequencies*.

It outlines the corresponding mitigation measures for potential environmental and social impacts; and occupational health and safety risks that are envisaged to occur during activities. Since the project consists of civil rehabilitation works basically, majority of the environmental and social impacts and occupational hazards will be expected to arise during the construction phase of the project. The ESMP also covers potential impacts as perceived during the pre-construction and operation phases.

7.2 Institutional Arrangement for ESMP and Monitoring Plan

It is planned that the environmental and social impacts and their designed enhancement and mitigation measures shall be monitored during implementation of the construction/rehabilitation works and operation phases. The roles and responsibilities for monitoring the environmental and social impacts and the implementation of the ESMP are as follows:

The ESMP shall be included in the contract documents for successful project implementation contractors.

Awareness creation exercises on HIV/AIDS, environmental protection and personal hygiene and sanitation shall also be undertaken for contactors personnel and all stakeholders involved in project implementation.

7.3 ESMP and Monitoring Plan Budget

The total cost for Implementing the ESMP and Monitoring Plan for the Amuzukwu Gully Erosion Site is estimated at **Thirteen Million Seven Hundred and Ninety Thousand Four Hundred Naira Only(₦13,790,400); [Eighty One Thousand Six Hundred US. Dollars $81,600.00].** A summary of the environmental and social managing plan indicating the components and subcomponents to be mitigated including the monitoring indicator and frequency is presented below in matrix table. This has been analysed with regards to the different project phases involved in the project.

Table 16 ESMP- PRE-COSTRUCTION PHASE

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
Environment	**Air**	Mobilization of workers, equipment and other materials into Amuzukwu Gully Erosion Site	Increase in amounts of fugitive dusts and exhaust fumes from movement of heavy-duty vehicles and equipment into work areas.	Sprinkling of water via spraying devices to limit dusts.	Air quality parameters are within permissible Limits	Twice monthly	**Mitigation**: Contractor	**3,000**
				Ensure that vehicles are serviced; undergo vehicle emission testing (VET) and vehicle exhaust screening (VES) as laid down in the NESREA guidelines.	Ensure that vehicles are serviced; undergo vehicle emission testing (VET) and vehicle exhaust screening (VES) as laid down in the NESREA guidelines.	Every two months	**Monitoring:** NESREA (state), SME, PMU, Contractor	
	Soil	Mobilization of workers, equipment and other materials into Amuzukwu Gully Erosion Site	Loss of top soil and soil compaction due to movement of vehicles to site and stacking of heavy-duty equipment	Limit zone of vehicle and equipment weight impacts (designate an area for parking and stacking equipment)	Visible demarcation of vehicles and equipment limit zone Warning signs, flags will be utilized to alert users, so as to reduce risks associated with the rehabilitation of the project	Weekly	**Mitigation**: PMU and Contractors	**5,500**
			Leakages from stacked equipment and subsequent intrusion of oil and chemical substances into soil.	Ensure fastening of loose parts (bolts, nuts); Install impermeable surface at the limit zone to contain potential leakages	Installation of impermeable platform at limit zone.	Weekly	**Monitoring**: SME, ASEPA, PMU	
Environment	**Noise**	Mobilization of workers, equipment and other materials	Increase above permissible noise level, (90dB) during movement of vehicles,	The effective control of noise from vehicles and equipment during	Options for noise impact mitigation are being implemented	Weekly	**Mitigation:** PMU, Contractor	**500**

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
		into Amuzukwu Gully Erosion Site	equipment and machines (site-specific and widespread)	this phase may be achieved by considering the following techniques: • Alternative design options; • Mitigation at the source; • Mitigation along the path; and • Mitigation at the receiver For minimal disturbance it will be advised that equipment is transported when it will cause least disturbance			**Monitoring**: SME, ASEPA	
	Vegetation	Vegetation clearing	Displacement of soil fauna and damage to flora.	Contractors should limit vegetation clearing to minimum areas required particularly areas with indigenous vegetation	Vegetation clearing is limited to precise areas	Monthly	**Mitigation:** Contractors **Monitoring**: PMU	**1,200**
			Predisposing of soils to erosion	Cleared areas should be re- vegetated with beneficial local species known to mitigate against erosion	Re-vegetation is ongoing where appropriate.	Monthly		

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
Social	**Traffic**	Mobilization of workers, equipment and other materials into Amuzukwu Gully Erosion Site	Traffic congestion/travel delay along some major roads	Apply lane configuration changes to affected roads and streets.	Lane configuration changes are being made where applicable.	Daily	**Mitigation:** Contractors, FRSC (Federal Road Safety Corps) **Monitoring**: FRSC	**1,100**
	Noise	Mobilization of workers, equipment and other materials into Amuzukwu Gully Erosion Site	Nuisance to nearby residential areas	Retrofit with suitable cost effective vehicle sound proofing materials/ technologies.	Retrofitting with vehicle sound proof materials is being performed	Daily	**Mitigation:** Contractors **Monitoring**: SME, ASEPA	**1,200**
Social	**Air**	Mobilization of workers, equipment and other materials into Amuzukwu Gully Erosion Site	Exposure to health risks from fugitive dusts and exhausts fumes.	Provision of facemasks to residents and project personnel.	Provision of face masks and appropriate PPEs are being provided.	Weekly	**Mitigation:** SME, PMU, Public Health depts. Of Umuahia North LGA **Monitoring:** ASEPA	**1,050**
				Restrict access of non-project personnel to work areas where dusts and emissions exist/persist from project works.	Restriction barrier are being installed.			
	Land	Land Acquisition	Conflict owing to unresolved land acquisition and involuntary displacement during the construction	The PMU will carry out an extensive enlightenment program to inform farmers and communities on the aim, scope and nature of the work	Documented evidence of enlightenment carried out showing method, coverage and dates of programs	Monthly for 6months before and during construction/rehabilitation phase	PMU	**1,000**

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
	Construction camping	Transportation and movement of heavy equipment	Public Safety and Traffic congestion	Transportation of heavy equipment will be carried out during off pick hours when it will not disturb public movement Where movement cannot be avoided during work hour, the contractor must attach a warning signal	Evidence of warning signal Log record of time of lorry arrival/discharge of equipment	Weekly during pre-construction phase	Contractor PMU	-
	Others	Mobilization of workers, equipment and other materials into Amuzukwu Gully Erosion Site .	Disruption of vehicle and pedestrian access to where rehabilitation works will be conducted	Adequate and timely sensitization of PAPs; Lane configuration	Adequate and timely sensitization program is being conducted Lane configuration change have been made	Monthly	**Mitigation**: PMU	**500**
			Grievances and negative community perception about the project.	Adequate and timely sensitization of PAPs	Sensitization exercise are conducted		PMU, Independent Consultant, Contractors	**1,500**

