



**SOKOTO STATE GOVERNMENT
NIGERIA EROSION AND WATERSHED MANAGEMENT
PROJECT (NEWMAP)**

FINAL REPORT

FOR:

**ENVIRONMENTAL AND SOCIAL MANAGEMENT
PLAN (ESMP)**

**STORMWATER MANAGEMENT WORKS FOR TUDUN
WADA/MABERA IN SOKOTO STATE, NIGERIA.**



July 2020

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ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN (ESMP)

FOR

**STORMWATER MANAGEMENT WORKS FOR TUDUN
WADA/MABERA IN SOKOTO STATE**

Credit No.: IDA51050

Project ID: P124905

Submitted To:

State Project Management Unit
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July 2020

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Table of Contents

ESMP PREPARERS	3
LIST OF TABLES	8
LIST OF FIGURES	9
LIST OF ACRONYMS	10
EXECUTIVE SUMMARY	11
CHAPTER 1: INTRODUCTION	30
1.1 Background	30
1.3 Description of Proposed Intervention	31
1.3.1 Project Description	31
1.3.2 Project Area Terrain Features:	34
1.4 Rationale for NEWMAP Intervention	37
1.5 Rationale for ESMP	37
1.6 Objective and Scope of the Consultancy Services	38
1.7 Approach and Methodology	38
1.8 Phases of Intervention Works:	39
1.8.1 Pre-construction Phase	39
1.8.2 Construction Phase	39
1.8.3 Post-Construction (Operations & Maintenance) Phase	40
1.9. Summary of the Structure of the ESMP Report	40
CHAPTER 2: INSTITUTIONAL AND LEGAL FRAMEWORK	41
2.1 World Bank Environmental and Social Safeguard Policies	41
2.1.1 Triggered WB Safeguard Policies	41
2.1.2 Environmental Assessment (EA) (OP 4.01):	42
2.1.3 Physical Cultural Resources (OP 4.11):	42
2.1.4 Involuntary Resettlement (OP 4.12):	42
2.2 Federal Policy, Legal, Regulatory and Administrative Frameworks	43
2.2.1 National Policy on Environment	43
2.2.2 National Environmental Impact Assessment Act 1992:	43
2.2.3 Nigerian Land Use Matters	43
2.2.4 National Erosion and Flood Control Policy 2005:	44
2.2.5 NESREA Establishment Act, 2007.	44
2.2.6 National Guidelines and Standards for Environmental Pollution (March, 2001):	44
2.2.7 National Waste Management Regulations of 1991	44
2.2.8 Approved National Forestry Policy 2006	44
2.3 Other Relevant Acts and Legislations at Federal Level	45
2.3.1 The Basel Convention on the Control of Transboundary Movement of Hazardous Waste and Disposal, 1989	45
2.3.2 UN Framework Convention on Climate Change – Kyoto Protocol (1992)	45
2.3.3 Agenda 21 - UN Conference on Environment and Development	45
2.3.4 Public Health Legislations and regulations	46
2.3.5 WHO Health and Safety Component of EIA, 1987	46
2.3.6 Convention on Conservation of Migratory Species of Wild Animals, Bonn, 1979	46
2.3.7 United Nations Guiding Principle on the Human Environmental	46
2.3.8 The Rio Declaration on Environmental and Development	46
2.4 State Legislations	47

2.4.1 Sokoto State Waste Management Act _____	47
2.5 Gaps between Nigerian Legislation and World Bank Policies _____	47
CHAPTER 3: DESCRIPTION OF ENVIRONMENTAL BASELINE CONDITIONS _____	49
3.1 Introduction _____	49
3.1.1 General Conditions _____	49
3.2 Baseline Environmental Setting _____	49
3.2.1 Climate _____	49
3.2.2 Geology and Hydrology _____	50
3.2.3 Soil Types _____	51
3.2.4 Biodiversity _____	52
3.2.5 General Geomorphology _____	56
3.2.6 Archaeology and Cultural Heritage: _____	57
3.2.7 Traffic and Transport Infrastructure: _____	57
3.2.8 Waste Management: _____	57
3.3 Site-Specific Baseline Environmental Setting _____	57
3.3.1 Tudun Wada/Mabera Communities Baseline Setting _____	57
3.3.2 Evaluation of Baseline Analytical Results _____	62
CHAPTER 4: SOCIOECONOMIC CHARACTERISTICS AND CONSULTATION WITH STAKEHOLDERS _____	64
4.1 Description of Socioeconomic Environment _____	64
4.1.1 Introduction: _____	64
4.1.2 Socioeconomic Study _____	64
4.1.3 Public/Stakeholder Consultation: _____	65
4.1.4 Use of Maps and GIS: _____	65
4.2 Description of Cultural Environment _____	66
4.2.1 Population _____	66
4.2.2 Ethnic Groups _____	66
4.2.3 Religion _____	66
4.3 Land Use Pattern _____	66
4.3.1 Cultural Resources _____	67
4.4 Analysis of Socioeconomic Survey _____	67
4.4.1 Objectives of the Socioeconomic Survey _____	67
4.5 Specific Mabera Socioeconomic Surveys _____	68
4.5.1 Respondent and Household Distribution in Project Area _____	68
4.5.2 Gender, Age and Household Size Distribution _____	68
4.6 Public/Stakeholders' Consultation and Participation _____	71
4.6.1 Community Participation _____	71
4.6.2 Objectives of the Community Consultations _____	71
4.6.3 Public Consultation Methodology _____	72
4.6.4 Stakeholders' Identification _____	72
4.6.5 Community Meetings _____	73
4.6.6 Participants' Feedback – Comments and Concerns _____	74
CHAPTER 5: ASSESSMENT OF POTENTIAL IMPACTS AND ANALYSIS OF ALTERNATIVES _____	76
5.1 Introduction _____	76
5.2 Analysis of Potential Impacts Triggered by Mabera Project _____	78
5.3 Potential Impacts Significance Rating for Mabera Project _____	80
5.4 Identified Social and Environmental Impacts _____	81