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
Occupational Health and Safety	**Air**	Mobilization of workers, equipment and other materials into gully site	Respiratory disease risks from exposure to exhaust fumes of equipment and vehicles	Institute workers respiratory protection program (WRPP)	Institution of WRPP	Weekly	**Mitigation**: Independent Consultant, Contractors **Monitoring**: ASEPA, PMU	**2,750**
	Noise	Mobilization of workers, equipment and other materials into gully site	Noise pollution	Institute noise control plan	Institution of noise control plan	Weekly	**Mitigation**: Independent Consultant, Contractor **Monitoring**: ASEPA, PMU	**750**
	Accidents	Mobilization of workers, equipment and other materials into gully site	Accidents involving pedestrians	Education and training of PAPs about the project and accident occurrence	Education and training has been conducted	One-off	PMU, Contractor, Independent Consultant	**500**
				Contractor(s) education and training on pedestrian safety	Training has been conducted	One-off	PMU	**150**
				Install safety signage	Safety signage have been installed	Weekly	PMU, Contractor	**500**
			Collapse ofheavy equipment etc. being conveyed to rehabilitation work area	Conduct haulage safety training	Training has been conducted	One-off	Contractor	**250**
				Enhanced fastening of equipment to carriage section of vehicles.	Contractor(s) Compliance	Weekly	Contractor	**500**
	Personnel Safety		Attack from dangerous animals during de-vegetation activities	Conduct safety and first aid training	Training has been conducted	One-off	Contractor	**300**
PRE-CONSTRUCTION PHASE TOTAL – 22,250								

Table 17 ESMP- CONSTRUCTION PHASE

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
Environment	**Climate Change**	Operation of equipment used during the construction phase	GHG Emissions	**Fuel switching**- Fuel switching from high- to low-carbon content fuels (where available) can be a relatively cost effective means to mitigate GHG emissions during this phase. Transition to renewable energy sources i.e. solar energy (where applicable) **Energy efficiency**- Machines e.g. generator plants could be turned off when not in use, in order to reduce carbon emissions. **Multiple trips reduction**: In order to reduce vehicular movement and subsequent increased carbon emissions. Hire vehicles, plants and equipment that are in good condition (current models) generally less than 3 yrs. old.	Compliance to proffered mitigation measures.	Weekly	**Mitigation**: PMU, Contractors **Monitoring**: ASEPA, PMU	**1,000**

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
Environment	**Air**	Operation of equipment used during the construction phase	Fugitive and cement dusts	Routine watering of the rehabilitation sites	Contractors Compliance	Daily	**Mitigation**: Contractors	**1,000**
		Rehabilitation works	Fugitive and cement dusts	Routine watering of the rehabilitation sites	Contractors Compliance	Daily	**Mitigation**: Contractors	**1,000**
		Heavy equipment operations during construction	Exhaust fumes, hazardous gases (NOx, CO, SOx, SPM), Oxides from welding activities.	Wet Right-of-Way to reduce dust production	QC and QA are in practice	Monthly	**Mitigation:** PMU, Contractors	**400**
				Test Procedures – Routine measuring of HC and CO concentrations during rehabilitation works should be employed for PMS powered vehicles. Diesel (AGO) vehicles should be tested for exhaust opacity during unloaded engine free acceleration periods.	Contractors Compliance	Monthly	**Monitoring:** PMU, Contractors	**1,250**
				Quality Control –Routine equipment efficiency audits **Quality Assurance –** Continuous training of contractor(s) personnel on air quality management	Contractors Compliance	Monthly	**Mitigation:** Contractors **Monitoring:** PMU	**500**
Environment	**Water quality/Hydrology**	All rehabilitation works	Contamination of surface water (discharge of sediment laden run-off into drainages, waterways	Attempts to dispose of sediment-laden run-off into surface water should be discouraged and prevented. Implement site-specific	Contractors Compliance	Daily	**Mitigation:** Contractors	**750**

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
			etc)	waste management plans				
		Defecation near gully erosion site	Generation of sewage overtime (from use of temporary mobile toilets by personnel involved in civil works)	Liaise with the municipal sewage collection authorities for collection and treatment of waste with ASEPA	PMU Compliance	Monthly	**Mitigation:** PMU **Monitoring:** SME, ASEPA	**700**
	Soil/geology	Movement of heavy vehicles/Stationary vehicles and equipment	Surface soil compaction	Creation of limit zones Minimize compaction during stockpiling by working the soil in the dry state. Rip compacted areas to reduce runoff and re-vegetate where necessary All topsoil and other soil profiles must be managed strictly	PMU, and Contractor's Compliance	Monthly	PMU, Contractors	**200**
		Contamination by oil spills, lubricants and other chemicals	Pollution of soil and groundwater	All oil and lubricants should be sited on an impervious base and should have drip pans The storage area should be far from water course All containers should be clearly labelled	Contractor Compliance	Periodically	Mitigation: Contractor Monitoring:	**600**
		Excavations for constructing stilling basin	Loss of top soil ; possible minor to moderate soil instability	Ensure excavation is limited to desired areas Excavated to be minimized and filled to ground level	PMU Compliance	Monthly	Contractors	**1,200**
		Erosion management	Erosion management	The contractor must implement appropriate erosion control measures to avoid further erosion in this watershed. Construct soil conservation	Contractor Compliance	Weekly	Contractor	**2,000**

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
				measures at appropriate locations Execution of major works that would impact on soil structure should be carried out during the dry season. If done during the wet season, temporal drain should precede the permanent drain so that run-off from rain can be managed properly.				
Environment	**Noise**	Construction of drainage structures, collection drains, chute and stilling basin Rehabilitation/ Construction of road networks	Extensive noise site-specific pollution as a result of on-going construction works.	**Mitigation at source (for all activities)** A noise barrier or acoustic shield will reduce noise by interrupting the propagation of sound waves.	Contractors Compliance	Weekly	**Mitigation:** PMU, Contractors **Monitoring:** SME, ASEPA	**2,250**
	Waste	All rehabilitation/construction works	Increase in waste generated	Implement site-specific waste management plan Liaise with ASEPA for effective waste management	Contractors Compliance	Weekly	**Mitigation:** Contractor **Monitoring:** SME, ASEPA	**600**
	Sanitary Concerns	Increased human faecal waste	Increased human faecal waste	Provision of on-site sanitary facilities	Contractors Compliance	One-off	**Mitigation:** Contractor **Monitoring:** SME, ASEPA	**400**

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
	Design	All Rehabilitation Works	Interference with the physical setting	The design shall in no way propose to implement developments that will hinder drainage, change the topography or introduce physical changes that are not in harmony with the physical setting of the Project area. The structures to be developed should be aesthetically acceptable to blend in with the surrounding. These structures should not form or end up being used by the resident population as access or bridges. No residential facilities shall be erected on site and the proponent shall as much as possible complete the works in such a way that natural aesthetics shall be retained at the locations. Restoration shall be undertaken to ensure that the original setting is as much as possible retained.	Contractors Compliance	During Design	**Monitoring:** Contractor	No additional costs to BOQ
								SUB-TOTAL – 12,850
Social	**Livelihood**	Rehabilitation/ Construction of Road and drainage network	Disruptions to residents activities – (e.g. blocked access to residents)	Conduct survey to identify best alternatives to prevent disruptions to livelihood within on & off-site work areas before commencement of rehabilitation works.	Independent Consultants Compliance	One-off	**Mitigation:** PMU, Independent Consultant **Monitoring:** SME, PMU	**1,250**

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
Social	**Traffic**	Mobilization of equipment and other materials	Loss of travel time due to heavy concentration of construction/project vehicles on and off the project site	Lane configuration changes	Contractors Compliance	Weekly	**Mitigation:** FRSC **Monitoring:** PMU,	**300**
			Grievances and negative perception among residents and commercial establishments about the project	Involve PAPs at certain levels of decision making and implementation of activities	PMU Compliance	Monthly	PMU **Monitoring:** SME	
	Education	Extensive civil work/rehabilitation activities	Noise disturbances to the serene environments for the residence	Mitigation at source Inform residents prior to commencement of works	Compliance	Monthly	**Mitigation:** PMU, Contractors **Monitoring**: Umuahia North LGA	**400**
Social	**Health**	Continuous civil work activities and steady influx of workforce	Increase in sexual activities leading to possible spread of STIs	Awareness campaign on sexual diseases, and distribution of male and female condoms.	Conduct of awareness campaigns	Quarterly	**Mitigation:** MWR, Public Health dept. of the Umuahia North LGA. **Monitoring:** SMH	**550**
			Incidence of respiratory diseases due to air contamination by fugitive dusts and exhaust fumes	Distribute facemasks to residents as a means to reduce allergic reactions and respiratory disease occurrence. Regular sprinkling of water in during construction works.	Facemasks are being distributed	Monthly	Public Health dept. of the UmuahiaNorth LGA, Contractors **Monitoring:** SMH	**1,050** **1,000**
		Blocked drainage channel	Possible spread of water borne diseases	Creation of temporary channels to collect flood water	Compliance		**Monitoring:** SME	**2,000**

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
	Environmental hygiene and aesthetics	Waste management	Increase in waste generated from construction works	Ensure that all construction wastes are gathered on-site and disposed off according through the available waste disposal operation in the project area.	Contractors Compliance	Weekly	Contractors **Monitoring:** SME, ASEPA	**3,000**
	Behaviour	Implementation of civil works and Rest periods	Occurrence of on-site/off-site social vices (Fights, rape, harassments, theft, vandalization, drug use etc.	Enforce and ensure proper orientation on acceptable behaviours for construction personnel on/off-site.	Compliance	Monthly	Contractors **Monitoring:** SME, ASEPA	**1,000**
	Project performance	Implementation of all construction phase activities	Conflicts between contractors, communities etc. may disrupt completion of tasks.	Good work enforcement program	Compliance	Monthly	Contractors **Monitoring:** SME, ASEPA	**100**
				Conflict resolution				**500**
				Regular stakeholders meetings				
Social	**Noise**	Massive use of heavy machinery for land clearing, levelling and excavation of soil	Hearing impairment for machinery operators	Operators of heavy duty machines must wear ear muffs They must not exceed 8 working hours per day	Evidence of procurement of ear muffs Evidence of use of the PPE Record of signing out time	Daily	Contractor	**300**
			Noise nuisance for Residents.	Mitigation at source Inform residents prior to commencement of works	Compliance	Monthly	**Mitigation:** PMU, Contractors **Monitoring**: Umuahia North LGA	**400**
	Loss of occupation	Land Acquisition	Disincentive to land owners	The pastoralist must be carried along all through	Minutes of meetings with land owners	monthly	**Mitigation:** Contractor **Monitoring:** PMU	-
								SUB-TOTAL – 24,700

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
Occupational Health and Safety	**Personnel safety**	All construction activities	Fugitive dust and fumes from grinding, welding, cutting, or brazing surfaces coated with lead-based paint; Silica dust from cutting concrete; solvent vapours from adhesives, paints, strippers, cleaning solvents, and spray coatings; and isocyanate vapours from spray foam insulation and certain spray paints or coatings.	Develop and implement on-site occupational health and safety management plan; Routine OHS training and education; Conduct routine JHA/PHA; Use of PPE; Establish electrical safety program; Establish fall protection program; Establish fleet safety management program; Establish and implement HazCom; Conduct hazard identification, control and analysis; Establish fire prevention program; Use material safety data sheets (MSDS); Employ hierarchy of controls procedure; Conduct OHSRA, Cost Benefit Analysis(CBA), Return on Investment(ROI)/pay-back period analysis	Independent Consultants/Contractors Compliance	Monthly	Independent Consultant, Contractors **Monitoring:** PMU	**2,000**
Occupational Health and Safety				Contractors should prepare and implement a Community Affairs, Safety, Health, Environment and Security (CASHES) manual, to coordinate OHS issues during the construction phase.		Monthly	Contractors **Monitoring:** PMU	
CONSTRUCTION PHASE TOTAL - 49,950								

Table 18: ESMP - OPERATIONAL PHASE

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
Environment	**Air**	Increased Vehicle movement	Increase of road users on Uzuakoli Road	Air sampling and monitoring	Compliance e	Monthly		**-**
	Soil	Change of topography	Change in soil profile Increase in soil salinity Change in land use	Training on Sustainable Land Management (SLM) practices	Trainings are conducted	Monthly	**Mitigation:** PMU, SME **Monitoring:** SME, NESREA (state), ASEPA	**2,000**
	Noise	Increase of road users on Uzuakoli Road	Noise nuisance to local residents	Air sampling and monitoring	-	One-off	**Monitoring:** SME, NESREA (state), ASEPA	**500**
	Water Quality	Roadway runoff	Potential surface water pollution	Water sampling and monitoring	Compliance	Bi-Annual	**Monitoring:** SME, NESREA (state), ASEPA	**1,000**
	Waste	Waste generation	Social and health concerns arising due to poor waste management practices Blocked drainage due to poor waste disposal	Dispose waste streams through the municipal waste management system in the project area. Flooding on roads	Proper waste management	Monthly	**Monitoring:** SME, ASEPA	**700**
Environment	**Others**	Negligence of rehabilitated Amuzukwu gully erosion site	Negligence of rehabilitated Amuzukwu gully erosion site	Regular maintenance and dredging of sediments in drainage channels and chute	PMU Compliance	Monthly Weekly Monthly	PMU	**700**

Component	Sub-component	Activities	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring Frequency	Institutional Responsibility	Costs (USD)
Social	**Employment**	Closure of civil works	Loss of employment	Inform personnel that employment is short-term prior to their engagement.	Proper engagement of service documentation	One-off	Contractors **Monitoring:** PMU	**200**
	Health	Operation of rehabilitated gully site	Breeding site for disease vectors Possible spread of water borne diseases (Cholera, dysentery)	Regular Maintenance and Monitoring	Compliance		Independent consultant, PMU	**-**
		Increase in number of vehicles using roads	Increase in respiratory problems amongst local residents	Regular sampling and monitoring	Regular monitoring		**Monitoring:** NESREA, SMH	**-**
	Land use conflicts	Land use conflicts	Land use conflict	Control land use conflicts through Land use planning that should be participatory to designate areas for ecological, grazing and farming	Inspections are conducted		Contractors **Monitoring:** PMU	**300**
	Public safety	Rise in water above safe limit	Over flooding and risk to life and property	Regular monitoring and maintenance	Compliance	Daily	**Monitoring:** PMU, Independent Consultant	-
	Safety	Increase in number of road users	Increase in vehicular accidents				**Monitoring: FRSC**	-
Occupational Health and Safety	**Personnel safety**	Tasks implementation	Injuries, accidents, deaths	Implement on-site occupational health and safety management plan; Routine OHS training and education; Conduct routine JHA/PHA; Use of PPE; Establish electrical safety program; Implement fall	Independent Consultants, Contractors Compliance.	Monthly	SME, PMU	**4,000**

				protection program; fleet safety management program; Implement HazCom; Conduct hazard identification, control and analysis; Implement fire prevention program; Use material safety data sheets (MSDS); Implement hierarchy of controls procedure; Conduct OHSRA, Cost Benefit Analysis(CBA), Return on Investment (ROI)/pay-back period analysis				
								OPERATIONAL PHASE TOTAL – 9,400
TOTAL COST OF THE ESMP : (PRE-CONSTRUCTION+ CONSTRUCTION + OPERATION)- 81,600								

CHAPTER EIGHT STAKEHOLDERS ENGAGEMENT

8.1 Introduction

This chapter is presented in 2 sections. Section **A** provides a matrix table summary of various consultations held during the field survey for data gathering. Section B provides a summary of the major stakeholder consultation held at the Umueleghe Azuahia, Amuzukwu Village Square on 6th of March, 2014.