5.5 Analysis of Alternatives	82
CHAPTER 6: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)	84
6.1 Mitigation Measures for Implementation	84
6.2 Environmental and Social Impact Mitigation Measures	85
6.3 Institutional Responsibilities and Accountabilities	94
6.4 Capacity of Sokoto NEWMAP to Implement the ESMPs	96
6.4.1 Capacity and Training Needs	96
6.4.2 Capacity Building Cost	97
6.5 E&S Obligations of the Construction Contractors	98
6.6 Required Environmental and Social Management Plans	98
6.6.1 Resettlement Action Plan	98
6.6.2 Public/Stakeholder Consultation Plan	99
6.6.3 Chance Finds/Cultural Heritage Management Plan (CHMP)	99
6.6.4 Occupational/Public Health, Safety and Security Management Plan	100
6.6.5 Gender Based Violence/Sexual Exploitation and Abuse Management Plan	101
6.6.6 Vegetation Clearing and Biomass Management Plan	101
6.6.7 Air Quality Management Plan	102
6.6.8 Emergency Response and Incident Plan	102
6.6.9 Water Management Plan	102
6.6.10 Erosion and Sedimentation Management Plan	103
6.6.11 Traffic and Vehicle Management Plan	103
6.6.12 Waste Management Plan	104
6.6.13 Chemical Management Plan	104
6.7 ESMP Monitoring and Evaluation	105
6.7.1 Monitoring and Reporting	105
6.7.2 Post Construction Monitoring	105
6.8 Grievance Mechanism and Procedures	105
6.8.1 Formation of Grievance Redress Committee (GRC)	106
6.8.2 Training of the Grievance Redress Committees	108
6.9 ESMP Management Costs	115
6.10 Budget to Implement ESMP	116
6.11 ESMP Implementation Schedule	117
CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS	119
7.1 Conclusions	119
7.2 Recommendations	119
CHAPTER 8: DECOMMISSIONING/ABANDONEMENT	121
REFERENCES	126
ANNEXURES	128
ANNEXURE I: List of Contacted Stakeholders	129
ANNEXURE II: Template of Socioeconomic/Census Data Forms	130
ANNEXURE III: Summary of Applicable World Bank Safeguard Policies	132
ANNEXURE IV: General Environmental Management Conditions For Construction Contracts/Civil Works.	134
ANNEXURE V: Minutes & Photos of Meetings with Tudun Wada/Mabera Project Communities	137

Minutes of Consultant Meeting with Maber District Head _____	137
Attendees to the Consultant Meeting with Maber District Head _____	140
Photos of Meeting with Tudun Wada/Maber District Heads _____	144
Minutes of Meetings with Tudun Wada/Maber Communities _____	146
Attendees to the Meetings with Tudun Wada/Maber Communities _____	149
Attendees to the FGD Meetings with Tudun Wada/Maber Community (Men) _____	159
Attendees to the FGD Meetings with Tudun Wada/Maber Community (Women) _____	160
Attendees to the FGD Meetings with Tudun Wada/Maber Community (Youths) _____	162
Photos of Meetings with Tudun Wada/Maber Communities _____	163
Photos of Tudun Wada/Maber Project Site Areas _____	167
ANNEXURE VI: Mapping of Sampling Locations & Coordinates Across the Maber Site _____	172
ANNEXURE VII: Study Sampling Methods and Locations _____	174
ANNEXURE VIII: Baseline Noise Readings and Sampling Locations _____	176
ANNEXURE IX: Complete Plant Listing from Vegetative Study _____	177
ANNEXURE X: Laboratory Analytical Results (Tudun Wada/Maber Project Site) _____	178
ANNEXURE XI: Summary of key ESHS Requirements for Procurement _____	187
ANNEXURE XII: Quick Brief on ESHS _____	191
ANNEXURE XIII: Construction Daily Monitoring Checklist _____	195
ANNEXURE XIV: Discussion Of Methods/Techniques Used In Assessing Impacts _____	199

LIST OF TABLES

LIST OF TABLES

Table	Page
1.1 Mabera Project Areas - Activity Descriptions	18
1.2 Dimensions of the Proposed Tudun Wada/Mabera Drainage Works	22
2.1 Triggered Safeguard Policies	26
2.2 Gaps between Nigeria Legislation and WB Policies	32
3.1 Listing of Prominent and Indicator Plant Species Found at Tudun Wada/Mabera Project Area	37
3.2 Major Cultivated/Agronomic Species at Tudun Wada/Mabera Project Site	39
3.3 Animal and Livestock Species at Tudun Wada/Mabera Site	40
3.4 Sampling Locations and Coordinates along the Drainage Corridor	43
3.5 Baseline Soil Quality Analysis for Tudun Wada/Mabera Site	43
3.6 Baseline Groundwater Quality Analysis for Tudun Wada/Mabera Site	45
3.7 Baseline Air Quality Analysis for Tudun Wada/Mabera Site	46
3.8 Tudun Wada/Mabera Project Site Noise Readings	46
3.9 Tudun Wada/Mabera Project Site Particulate Matter Readings	47
4.1 Schedule of Community/Stakeholder Meetings and Socioeconomic Documentation	50
4.2 Identified Stakeholder Groups	58
4.3 List of Stakeholders and Their Responsibilities	59
5.1 Summary of Potential Impact Areas Triggered by Project	64
5.2 Significance Ratings for Mabera Project Impact Areas	66
6.1 Summary of Impacts and Mitigation Measures for Mabera Project	70
6.2 Institutional Responsibilities	79
6.3 Summary of Institutional Capacity and Training Needs with Costs	82
6.4 Summary of Stakeholder Consultation Plan	84
6.5 E&S Impact Mitigation and Monitoring Plan for Tudun Wada/Mabera Stormwater Drainage Project	94
6.6 Summary of Monitoring Cost by Project Site and Activity Area	100
6.7 ESMP Management Costs	100
6.8 Breakdown of Cost Estimates	101
6.9 Proposed ESMP Implementation Schedule	103

LIST OF FIGURES

LIST OF FIGURES

Figure	Page
1.1 Map of Nigeria showing Sokoto State	17
1.2 Map of Sokoto State Showing LGAs & Project Locations	17
1.3 General Satellite View of Tudun Wada/Mabera Project Areas	19
1.4 Tudun Wada/Mabera Project Areas Showing Proposed Drainage Corridors	20
1.5 Mabera Drainage System Layout	23
3.1 Temperature and Rainfall Distribution in Project Areas	35
3.2 Geology of Sokoto State	36
4.1 Gender Distribution of Mabera Households	53
4.2 Age Distribution of Mabera Households	53
4.3 Household Size Distribution for Mabera	53
4.4 Marital Status of Mabera Households	54
4.5 Educational Distribution of Mabera Households	54
4.6 Occupational Distribution of Mabera Households	55
4.7 Monthly Income Distribution of Mabera Households	55
5.1 Standard Flowchart for a Systematic Approach to Impact Assessment	61
6.1 Grievance Redress Procedure	91