8.1.1 Section A: Summary of stakeholders consultation

This section highlights the stakeholders' consultation held at Amuzukwu village square. The essence of the consultation, among other things, is to inform the stakeholders about the project and get their concerns and inputs on the project. This meeting involved the SPCU, ESMP Consultant, Representatives of the Traditional ruling council, Youth association, Women association, and Site committee members. Table 19 shows a summary of the discussion with concerns raised and responses given during the meeting.

Table 19: Matrix table summary of consultation

Date	**5st January**
Name of Stakeholder	**Environmental Safeguards officer, Livelihood officer, Project Engineer, Project Account, Site Committee Secretary, Woman Leader. Chief P. Ekeleme, Sunday Nkemjika, Monday Okorie, Uzoranya Cordelia, Uchenna OInuobia, Ngbaraonye James, Uzoanya Peter, Mr. Ifeanyi Chukwu, Mrs. C Ugorji, Mr. Uche Onuobia, Mrs Jonah Okorie, Mrs. Chinyere Anyanwu,**
Language of Communication	English and Igbo
Introduction	A brief introduction on the project was made, stating the project objectives and its area of coverage. Stakeholders were provided information on the efforts and plan by the government and World Bank in solving the erosion problems within the state.
Response of Stakeholders about the project	The stakeholders appreciated and welcomed the initiative and informed that the project will help in creating better access road for the community. They were interested in knowing how soon this project will be implemented.
Concerns/ Complaints	The stakeholders stated that the Government should ensure that the project is realized and not just end in paper work and hear say.
Feedback to the Stakeholders	The stakeholders were assured that their concerns and recommendations will be imputed in the ESMP and in project planning.
Remarks/Recommendation	Generally stakeholders appreciate the development. The NEWMAP PMU will need to implement continuous social awareness programs prior to, during and after project implementation.

8.1.2 Section B: Major Public Consultation Exercise

8.1.2.1 Background and Objectives

The public consultation for the Environmental and Social Management Plan (ESMP) for the Rehabilitation of Amuzukwu Gully Erosion site was conducted on the 6th of March, 2014, following notification passed on to the Community Liaison Officer, Amuzukwu Township Secretary and other stakeholders through the Abia State NEWMAP Environmental and Social safeguards officers.

Figure 15 Stakeholders consultation

Figure 16 Cross-section of Stakeholders

The public consultation meeting was held at the Umueleghe village square in Amuzukwu. The consultation was conducted to ensure the effective participation and awareness of the Project Affected Person's (PAPs) and to document comments, suggestions and concerns raised with regards to the project and its sub-activities. The following were taken into full account:

1) The project will have foreseeable environmental and social impacts, especially on both the people and structures around the gully and on the "Right of Way" of the road.

2) The project aims at impacting more positively to the environment and social conditions, and will devise suitable, practicable mitigation measures through an ESMP to reduce or eliminate negative impacts.

3) That positive impact of sub-project activities will be enhanced.

4) The priority concerns raised by Project Affected Persons (PAPs) and other relevant stakeholders will be put into account and incorporated in project planning.

8.1.2.2 Objectives of the Public Consultation

- To create general public awareness and understanding of the project, and ensure its acceptance;

- To develop and maintain avenues of communication between the project proponent, stakeholders and PAPs in order to ensure that their views and concerns are incorporated into project design and implementation with the objectives of reducing, mitigating or offsetting negative impacts and enhancing benefits from the project;

- To inform and discuss about the nature and scale of adverse impacts and to identify and prioritize the mitigation measures for the impacts in a more transparent and direct manner;

- To document the concerns raised by stakeholders and PAPs so that their views and proposals are mainstreamed to formulate mitigation and benefit enhancement measures; and
- To sensitize other MDAs, local authorities, Non-governmental Organizations (NGOs) and Community Based Organizations (CBOs) about the project and solicit their views and discuss their share of responsibility for the smooth functioning of the overall project operations.

8.1.2.3 Stakeholders Identification

The Client and Consultant worked together to identify the key stakeholders that should be consulted at various stages of project implementation. This process was completed with the identification of project-affected areas, residents and relevant governmental stakeholders.

The identified stakeholders for consultations were selected as follows:

1. **Federal and State Government Organizations:** This level of stakeholders constituted staff and representatives from the NEWMAP, , MDAs, LGAs, agencies, Nigerian Police Force, Nigeria Security and Civil Defence Corps (NSCDC) management boards etc
2. **Civil Groups/Non-governmental Organizations:** This level comprised NGOs, community development commissions (CDCs), civil society groups etc.
3. **Private Organizations:** This cadre comprised of private establishments (e.g. Limited Liability Companies, corporations etc).
4. **Communities, Residents and Businesses**: This cadre comprised mainly of local residents, small and medium business owners likely to be directly impacted especially during civil works.

8.1.2.4 Consultation Method

A combination of various consultation methods were used to assess knowledge, perception and attitude of the groups consulted concerning the project, and its potential environmental and social impacts.

Major Points of the Consultation

Key agenda points included:

1. Introduction of Stakeholders
2. Opening Remarks by NEWMAP
3. Overview of The ESMP and Public Consultation by Consultant
4. Questions, Comments and Remarks by other stakeholders
5. Closing Remark

Discussion during the consultation

Meeting commenced by 11:05am with an opening prayer said by the site committee chairman Chief I.C. Ekeleme.

The Environmental officer for Abia State PMU NEWMAP office then addressed the community and expressed displeasure at the low turnout. She hinted that they had already done a tour of the community with the consultant and were now going to entertain questions from the community and question the community also. She then introduced the Consultant to the community.

The Consultant after formal introduction, pointed out that the end factor or effects of any projects on a community was very important and hence the need for the Environmental and Social Management Plan (ESMP).

Consultant then went into an interactive session with the community: If the community needs the project? Mrs. B.O. Ngbaronye said it was most important since the community has lost quite a lot of properties and lives due to the erosion. The consultant asked for major cause of the erosion and the activities going on in the area before the erosion started. Chief I.C. Ekeleme explained that development and poor drainage to be major cause of the erosion. He further stated that the area housed a market, slaughterhouse, *Garri* processing industry, Age grade hall, residential buildings were situated in that area which are presently lost to the erosion. The consultant went further to enquire about land tenure system in the area especially the affected. They also stated that most of the affected individuals who are non-indigenes have relocated but stated that the indigenes are worst affected since they have nowhere else to relocate to.

The community made know their effort in controlling the erosion by building embankments with sand bags, planted bamboo trees at the site and stopped all sand dredging activities in the area to help check the erosion. They explained that most people built up their entire land with no space or consideration for drains to be built later. Presently, the residents use the erosion site as dumpsite for waste as seen in fig…..The community also has been appealing to the government for help before the situation deteriorates.

Figure 17 Bamboo planted to mitigate erosion

Figure 18 Residents dumping refuse at erosion site

Consultant asked if community was making any arrangement to guarantee jobs from the contractor. The Environmental officer explained that it was part of the contract agreement that the contractor must source for labor from the community before out sourcing. On efforts made to stop indiscriminate refuse dumping; the community has done not much since they have no other alternative. They were advised to meet ASEPA on this issue so they can be issued with a refuse bin.

When asked for the number of death recorded due to the erosion, nobody was sure but the figure was put to about 4 or 5. The members of the community indicated that they have been denied from a lot of amenities, from access road to source of clean water, market, farmland, town halls, industries, some businesses etc.

They pointed out that the village was just a small portion of the main community and the erosion has cut off the community from the rest of the village.

Consultant enquired about the diseases prevalent in the area and basic amenities. It was indicated that the most common was malaria, typhoid, common colds and some cases of asthma. Electricity was said to be very epileptic and most common type of toilet in the area is the pit latrine in the community however most people use W/C while others defecate in the Bush.

CONCLUSION/RECOMMENDATIONS

They community took the project as a good development. They anticipate the project commencing as soon as possible as it will go a long way in alleviating some of their predicaments especially as regards uniting them with the other part of their community that has been shutoff due to the erosion. They were also of the opinion that their people be carried along during the civil works as it will give jobs to their unemployed youths.

They were assured that all their concerns will be taken into consideration during the project planning and further consultations will be going on as the project progresses. We recommend that the consultation process continue and the youths be carried along when the project commences.

References

Environmental and Social Management Framework for the Nigeria Erosion and Watershed Management Project

Resettlement Action Plan for the Nigeria Erosion and Watershed Management Project

Engineering for the Amuzukwu Gully Erosion Site

Project Implementation Manual for the Nigeria Erosion and Watershed Management Project

World Bank Environmental Safeguards Document

NIMET Meteorological Datasheet

NPC Census and Population Document

ANNEXES

Annex 1: Stakeholder Attendance List and Minutes of Stakeholders Consultation

Hospiatlia Consultaire Ltd

Attendance for Stakeholders Consultation for ESMP [redacted] for the Amuzukwu Gully Erosion Site (NEWMAP)

Location....Amuzukwu.........

Date 06/03/2014.......

Time.........11:05am............

S/N	Name	Group/Association	Phone Number	Signature
1	Chief Philip C. Ekeleme	C A	08056943572	[illegible]
2	Mr Elijah Ekeleme	C A		
3	Sunday Nkemjika	C A	08083815205	Sunday [illegible]
4	Mr Monday Okorie	C A	07044871023	M.O
5	Mr Jona Aduele	Member Community	07066778370	[illegible]
6	Ifenyichi Akandu	Chairman Youth	08038593603	[illegible]
7	Akandu Jacobson	Member	08067583619	[illegible]
8	Shedrack Ikwelchi	"	07038348561	[illegible]
9	Azubuike Ekeleme	"	07068795245	[illegible]
10	Chinyere Anyemnue	"	08098900787	[illegible]
11	Roseline Ugoziyi	"	~~[illegible]~~ 08064151068	
12	Ifeanyi Lazarus	"	0103682	9074
13	Uzoanya Emmanuel	Community member	08032477507	[illegible]
14	Ekeleme Ebere	S. A Community member	08142932807	[illegible]
15	Uzoanya Peter. D	Site Committee	03068758088	[illegible]
16	Ahamefule Ekeleme	Site Committee	08038298550	[illegible] Ekeleme
17	Nobaronye B.O (Mrs)	Site Comm.	08037706801	[illegible]
18	Chief I. C. Ekeleme	Site Com.	07030866256	[illegible]
19	Uzoanya Cordelia	Woman Leader	07036997415	[illegible]
20	Uchenna Onuoha	L member	08032662913	[illegible]
21	Nwayoiunde Odumku	Com member		[illegible]
22.	Arc. Nobaronye James.	Sec. Site Committee	08062300170	[illegible]
23	Kenneth Offoreagbu Mbaezue	Member	08037469961	[illegible]
24	Udochi Judi. Okorie	Member	08144851272	[illegible]
25	Mr Nnamdi Nkemjika	C A		N.N

Annex 2 Minutes of Stakeholders Consultation Held on the 6th of March, 2014 at Umueleghe Azuahia Community, in Amuzukwu

Opening

Meeting commenced by 11:05am with an opening prayer said by the site committee chairman Chief I.C. Ekeleme. In attendance were three representatives from the Abia State PMU NEWMAP, the Consultant developing the ESMP for the Amuzukwu Gully Erosion and members of the community (see attendance list ANNEX 1). Kola nut was offered to the representatives by the community head Chief Philip Ekeleme.

Opening Remarks and Overview

The Environmental officer for Abia State PMU NEWMAP office then addressed the community and expressed displeasure at the low turnout. She hinted that they had already done a tour of the community with the consultant and were now going to entertain questions from the community and question the community also. She then introduced the Consultant to the community.

The Consultant after formal introduction, pointed out that the end factor or effects of any projects on a community was very important and hence the need for the Environmental and Social Management Plan (ESMP). He asked all to be free and air their views since it would more of an interactive session than lectures.

Discussions, Questions and Comments

Consultant then went into an interactive session with the community:

- ✓ If the community needs the project? Mrs. B.O. Ngbaronye said it was most important since the community has lost quite a lot of properties and lives due to the erosion.
- ✓ The consultant asked for major cause of the erosion and the activities going on in the area before the erosion started. Chief I.C. Ekeleme explained that the erosion started a long time ago about 1965. He stated that the site was even visited by the then Head of State, General Olusegun Obasanjo. He further went on to state that farming, trading and water fetching were some activities on-going in the area. He attributed development and poor drainage to be major cause of the erosion. He further stated that the area housed a market, slaughterhouse, *Garri* processing industry, Age grade hall, residential buildings were situated in that area which are presently lost to the erosion. An even a village stream was located in the area too.
- ✓ The consultant went further to enquire about land tenure system in the area especially the affected part. Chief I.C. Ekeleme answered, explaining that the erosion started from the community land before spreading to some private properties owned by non-indigenes who bought from the community. Most of the affected individuals who are non-indigenes have relocated but stated that the indigenes are worst affected since they have nowhere else to relocate to.
- ✓ The community was asked the efforts made so far to check the erosion; the response was that the community built embankments, planted bamboo trees at the site and stopped all sand dredging activities in the area to help check the erosion.

- ✓ Also, the consultant asked if there has been any effort to stop wrong building practices. They explained that most people built up their entire land with no space or consideration for drains to be built later.
- ✓ The Consultant enquired if there has been any conflict in the community due to the erosion? The members stated that there has been none till the date. However, the community has been appealing to the government for help before the situation deteriorates.
- ✓ Consultant asked if community was making any arrangement to guarantee jobs from the contractor. The Environmental officer explained that it was part of the contract agreement that the contractor must source for labor from the community before out sourcing.
- ✓ On efforts made to stop indiscriminate refuse dumping; the community has done not much since they have no other alternative. They were advised to meet ASEPA on this issue so they can be issued with a refuse bin.
- ✓ When asked for the number of death recorded due to the erosion, nobody was sure but the figure was put to about 4 or 5.
- ✓ The community was asked if they were denied from any basic amenity as a result of the prevalence of the erosion. The members of the community indicated that they have been denied from a lot of amenities, from access road to source of clean water, market, farmland, town halls, industries, some businesses etc.
- ✓ When asked if there is any other society or group to help in the works of the site committee, the community stated that they have non at the moment except for the site committee which has been set up for the erosion project.
- ✓ They were also asked if the age grade system work in the community. Chief Ekeleme answered that it works but pointed out that the village was just a small portion of the main community and the erosion has cut off the community from the rest of the village.
- ✓ Consultant enquired about the diseases prevalent in the area; Mrs. Ngbaronye answered that most common was malaria, typhoid, common colds and some cases of asthma.
- ✓ The consultant enquired about some basic amenities within the community and was told that electricity is very epileptic and most common type of toilet in the area is the pit latrine in the community however most people use W/C while others defecate in the Bush.