LIST OF ACRONYMS

ARAP	Abbreviated Resettlement Action Plan
CBO	Community Based Organization
CIP	Community Involvement Program
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
FBO	Faith-Based Organization
FGD	Focused Group Discussion
FGN	Federal Government of Nigeria
FME _{env}	Federal Ministry of Environment
GEF	Global Environmental Fund
GIS	Geographic Information System
GRASS	Gully Rapid Action and Slope Stabilization
GPS	Global Positioning System
GRRM	Grievance Referral and Redress Mechanism
SKS-NEWMAP	Sokoto State Nigeria Erosion and Watershed Management Program
SKSG	Sokoto State Government of Nigeria
LGA	Local Government Area
MOE	Ministry of Environment
NEWMAP	Nigeria Erosion and Watershed Management Program
NGO	Non-governmental Organization
NRO	Natural Resources Officer
OP	Operation Procedure of the World Bank
OTG	OTG Enviroengineering Nigeria Limited
PAH	Project-Affected Household
PAP	Project-Affected Person
PC	Project Coordinator
PCC	Project Complaints Committee
PE	Project Engineer
PRS	Government's Poverty Reduction Strategy (PRS)
RAP	Resettlement Action Plan
SCCF	Special Climate Change Fund
SMLS	State Ministry of Lands and Survey
SPMU	State Project Management Unit
ToR	Terms of Reference
WB	World Bank

EXECUTIVE SUMMARY

Project Background

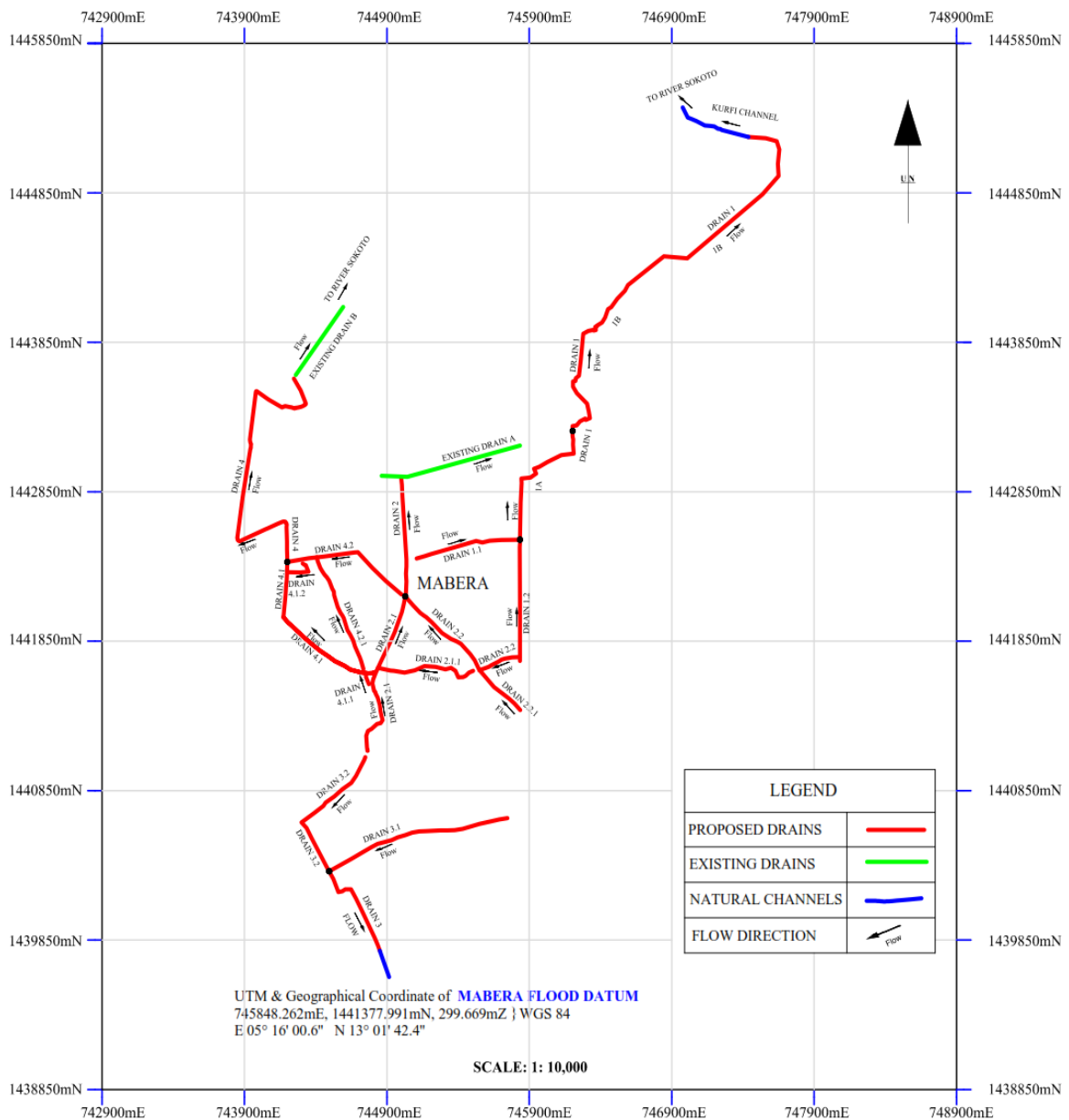
The Nigeria Erosion and Watershed Management Project (NEWMAP), initiated by the Federal Government of Nigeria (FGN) and funded by the World Bank (WB) and International Development Fund (IDF), is being implemented in Sokoto State, Nigeria and other participating states to help reduce flood and soil erosion vulnerability in the States and to develop the States' watersheds. Tudun Wada/Mabera are part of the many towns in Sokoto State whose communities are perennially devastated by floods and soil erosion resulting from stormwater flow. The flood and soil erosion occurring in these communities have caused major property losses to residents and remain a serious threat to lives in the communities. The non-existence of stormwater drainage systems in the towns has over the years become causes of severe floods and erosion hazards in the towns creating severe structural and environmental damages in all the Tudun Wada communities. These damages include destructions to homes, properties, and farmlands as well as causing unprecedented siltation of rivers/streams.

The Sokoto State NEWMAP is targeting to remedy and develop the Tudun Wada/Mabera stormwater drainage systems and reduce the impacts of the floods through the NEWMAP opportunity. This Environmental and Social Management Plan (ESMP) has been prepared in support of the proposed intervention project for Tudun Wada Madera in Sokoto State.

Description of Proposed Intervention

Tudun Wada/Mabera is a high density fully developed residential area without adequate roads and drainages. Presently most of the township roads are unpaved and there are large areas of barrenland. The Tudun Wada/Mabera project consist of remedial structural and non-structural developments that include civil works and vegetative development. The proposed ground intervention will address, prevent and reverse the flooding and land degradation at the project site for the long-term and will involve construction/rehabilitation of the stormwater drainage systems. The construction/rehabilitation activities will involve civil works as well as bioengineering restoration and will result in disruptions in the physical environment, habitat, and cause river siltation as well as involuntary resettlement thereby triggering the relevant World Bank Safeguard Policies.

Based on the project engineering designs (Enplan Group, 2019), the proposed remedial intervention in Tudun Wada/Mabera consists of a total of seventeen drains with a total length of 18.59Km. The layout of the proposed drainage networks is shown below. Drain 1 discharges into an existing drainage channel at Kurfi, which empites into River Sokoto after crossing the Eastern Bye Pass Road. Drain 3 discharges into an existing natural drainage corridor within a flood plain area in the southern part of Tudun Wada/Mabera, while Drains 2 and 4 are linked to existing drainage channels within Tudun Wada/Mabera. These existing drainage channels are proposed to be demolished and reconstructed to appropriately designed sizes.



Mabera Drainage System Layout
Source: Enplan Group Engineering Design Report (Sept. 2019)

Rationale for NEWMAP Intervention

Tudun Wada/Mabera Community is one of the metropolitan areas of Sokoto State whose residents experience incessant flooding every year due to heavy rainfalls. The flood and erosion hazards within this town has caused loss of properties to the residents and also continue to pose serious threats to lives and properties to community members. Many community members have also lost their homes, lands and properties to the devastating floods and erosive actions of stormwater.

It is envisaged that the perennial floods and the erosive impacts of stormwater will increasingly be more devastating to the communities with each passing raining season and as the density of settlements increase in the catchment area. There is palpable fear of losing lives particularly children, to the floods among the residents of the area while economic activities are often disrupted with increased cost of movements. Involuntary resettlement can cause loss of income, assets, and

community ties that, especially among the poor, can be essential for survival and well being. In extreme cases, involuntary resettlement can lead to the dissolution of families, impoverishment and health problems. Urgent intervention is therefore needed in the areas of flood and erosion control as well as management of the environment to ensure that Tudun Wada/Mabera is environmentally salvaged including saving lives, properties, and to restore the people's confidence in Government.

In an effort to redress the impacts on the Tudun Wada/Mabera community resulting from the perennial floods and the erosive actions of the stormwater flows, the SKSG has targeted to rehabilitate and redevelop the Tudun Wada/Mabera drainage works through the NEWMAP opportunity.

Rationale for the ESMP

The World Bank safeguard policies are designed to ensure that projects proposed for financing by the Bank or its affiliate Agencies are environmentally and socially sustainable, and thus improve the decision-making process associated with the project. The Tudun Wada/Mabera project consists of remedial structural and non-structural developments that include civil works and earth works, and vegetative protection to prevent further floods, soil erosion and land degradation as well as provide aesthetic view along the stormwater drainage corridors. The construction/rehabilitation of the new and existing critical infrastructures that serve as inter- and intra-community linkages (rural roads and drainage channels) providing access to the project area. These activities will result in several environmental and social impacts which must be considered and properly addressed to ensure that the environment is not further degraded unreasonably and the socioeconomic life of the people is not adversely disrupted.

In fulfillment of the World Bank safeguard policy requirements, and considering the high magnitude and level of significance of the environmental and social impacts associated with the Tudun Wada/Mabera stormwater drainage intervention, the ESMP serves as a safeguard instrument that documents the necessary mitigation, monitoring and institutional actions to be carried out with the implementation of the project to eliminate adverse environmental and social impacts or reduce them to an acceptable level.

The objective of this study is to prepare an environmental and social management plan (ESMP) for the Mabera project that specifically identifies, evaluates and documents the set of mitigation, monitoring and institutional actions to be taken before and during site construction and rehabilitation to eliminate adverse environmental and social impacts, offset the impacts or reduce the impacts to acceptable levels. The potential impacts associated with the phases of the designed site intervention consisting of pre-construction, construction, and operation and maintenance (O&M) are developed and appropriate mitigation measures established for the impacts.

Policy, Legal and Administrative Framework

This ESMP is guided by the requirements of the World Bank safeguard policies and the relevant and applicable state, national and international regulation, guidelines, conventions, industrial best management practices that are triggered by the NEWMAP. Based on the environmental and social effects of the project the potentially triggered WB safeguard operational policies (OPs) include:

- Environmental Assessment (OP/BP 4.01)
- Involuntary Resettlement (OP/BP 4.12)
- Cultural Physical Property (OP 4.11)

The basic legal framework for the regulation of the environment in Nigeria is based in the Environmental Impact Assessment (EIA) Act No. 86 of 1992; the National Guidelines and Standards for Environmental Pollution Control in Nigeria (March 1991); the National Environmental Standards and Regulations Enforcement Agency (establishment) Act 2007 (NESREA), as well as the Land Use Act 1978 (modified in 1990). The power to regulate all environmental matters in Nigeria is vested in the Federal Ministry of Environment (FMEnv).

Institutional Framework

The primary responsibility for the project monitoring and ESMP implementation is on the SPMU. The SPMU through its various officers, and may also employ the services of consultants, provide the necessary awareness, mobilization and facilitation, project appraisal, approval & disbursement, capacity building, monitoring & evaluation of all project activities and reporting to the FPMU and the World Bank.