The consultant at this point called out the affected persons present and told then to wait after the meeting for in-depth interview.

Closing

The meeting ended by 12:19pm with the consultant and site committee secretary proceeding to site for further field survey.

Annex 3: General Environmental Management Conditions for Construction Contracts

1. In addition to these general conditions, the Contractor shall comply with any specific Environmental and Social Management Plan (ESMP) for the works he is responsible for. The Contractor shall inform himself about such an ESMP, and prepare his work strategy and plan to fully take into account relevant provisions of that ESMP. If the Contractor fails to implement the approved ESMP after written instruction by the Supervising Engineer (SE) to fulfil his obligation within the requested time, the Owner reserves the right to arrange through the SE for execution of the missing action by a third party on account of the Contractor.

2. Notwithstanding the Contractor's obligation under the above clause, the Contractor shall implement all measures necessary to avoid undesirable adverse environmental and social impacts wherever possible, restore work sites to acceptable standards, and abide by any environmental performance requirements specified in an ESMP. In general these measures shall include but not be limited to:

a) Minimize the effect of dust on the surrounding environment resulting from earth mixing sites, asphalt mixing sites, dispersing coal ashes, vibrating equipment, temporary access roads, etc. to ensure safety, health and the protection of workers and communities living in the vicinity of dust producing activities.

b) Ensure that noise levels emanating from machinery, vehicles and noisy construction activities (e.g. excavation, blasting) are kept at a minimum for the safety, health and protection of workers within the vicinity of high noise levels and nearby communities.

c) Ensure that existing water flow regimes in rivers, streams and other natural or irrigation channels is maintained and/or re-established where they are disrupted due to works being carried out.

d) Prevent bitumen, oils, lubricants and waste water used or produced during the execution of works from entering into rivers, streams, irrigation channels and other natural water bodies/reservoirs, and also ensure that stagnant water in uncovered borrow pits is treated in the best way to avoid creating possible breeding grounds for mosquitoes.

e) Prevent and minimize the impacts of quarrying, earth borrowing, piling and building of temporary construction camps and access roads on the biophysical environment including protected areas and arable lands; local communities and their settlements. In as much as possible restore/rehabilitate all sites to acceptable standards.

f) Upon discovery of ancient heritage, relics or anything that might or believed to be of archaeological or historical importance during the execution of works, immediately report such findings to the SE so that the appropriate authorities may be expeditiously contacted for fulfilment of the measures aimed at protecting such historical or archaeological resources.

g) Discourage construction workers from engaging in the exploitation of natural resources such as hunting, fishing, and collection of forest products or any other activity that might have a negative impact on the social and economic welfare of the local communities.

h) Implement soil erosion control measures in order to avoid surface run off and prevents siltation, etc.

i) Ensure that garbage, sanitation and drinking water facilities are provided in construction worker scamps.

j) Ensure that, in as much as possible, local materials are used to avoid importation of foreign material and long distance transportation.

k) Ensure public safety, and meet traffic safety requirements for the operation of work to avoid accidents.

3. The Contractor shall indicate the period within which he/she shall maintain status on site after completion of civil works to ensure that significant adverse impacts arising from such works have been appropriately addressed.

4. The Contractor shall adhere to the proposed activity implementation schedule and the monitoring plan / strategy to ensure effective feedback of monitoring information to project management so that impact management can be implemented properly, and if necessary, adapt to changing and unforeseen conditions.

5. Besides the regular inspection of the sites by the Supervising Engineer for adherence to the contract conditions and specifications, the Owner may appoint an Inspector to oversee the compliance with these environmental conditions and any proposed mitigation measures. State environmental authorities may carry out similar inspection duties. In all cases, as directed by the SE, the Contractor shall comply with directives from such inspectors to implement measures required to ensure the adequacy rehabilitation measures carried out on the bio-physical environment and compensation for socio-economic disruption resulting from implementation of any works.

6. All vessels (drums, containers, bags, etc.) containing oil/fuel/surfacing materials and other hazardous chemicals shall be bonded in order to contain spillage. All waste containers, litter and any other waste generated during the construction shall be collected and disposed off at designated disposal sites in line with applicable government waste management regulations.

7. All drainage and effluent from storage areas, workshops and camp sites shall be captured and treated before being discharged into the drainage system in line with applicable government water pollution control regulations.

8. Used oil from maintenance shall be collected and disposed off appropriately at designated sites or be reused or sold for re-use locally.

9. Entry of runoff to the site shall be restricted by constructing diversion channels or holding structures such as banks, drains, dams, etc. to reduce the potential of soil erosion and water pollution.

10. Construction waste shall not be left in stockpiles along the road, but removed and reused or disposed of on a daily basis.

11. If disposal sites for clean spoil are necessary, they shall be located in areas, approved by the SE, of low land use value and where they will not result in material being easily washed into drainage channels. Whenever possible, spoil materials should be placed in low-lying areas and should be compacted and planted with species indigenous to the locality.

12. The Contractor shall obtain appropriate licenses/permits from relevant authorities to operate quarries or borrow areas.

13. The location of quarries and borrow areas shall be subject to approval by relevant local and national authorities, including traditional authorities if the land on which the quarry or borrow areas fall in traditional land.

14. New extraction sites:

a) Shall not be located in the vicinity of settlement areas, cultural sites, wetlands or any other valued ecosystem component, or on high or steep ground or in areas of high scenic value, and shall not be located less than 1km from such areas.

b) Shall not be located adjacent to stream channels wherever possible to avoid siltation of river channels.

c) Where they are located near water sources, borrow pits and perimeter drains shall surround quarry sites.

d) Shall not be located in archaeological areas. Excavations in the vicinity of such areas shall proceed with great care and shall be done in the presence of government authorities having a mandate for their protection.

e) Shall not be located in forest reserves. However, where there are no other alternatives, permission shall be obtained from the appropriate authorities and an environmental impact study shall be conducted.

f) Shall be easily rehabilitated. Areas with minimal vegetation cover such as flat and bare ground, or areas covered with grass only or covered with shrubs less than 1.5m in height, are preferred.

g) Shall have clearly demarcated and marked boundaries to minimize vegetation clearing.

15. Vegetation clearing shall be restricted to the area required for safe operation of construction work. Vegetation clearing shall not be done more than two months in advance of operations.

16. Stockpile areas shall be located in areas where trees can act as buffers to prevent dust pollution. Perimeter drains shall be built around stockpile areas. Sediment and other pollutant traps shall be located at drainage exits from workings.

17. The Contractor shall deposit any excess material in accordance with the principles of these general conditions, and any applicable ESMP, in areas approved by local authorities and/or the SE.

18. Areas for depositing hazardous materials such as contaminated liquid and solid materials shall be approved by the SE and appropriate local and/or national authorities before the

commencement of work. Use of existing, approved sites shall be preferred over the establishment of new sites.

19. To the extent practicable, the Contractor shall rehabilitate the site progressively so that the rate of rehabilitation is similar to the rate of construction.

20. Always remove and retain topsoil for subsequent rehabilitation. Soils shall not be stripped when they are wet as this can lead to soil compaction and loss of structure.