The key actors in the implementation of this ESMP include:

- The contractor - to be awarded the rehabilitation contract and be required to implement the environmental and social safeguard measures;
- SPMU - to ensure that environmental and social (E&S) safeguards and other mitigation measures are duly implemented;
- FMEnv/FPMU - to ensure compliance with the ESMP and other relevant approval conditions;
- SMEnv - to oversee the effective implementation of the flood control project and related E&S safeguards
- PCC - to address complaints of any aggrieved parties on E&S safeguards
- SMLS – to ensure appropriate disposition of land matters in accordance with the statutory requirements.

Existing Safeguard Instruments

The implementation of projects under NEWMAP is guided by two existing safeguard documents - the Environmental and Social Management Framework (ESMF) and the Resettlement Policy Framework (RPF) prepared for NEWMAP. The ESMF indicates that NEWMAP is categorized by the WB as a Category A project whose impacts are sensitive, diverse, unprecedented, felt beyond the immediate project environment and are potentially irreversible over the long term. For Maberu project, the scale of the construction and development works will involve a significant disturbance of the environmental conditions with localized impacts.

Biophysical Environment

The topography of the project area watershed shows a modest variation in elevation, with a maximum elevation change of 78.9m and an average elevation above sea level of 276.5m. The climatic condition of the project area is characterized by uniformly high temperatures and a short seasonal distribution of precipitations. The area falls within the Sahel savanna zone that receives about three months of rain and experiences up to nine months of dry season, which makes it very dry for most part of the year. The temperature in the area varies from 15°C to 42°C and is rarely below 14°C or above 44°C (Ibrahim, A 1990). The hot season in the area lasts for a little over two months from March to May, while the cool season lasts for about one

and half months, usually from December to January of each year. The rainy season usually lasts from June to September, with a peak that occurs in August. The dry season begins from September to June. Mabera watersheds experience extreme seasonal variation in humidity. The muggier period of the year last for over six months, from April to October.

Flora and fauna within and around the various project corridors and vicinity were surveyed and characterized to evaluate the health status of the vegetation and the general composition, diversity, and economic values, etc. of existing wildlife in the project area. The project area is an urban community that lies within the dry arid belt of northwestern Nigeria and evidences savannah type vegetation. The pressure on land for agriculture is largely diminished by the limitation imposed through the prevailing harsh climate and weather conditions within the Mabera project area for most part of the year. A listing of plant species with frequent or abundant distribution in the various categories for the project area is shown in Chapter 3.

Air quality assessment was carried out at several locations where active construction operations are anticipated and where human activities are expected to be high. The analytical results of the baseline air quality indicators within and around the Mabera project corridors show concentrations below the regulatory threshold limits. Field (in-situ) air sampling was carried out using the Dragner CMS Gas Analyzer. The matrix of air sampling locations and coordinates across the project site are included in Table 3.4.

The parameters measured as part of the air quality assessment included particulate matter (PM-2.5, PM-10), carbon monoxide (CO), Ammonia (NH₃), hydrogen sulphide (H₂S), sulphur dioxide (SO₂), nitrogen oxides (NO_x), hydrogen cyanide (HCN) as well as oxygen (O₂). Analytical results obtained were reviewed against the appropriate regulatory limits to determine any potential health risk levels.

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

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

Socio-Economic Characteristics

Based on the 2006 national population census records and the 3.04% annual population growth factor recommended by the national population commission (NPC), the Tudun Wada/Mabera and Sokoto South LGA of Sokoto State have projected populations of 427,760 and 291,410, respectively for 2018. Tudun Wada/Mabera are made up of essentially urban (Mabera and Gagi) as well as rural

(Kurfi) communities whose residents are generally businessmen and agro-traders. Tudun Wada/Mabera communities have male/female population distribution at the household level of about 53.0/47.0%.

The people of the project area are of the Hausa-Fulani ethnic group and generally, speak and write mainly the Arabic, Hausa/Fulani and English languages. Clanism and kinship are strong elements and driving forces in control of political and cultural institutions and service points. Residents of Tudun Wada/Mabera communities are predominantly of the Islamic religion (Muslims).

Three major types of customary land tenure system exist in the project area, viz: – (1) individual land ownership; (2) family land ownership; and. (3) communal land ownership. Individual ownership may be for indigenes or for residents of the community. Family lands (as well as individual lands) are inherited from generational relatives. Communities retain family lands which may be sold and mostly used for developmental purposes. Over 85% of land within the project area is committed to agricultural production of food crops.

The literacy level within the project areas of Tudun Wada/Mabera communities is relatively moderate with 20.0% of the surveyed population of schooling age having never attended school. The moderate literacy level within the project affected area is reflected in the number of existing educational infrastructure support within the areas. There is a relatively high rate of unemployment (9.6%) in the Tudun Wada/Mabera communities. This situation potentially could pose some serious social risks when not properly managed. The community must come together to address unemployment as a social risk within its fold.

Solid wastes pose considerable hazards to human health due to the indiscriminate dumping of household wastes at illegal points or dumpsites. The continued and uncontrolled waste dumping within the Tudun Wada/Mabera communities cause regular obstructions to the storm water drainage systems. The common diseases in project area include diarrhea, malaria, typhoid, pneumonia, cough, skin diseases, deficiency diseases, eye diseases, ear diseases, and waterborne diseases resulting mainly from malnutrition and lack of hygiene. The quality of the health services in the area is generally poor with most residents patronizing quacks and medicine shops for their medical treatment. The socioeconomic infrastructures (roads system, electric power and access to water) in the area are also generally in fair to poor state. Public access to potable water is non-existent and power is generally not steady. Market facilities are fairly developed complimented by numerous home-based commercial shops located throughout the community.

Public Consultations and Concerns

The stakeholders' and public consultation included a qualitative and quantitative mixed method that offered an effective means to interact widely with the project area general public as well as stakeholder groups. Five broad categories of stakeholders were identified for this project based on the degree to which the project activities affected or involved such persons or group of persons. Individual stakeholders and project affected persons (PAPs) were also engaged during the ESMP preparation. To ensure that the rights and interests of PAPs are considered seriously local level consultative forums serve as community voices and become part of the entire project process.

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

1. Community safety with the next cycle of the rainy season. The community was quite apprehensive of the worsening flood situation particularly in relation to safety risks posed to existing homes and human lives;
2. Continued flooding in the area would lead to damages and loss of crops and livestock, personal possessions, spread of diseases such as typhoid, cholera, diarrhea, and malaria;
3. Loss of access to roadways, crop lands and pasture.
4. Physical displacement of vulnerable persons during project implementation.

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

Summary of Impacts of the Project

Positive Impacts:

This project will effectively:

- Develop new stormwater drainage systems for Tudun Wada/Mabera including reconstructing the existing ineffective drainage corridors;
- Control perennial flooding of the Mabera communities as well as improve the flow of traffic in and out of the communities;
- Greatly improve agricultural productivity within the area;
- People who have been displaced by the floods would be able to return back to their settlements;
- Reduced costs of transportation and delays on travel time;
- Improved livelihoods for the area residents due to increased enterprise and reduced cost of transportation;
- Improved landscape vista of the project area; and,
- Provide of temporary job opportunities for both skilled and un-skilled labors.
- Increased value of properties within the area as most flood inundated properties have lost market value

Potential Adverse Impacts

Disturbance of flora and fauna: Movement of personnel and vehicles may result in trampling of flora and disturbance of fauna.

Injuries and accidents: Workers may be exposed to injury from machines and equipment

Loss of vegetation and impacts on flora and fauna: Rehabilitation work will involve clearing of vegetation in and around the canals and drains. This may result in a potential disturbance and/or loss of fauna at the project site.

Soil erosion and soil pollution: Excavation, vegetation clearance, leveling and other land preparation works will expose and loosen the soil making it susceptible to both wind and water erosion and subsequent loss of top soil. There is potential for compaction of soil from the use of heavy machinery and contamination of soil from fuels, oils and waste.

Air quality deterioration: Loose soils exposed during land preparation work and movement of vehicles/trucks (including haulage trucks) to and from the project site on the untarred surfaces may result in the increase of airborne particulates.

Vibration and noise nuisance: Movement and operation of machines/equipment, trucks during construction is likely to increase noise levels intermittently in communities; May also experience temporary increase in noise levels from construction activities.

Occupational accidents and risk of injury to workers: Workers' exposure to noise, dust and vibrations and risk of accidents and injury from the use of machinery and equipment, materials management at the construction yards/workplace are concerns that need to be addressed.

Risk of accidents and injury to the public: The movement of trucks and other vehicles and machinery to and from offsite sources to the project site will pose safety risks for the communities along and around the project site. Communities near the project site may also be at risk from unsecured excavations.

Influx of workers and migrants: Migrants who move into the project area for job opportunities may not conform to the societal norms and cultural practices and may upset the social structure of these communities.

Obstruction of access ways to communities: Construction works at the project site may render portions of access roads and existing foot paths inaccessible to users and/or temporarily closed. This may create inconvenience and increase travel time to and from the affected communities.

Risk of spread of diseases: Poorly managed construction sites, site camps, indiscriminate disposal of waste and open defecation will create unsightly conditions and may result in the spread of disease (e.g. malaria, typhoid).

HIV/AIDS and STIs Risks: Construction workers camp give rise to health risks associated with poor sexual practices and prostitution including potential risk of Gender Based Violence(GBV) /Sexual Exploitation and Abuse(SEA).

Summary of Impacts and Mitigation Measures

The designed measures to mitigate identified significant adverse impacts are included in the table below:

Summary of Impacts and Mitigation Measures

Item No	Impacts	Receptor(s)	Proposed Mitigation Measures	Responsibility Party
PRE CONSTRUCTION				
1	<p><u>Impacts on Community and PAP Management (Loss of physical assets; Loss of means of livelihood)</u></p> <ul style="list-style-type: none"> • Croplands and economic trees along the gully setback may be destroyed during gully wall stabilization. • Construction activities may 	<p>Grassland; Shrubs; Crop fields and pastures; Residential homes</p>	<ul style="list-style-type: none"> • A stand-alone Resettlement Action Plan (RAP) has been prepared for the project addressing impacts on the community and the PAP management. The SPMU shall be required to implement the RAP in accordance with the provisions therein • Appropriate compensations shall be paid for project acquired lands; temporary use 	<p>SPMU-SLO, ESO; Focal NGO SMEnv.; SMLS.; Community Leaders; Site Committee</p>

Item No	Impacts	Receptor(s)	Proposed Mitigation Measures	Responsibility Party
	<p>affect persons with critical health conditions, including old persons, children and other vulnerable persons within project area may be temporarily relocated for construction phase.</p> <ul style="list-style-type: none"> Possible disagreement over siting of staging areas and temporary facilities between community and contractor 		<p>of lands; destroyed crops and economic trees.</p> <ul style="list-style-type: none"> Compensation to persons (PAPs) within project area who will need to be temporarily relocated prior to beginning of construction activities. Create awareness among community members and sensitize the people to all project activities Seek the consent of the landowner to erect the site office for the specified duration of the project; 	
2	<p><u>Public/Stakeholders Participation</u></p> <ul style="list-style-type: none"> Effective project implementation requires active involvement and cooperation of the project community. 	Community members	<ul style="list-style-type: none"> Build capacities within community Incorporate community feedback into project implementation process Disseminate project study findings; Ensure that period of inaccessibility to land is as short as possible Awareness campaigns and capacity building. The Contractor shall be required to prepare and submit a Stakeholders' Engagement Plan to the SPMU for approval and adoption for the contractor's implementation 	SPMU-SLO, ESO; Focal NGO; SMOW; SMEnv; SMOH; Community Leaders; Site Committee
3	<p><u>Vegetation and Biomass Removal Management</u></p> <ul style="list-style-type: none"> Damage to the natural and planted vegetation on acquired gully setback lands during site clearance, areas for siting of temporary office and workers camp. Impact on flora and fauna. Impact on wild life. 	Grassland; Shrubs; Crop fields and pastures;	<ul style="list-style-type: none"> Mark out areas for clearance & where possible use manual method of vegetation clearing; Undertake selective clearance by removing tall woody species leaving saplings for quick regeneration of vegetation; Prevent colonization by invasive species- Prevent damage to critical ecosystems and habitats Prevent destruction of flora and fauna. The Contractor shall be required to prepare and submit a Vegetation and Biomass Management Plan to the SPMU for approval and adoption for the contractor's implementation 	SPMU-NRO, ; Focal NGO; SMOW; SMEnv; SMOH; Community Leaders; Site Committee
4	<p><u>Gender Based Violence/Sexual Exploitation & Abuse Management</u></p>	Construction workers; Community members.	<ul style="list-style-type: none"> Contractor to submit an ESHS Performance Security to PMU Contractor to prepare and submit a GBV/SEA Management Plan to PMU for approval and adoption for the 	Contractor SPMU