21. Topsoil shall not be stored in large heaps. Low mounds of no more than 1 to 2m high are recommended.

22. Re-vegetate stockpiles to protect the soil from erosion, discourage weeds and maintain an active population of beneficial soil microbes.

23. Locate stockpiles where they will not be disturbed by future construction activities.

24. To the extent practicable, reinstate natural drainage patterns where they have been altered or impaired.

25. Remove toxic materials and dispose of them in designated sites. Backfill excavated areas with soils or overburden that is free of foreign material that could pollute groundwater and soil.

26. Identify potentially toxic overburden and screen with suitable material to prevent mobilization of toxins.

27. Ensure reshaped land is formed so as to be inherently stable, adequately drained and suitable for the desired long-term land use, and allow natural regeneration of vegetation.

28. Minimize the long-term visual impact by creating landforms that are compatible with the adjacent landscape.

29. Minimize erosion by wind and water both during and after the process of reinstatement.

30. Compacted surfaces shall be deep ripped to relieve compaction unless subsurface conditions dictate otherwise.

31. Re-vegetate with plant species that will control erosion, provide vegetative diversity and, through succession, contribute to a resilient ecosystem. The choice of plant species for rehabilitation shall be done in consultation with local research institutions, forest department and the local people.

Water Resources Management

32. The Contractor shall at all costs avoid conflicting with water demands of local communities.

33. Abstraction of both surface and underground water shall only be done with the consultation of the local community and after obtaining a permit from the relevant Water Authority.

34. Abstraction of water from wetlands shall be avoided. Where necessary, authority has to be obtained from relevant authorities.

35. Temporary damming of streams and rivers shall be done in such a way avoids disrupting water supplies to communities downstream, and maintains the ecological balance of the river system.

36. No construction water containing spoils or site effluent, especially cement and oil, shall be allowed to flow into natural water drainage courses.

37. Wash water from washing out of equipment shall not be discharged into water courses or road drains.

38. Site spoils and temporary stockpiles shall be located away from the drainage system, and surface run off shall be directed away from stockpiles to prevent erosion.

39. Location of access roads/detours shall be done in consultation with the local community especially in important or sensitive environments. Access roads shall not traverse wetland areas.

40. Upon the completion of civil works, all access roads shall be ripped and rehabilitated.

41. Access roads shall be sprinkled with water at least five times a day in settled areas, and three times in unsettled areas, to suppress dust emissions.

42. Blasting activities shall not take place less than 2km from settlement areas, cultural sites, or wetlands without the permission of the SE.

43. Blasting activities shall be done during working hours, and local communities shall be consulted on the proposed blasting times.

44. Noise levels reaching the communities from blasting activities shall not exceed 90 decibels.

45. Unusable materials and construction elements such as electro-mechanical equipment, pipes, accessories and demolished structures will be disposed of in a manner approved by the SE. The Contractor has to agree with the SE which elements are to be surrendered to the Client's premises, which will be recycled or reused, and which will be disposed of at approved landfill sites.

46. As far as possible, abandoned pipelines shall remain in place. Where for any reason no alternative alignment for the new pipeline is possible, the old pipes shall be safely removed and stored at a safe place to be agreed upon with the SE and the local authorities concerned.

47. AC-pipes as well as broken parts thereof have to be treated as hazardous material and disposed of as specified above.

48. Unsuitable and demolished elements shall be dismantled to a size fitting on ordinary trucks for transport.

49. In advance of the construction work, the Contractor shall mount an awareness and hygiene campaign. Workers and local residents shall be sensitized on health risks particularly of AIDS.

50. Adequate road signs to warn pedestrians and motorists of construction activities, diversions, etc. shall be provided at appropriate points.

51. Construction vehicles shall not exceed maximum speed limit of 40km per hour.

52. Should the Contractor, deliberately or accidentally, damage private property, he shall repair the property to the owner's satisfaction and at his own cost. For each repair, the Contractor shall obtain from the owner a certificate that the damage has been made good satisfactorily in order to indemnify the Client from subsequent claims.

53. In cases where compensation for inconveniences, damage of crops etc. are claimed by the owner, the Client has to be informed by the Contractor through the SE. This compensation is in general settled under the responsibility of the Client before signing the Contract. In unforeseeable cases, the respective administrative entities of the Client will take care of compensation.

54. Within 6 weeks of signing the Contract, the Contractor shall prepare an EHS-MP to ensure the adequate management of the health, safety, environmental and social aspects of the works, including implementation of the requirements of these general conditions and any specific requirements of an EMP for the works.

The Contractor's EHS-MP will serve two main purposes:

- For the Contractor, for internal purposes, to ensure that all measures are in place for adequate HSE management, and as an operational manual for his staff.
- For the Client, supported where necessary by a SE, to ensure that the Contractor is fully prepared for the adequate management of the HSE aspects of the project, and as a basis for monitoring of the Contractor's HSE performance.

55. The Contractor's EHS-MP shall provide at least:

- A description of procedures and methods for complying with these general environmental management conditions, and any specific conditions specified in an EMP;
- A description of specific mitigation measures that will be implemented in order to minimize adverse impacts;
- A description of all planned monitoring activities (e.g. sediment discharges from borrow areas) and the reporting thereof; and
- The internal organizational, management and reporting mechanisms put in place for such.

56. The Contractor's EHS-MP will be reviewed and approved by the Client before start of the works. This review should demonstrate if the Contractor's EHS-MP covers all of the identified impacts, and has defined appropriate measures to counteract any potential impacts.

57. The Contractor shall prepare bi-weekly progress reports to the SE on compliance with these general conditions, the project EMP if any, and his own EHS-MP. An example format for a Contractor HSE report is given below. It is expected that the Contractor's reports will include information on:

- HSE management actions/measures taken, including approvals sought from local or national authorities;

- Problems encountered in relation to HSE aspects (incidents, including delays, cost consequences, etc. as a result thereof);
- Lack of compliance with contract requirements on the part of the Contractor;
- Changes of assumptions, conditions, measures, designs and actual works in relation to HSE aspects; and
- Observations, concerns raised and/or decisions taken with regard to HSE management during site meetings.

58. It is advisable that reporting of significant HSE incidents be done "as soon as practicable". Such incident reporting shall therefore be done individually. Also, it is advisable that the Contractor keeps his own records on health, safety and welfare of persons, and damage to property. It is advisable to include such records, as well as copies of incident reports, as appendices to the bi-weekly reports. Example formats for an incident notification and detailed report are given below. Details of HSE performance will be reported to the Client through the SE's reports to the Client

59. The Contractor shall provide sufficient training to his own personnel to ensure that they are all aware of the relevant aspects of these general conditions, any project EMP, and his own EHS-MP, and are able to fulfill their expected roles and functions. Specific training should be provided to those employees that have particular responsibilities associated with the implementation of the EHS-MP.

General topics should be:

- Occupational Health and Safety Basics
- Occupational Health and Safety in water supply pipeline installation
- Safety Practices in Borehole installation and Aquifer Abstraction
- Electrical Safety Basics
- Hazard Identification and Control
- Hazard Communication Program
- Accident Investigation
- Asbestos Management
- Safe work Procedures
- Fall Protection
- Noise Management Program
- Workers Respiratory Program
- Work place Violence Management
- Fire Safety
- Emergency Management; and
- Social and cultural awareness

60. It is expected that compliance with these conditions is already part of standard good workmanship and state of the art as generally required under this Contract. The item "Compliance with Environmental Management Conditions" in the Bill of Quantities covers these costs. No other payments will be made to the Contractor for compliance with any request to avoid and/or mitigate an avoidable HSE impact.