Item No	Impacts	Receptor(s)	Proposed Mitigation Measures	Responsibility Party
			contractor's implementation	
CONSTRUCTION PHASE				
5	<u>COVID-19 Management</u>	Construction workers; Vulnerable persons; Community members; Residential homes;	<ul style="list-style-type: none"> • Induction and awareness programme held for all employees on COVID-19 issues; • Mandatory use of face masks, frequent hand washing or use of sanitizers, maintaining social distancing where appropriate; • COVID-19 awareness will be extended to Tudun Wada Mabera community members and local residents; • COVID-19 records at construction site and neighbourhoods to be maintained both for workers and the public; • The Contractor to prepare and submit a COVID-19 Management Plan to the SPMU for approval and adoption for the contractor's implementation 	Focal NGO; SPMU-ESO; SLO, SMEnv; SMOH; Community Leaders; Site Committee
6	<u>Dust and Air Quality Management</u> • Air pollution is expected from dust and emissions from construction vehicles, plant and equipment. Dust is generated by excavation and earth moving operations and causes nuisance to residents and other sensitive receptors. Exhaust emissions occur from poor maintenance of plant and equipment or over revving of engines.	Construction workers; Vulnerable persons; Community members; Residential homes;	<ul style="list-style-type: none"> • Dust generation will be controlled mainly by the use of water, especially in the dry season. • Use of water tanker for purposes of water dousing to control dust emission. • Erection of speed control signals and ramps mounted in communities; • Covering of hauling trucks carrying sand and other aggregates; • Covering of heaped material e.g. sand will be covered; • Use of nose masks by all workers at road maintenance/works sites. • Surfaces of vegetation along the maintenance road will be monitored to verify the effectiveness of dust suppression method. • The Contractor shall be required to prepare and submit an Air Quality Management Plan to the SPMU for approval and adoption for the contractor's implementation. 	SPMU-ESO; Focal NGO SMOH.; Community Leaders; Site Committee
7	<u>Impact on a historical site within the project area</u> Possible undermining of the	Community	<ul style="list-style-type: none"> • An understanding of the identified property, site and usage 	

Item No	Impacts	Receptor(s)	Proposed Mitigation Measures	Responsibility Party
	<p><u>integrity of the structure due to vibration from construction</u></p> <p><u>Construction activities around it might cause the property to be vulnerable to intruders</u></p> <p><u>Possible conflict between the construction workers and the community/local authorities if not well handled</u></p>		<ul style="list-style-type: none"> • • GPS coordinates for the identified historical/cultural heritage properties • • An indication of the identified constraints / sensitivities and how potentially to manage the heritage property • • Proper consultation with stakeholders 	
8	<p><u>Water Resources, Erosion and Sedimentation, Run-off Control Management</u></p> <ul style="list-style-type: none"> • Increased sedimentation and runoff may result from activities during the construction works. • Earthworks release suspended particles into watercourses, which can have temporary detrimental effects on water organisms. Spillages of fuel and other petroleum products cause contamination of the soil and water resources. • Excavation at the borrow pits may cause land degradation in the vicinity of the borrow pits; may cause soil erosion and siltation of nearby roads. 	Streams; Ponds; Groundwater; Drainage corridors; Roadways.	<ul style="list-style-type: none"> • Location for heaping construction material (e.g. sand and other aggregates) not less than 50m from water bodies and drainage channels (i.e. a separation distance of 50m will be observed); • Site for fueling of machinery and servicing of equipment will be located at a minimum distance of 100m from water bodies, wetlands and drainage channels; • Embankment erection around fueling and other liquid or spillable storage sites in order to limit or contain such material from escape to potentially pollute water resources; • Side drains (where appropriate) will be provided with settling basins near water bodies to remove silt and debris from road surface and construction site run-off, before discharge to adjoining streams or rivers; • Adequate side drains provided to carry run-off into drainage channels to prevent erosion; • Culverts of suitable capacity constructed to contain and direct flow, especially at peak flow and run-off; • Road maintenance works to be carried out off peak rainy season; • Provision of toilets and urinal at locations not less than 50m away from water bodies; and • Adequate worker awareness on sanitation and measures to avoid water resource contamination. • The Contractor shall be 	SPMU-ESO; PE, Focal NGO; SMOW; Community Leaders; Site Committee

Item No	Impacts	Receptor(s)	Proposed Mitigation Measures	Responsibility Party
			required to prepare and submit a Water management Plan and an Erosion and Sedimentation Management Plan to the SPMU for approval and adoption for the contractor's implementation.	
9	<p><u>Noise and Vibration Exposure Management</u></p> <ul style="list-style-type: none"> Noise will emanate from moving vehicles, excavators, generators, power tools (e.g. for vegetation clearing), and compressors during construction. Vibrations may come from soil compaction equipment and other vibro equipment to be used at the gully heads. 	Construction workers; Vulnerable persons; Community members; Residential homes;	<ul style="list-style-type: none"> Equipment servicing plan will be prepared and strictly followed to ensure efficient machinery performance and optimum noise generation. Stationary equipment shall be sited at safe distances from sensitive areas to minimize noise impacts Workers operating noisy equipment will not be exposed continuously for more than 3 hours a day. Workers will be provided with ear plugs. Workers handling vibrating equipment or parts will be given pads to absorb the vibrations and will not be exposed continuously for longer than 3 hours a day. Sanctions (ranging from a warning to dismissal) will be instituted by the contractor against workers who do not observe the use of appropriate PPEs 	SPMU-ESO; Focal NGO; SMOW; SMOH; Community Leaders; Site Committee
10	<p><u>Occupational/Public Health and Safety Management</u></p> <ul style="list-style-type: none"> Occupational accident during construction. Construction operations pose hazards to people living or working near construction areas or employed to work on site. Excavations, construction traffic and stockpiled materials pose particular threats to children and livestock. Children may be inadvertently recruited to work on construction sites. 	Construction workers; Vulnerable persons; Community members; Residential homes;	<ul style="list-style-type: none"> Health, safety and environmental training and awareness will be extended to community members and local residents; Erection of warning signals and use of reflective tapes at approaches to excavations, heaped materials, stationary equipment, etc. Posting of speed limits of 40km/hr at approaches to construction sites; Safety meetings held twice a week and documented accordingly; Inductions and awareness programmes held for all employees on occupational health and safety practices; A First Aid team formed to provide first aid services to workers and where appropriate make referrals to the nearest Health Centre or hospital; First Aid team to be trained by 	SPMU-ESO; Focal NGO; SMOH; Community Leaders; Site Committee;