Example Format: HSE Report

Contract:

Period of reporting:

HSE management actions/measures:

Summarize HSE management actions/measures taken during period of reporting, including planning and management activities (e.g. risk and impact assessments), HSE training, specific design and work measures taken, etc.

HSE incidents:

Report on any problems encountered in relation to HSE aspects, including its consequences (delays, costs) and corrective measures taken. Include relevant incident reports.

HSE compliance:

Report on compliance with Contract HSE conditions, including any cases of non-compliance.

Changes:

Report on any changes of assumptions, conditions, measures, designs and actual works in relation to HSE aspects.

Concerns and observations:

Report on any observations, concerns raised and/or decisions taken with regard to HSE management during site meetings and visits.

Signature (Name, Title Date):

Contractor's Representative

Example Format: HSE Incident Notification

Provide within 24 hrs to the Supervising Engineer

Originators Reference No:

Date of Incident: Time:

Location of incident:

Name of Person(s) involved:

Employing Company:

Type of Incident:

Description of Incident:

Where, when, what, how, who, operation in progress at the time (only factual)

Immediate Action:

Immediate remedial action and actions taken to prevent reoccurrence or escalation

Signature (Name, Title, Date):

Contractor's Representative

Annex4: Socio-Economic Data Gathering Sheet for the ESMP For Amuzukwu Gully Erosion Site in Umuahia, Abia State Under The Nigeria Erosion and Watershed Management Project (NEWMAP)

QUESTIONNIARE

SOCIO-ECONOMIC DATA GATHERING SHEET FOR THE ESMP FOR AMUZUKWU GULLY EROSION SITE IN UMUAHIA, ABIA STATE UNDER THE Nigeria Erosion and Watershed Management Project (NEWMAP)

IDENTIFICATION

- Serial Number.....
- Questionnaire administration from point of entry (a) Left side……. (b) Right side……
- Landmark(s) at point of entry ……..
- Location of Interview: ……..
- Name and Signature of Interviewer: …….
- Date: ……
- Time Interview Started: …… Time Ended: ……..

SOCIOECONOMIC ATTRIBUTES

Households

- Name of Household Head (HH) ……
- Name of Respondent …….
- Relationship of Respondent to Household Head ***(Please Tick One)***
  (a)Wife of HH (b) Son of HH (c) Daughter of HH (d) Father of HH (e) Mother of HH (f) Brother of HH (g) Sister of HH (b) Others Specify……..
- House Address …….
- Sex **(M)**…… **(F)**…….
- Age ……
- Religion (Christian)…… (Islam)…… (Traditional)…… (Others)….. ***(Please Tick One)***
- Marital Status (Single)…. (Married)…. (Divorced)…. (Widow/Widower)…. ***(Please Tick One)***
- Number of wives …….
- How long have you lived in this community ……
- How many persons live in your Household (i.e. Eat from the same pot)……
- How many persons in your house hold fall into the following age categories?

CARTEGORIES	MALE	FEMALE	TOTAL
0-4yrs			
5-9yrs			
10-14yrs			
15-19yrs			
20-24yrs			
25-29yrs			
30-34yrs			
35-39yrs			
40-44yrs			
50-54yrs			
45-49yrs			
50-54yrs			
55-59yrs			
60-64yrs			
65-above			
TOTAL			

- What is your highest educational qualification?
  - (i)FSLC … (ii)WASC/SSCE … (iii)TCII/OND …. (iv)HND/Degree … (v)MSc/PhD … (vii) Islamic studies….. (vii)None..... ***(Please Tick One)***

- How many members of your household/Business fall under the following educational categories?

CARTEGORIES	MALE	FEMALE	TOTAL
Primary School (attempted/still attending)			
Primary School-Completed (Living Certificate)			
Secondary School (attempted/still attending)			
Secondary School-Completed			

(O'Levels)			
Tertiary Institution (attempted/ still attending)			
Tertiary Institution (Completed)			
Islamic Studies			
TOTAL			

- What is your Occupation (*indicate the category you belong to and the level/profession*):

Categories	**Public Sector Employee**	**Private Sector Employee**	**Self Employed**	**Student**
Senior Mgt Staff				
Middle level Staff				
Junior Staff				
Professional				
Artisan				
Businessman				
Part time				
Others				

- How many employed members of your household/Business/School are engaged in occupation listed below?

CATEGORIES	**MALE**	**FEMALE**	**TOTAL**
Farming			
Fishing			
Mining			
Hunting			
Crafting			
Trading			

Civil Service			
Company Employment			
Self-Employment			
House Wife			
Others(Specify)			
TOTAL			

- What is your Annual Income? (i)₦0 –50,000…… (ii)₦51, 000- 100,000……. (iii)₦100,101- 500,000…… (iv)₦500,000 and above…… ***If Not Known***, what is your Monthly income…….***OR***Daily income…….

- Estimate the monthly/annual income of other members of your Household/Business/School (i) ₦0 – 50,000…… (ii)₦51, 000- 100,000…… (iii)₦100,101- 500,000… (iv)₦500,000 and above…….

AVAILABILITY OF AMENITIES

- How would you describe the condition of the following amenities in town you live/community?

Amenities	**Excellent**	**Very Good**	**Good**	**Fair**	**Poor**
Roads to the community					
Roads within the community					
Schools in the community					
Public Health Institutions					
Potable Water					
Public Electricity					
Communication facilities (Postal Service, Telephone)					
Public recreation facilities					

- What is the major source of water available to your household? ***(Please Tick One)***(i)River..... (ii)Borehole (commercial)…….. (iii)Borehole (private)…… (iv)Public pipe-borne water …… (v)Pond …… (vi)Water Vendor…… (vii)Well water……

- If a public pipe borne water, how regular does the tap flow in a week? ***(Please Tick One)***
  (i)Regularly ---------- (ii) Occasionally …..... (iii) Rarely ……

- How long does it take you in minutes/hours to get to your water source ……

- What is the primary source of electricity/ light to your community? ***(Please Tick One)***
  (i)Hurricane Lamp …… (ii) Private Generators…….. (iii)Community Generators…… (iv)State Government Utilities Board…… (v)Company Operating in your community……. (vi) PHCN (National Grid)……

- What is the secondary source of electricity? ***(Please Tick One)***
  (i)Hurricane Lamp …… (ii) Private Generators…. (iii)Community Generators…… (iv)Company Operating in your community……

- What is the main fuel you use for cooking? ***(Please Tick One)***
  (i)Firewood …… (ii)Charcoal…… (iii)Kerosene/ Oil …… (iv)Gas…… (v)Electricity …… (vi)Crop residue/ Saw dust…… (vii) Animal Wastes … (viii)Others.....

- What type of toilet facility do you use? ***(Please Tick One)***
  (i)Pit…… (ii) Bush…… (iii)Prier Head……iv) Bucket…… (v) Water Closet…… (vi)Others (Specify)……

- How do you dispose of your household refuse? ***(Please Tick one)***
  (i)Private Open Dump..... (ii) Public Open Dump..... (iii) Organized Collection..... (iv)Burning..... (v) Bush..... (vi)Burying.....

HEALTH

- Which of the following diseases/condition is most common in your area ***(Please Tick one)***

  (i)Malaria..... (ii)Typhoid..... (iii)Diarrhoea..... (iv)Cough…….. (v) Respiratory Disturbance……(vi)Others.....