Item No	Impacts	Receptor(s)	Proposed Mitigation Measures	Responsibility Party
			<p>a medical team from the Health Centre;</p> <ul style="list-style-type: none"> • Accident records at construction site and neighbourhoods to be maintained both for workers and the public; • Stocks of PPEs to be maintained and supplied to workers regularly as needed; and • Workers required to wear the appropriate PPEs e.g. helmets, ear plugs, nose masks, vibration pads, hand gloves, etc. • The Contractor shall be required to prepare and submit a Community/Occupational Health Management Plan to the SPMU for approval and adoption for the contractor's implementation 	
11	<p><u>Gender Based Violence /Sexual Exploitation and Abuse (GBV-SEA) Management</u></p>	<p>Construction workers; Vulnerable persons; Community members; Residential homes;</p>	<ul style="list-style-type: none"> • Inductions and awareness programmes held for all employees on GBV-SEA issues; • Contractor to comply with ESHS provisions of the contract. • GBV-SEA awareness will be extended to Tudun Wada Mabera community members and local residents; • GBV-SEA records at construction site and neighbourhoods to be maintained both for workers and the public; • Workers required to report any GBV-SEA issues to the construction management. • The Contractor to prepare and submit a GBV-SEA Management Plan to the SPMU for approval and adoption for the contractor's implementation 	<p>Focal NGO; SPMU-ESO; SLO, SMEnv; SMOH; Community Leaders; Site Committee</p>
12	<p><u>HIV/AIDS and STIs Management</u></p> <ul style="list-style-type: none"> • Construction workers camp give rise to health risks associated with poor sexual practices and prostitution. 	<p>Construction workers; Vulnerable persons; Community members; Residential homes;</p>	<ul style="list-style-type: none"> • Provide quarterly HIV/AIDS and STIs awareness programmes for workers and nearby communities; • Health and HIV awareness team arranged from the State Health Ministry for the quarterly programmes; • Sponsored educational package put together by the team to be implemented to enlighten both workers and 	<p>Focal NGO; SPMU-ESO; SMEnv; SMOH; Community Leaders; Site Committee;</p>

Item No	Impacts	Receptor(s)	Proposed Mitigation Measures	Responsibility Party
			communities; <ul style="list-style-type: none"> • Training of peer educators within the work force and in communities by the team; and • The contractor to provide free condom supplies and encourage free discussions, counselling and testing. 	
13	<p><u>Construction Operation and Slope Stabilization</u></p> <ul style="list-style-type: none"> • Construction operations will result in topographic alterations. • Construction operations may result in landslides, rock cave-ins, and mudflow/flooding. • Construction operations can pose earth movement hazards to people working near the construction areas due to unstable soil profiles from site excavations. 	Vulnerable persons; Community members; Residential homes;	<ul style="list-style-type: none"> • Maximize local employment (including women) on construction works (this should be a contractual requirement to hire a percentage of local workforce including women) • Provide occupational health and safety awareness training and workshops, • Use of child labor shall be strictly prohibited • Monitor and maintain intervention work for continued stability and quality • Shortcomings in the control structures including the check dams (retention basins) along the gully corridor should be corrected before they develop into serious problems. • The Contractor shall be required to prepare and submit an ESMP and Emergency Response and Incident Plan to the SPMU for approval and adoption for the contractor's implementation 	SPMU-ESO; Focal NGO; SMOW; SMeNV; Community Leaders; Site Committee
14	<p><u>Traffic and Transportation Hazards</u></p> <p>Impedance to traffic flow and movements. Possible vehicular collisions and accidents. Temporary diversions of traffic.</p>	Construction workers; Community members; Residential homes;	<ul style="list-style-type: none"> • Traffic wardens to be posted at positions 100m from the construction points on either side of the road to ensure orderly traffic flow; • Actual working areas to be secured with barricades; • Adequate road warning signs to be posted at vantage points to warn and direct traffic; • Traffic and transport associated with project will adhere to existing roads or follow specified routes as established. • The Contractor shall be required to prepare and submit a Traffic and Vehicle Management Plan to the SPMU for approval and adoption for the contractor's implementation 	SPMU-ESO; Focal NGO; SMOW; SMeNV; Community Leaders; Site Committee
OPERATIONS PHASE (POST CONSTRUCTION)				

Item No	Impacts	Receptor(s)	Proposed Mitigation Measures	Responsibility Party
15	<p><u>Waste Management (solid and liquid wastes)</u></p> <p>Proposed project will generate waste during construction including off specification materials such as wood, plastic, paper and domestic waste from construction areas and worker camps. This could result in increased pressure on local waste dump facilities as well as potential for unauthorized disposal and littering if not properly managed.</p> <ul style="list-style-type: none"> • Waste bins to be provided for the disposal of waste generated; • Waste will be segregated into three at source - organic (food residues), recyclables (woods, metals) and non-recyclables (plastic and glass wastes); • Organic waste to be composted near the site office to enrich the soil, while plastics and glass are taken to the district dump-sites; 	Streams; Ponds; Groundwater; Drainage corridors; Roadways.	<ul style="list-style-type: none"> • Topsoil removed from the right of way for maintenance work to be spread on the land to avoid disrupting drainage network; and • Toilets and urinals to be sited at least 100m from any stream or drainage channel and decommissioned at the end of project. • The Contractor shall be required to prepare and submit a Waste Management Plan to the SPMU for approval and adoption for the contractor's implementation 	SPMU-ESO; Focal NGO; SMOW; SMEnv; Community Leaders; Site Committee
16	<p><u>Land use restriction</u></p> <p>Use of the acquired land associated with gully setback will be altered and restricted to limited community uses. Structures may never be erected on this portion of land but economic trees could be planted.</p> <ul style="list-style-type: none"> • Create awareness among community members; • Build capacities within community; • Incorporate community feedback mechanism into process 	Community members; Residential homes;	<ul style="list-style-type: none"> • Ensure periodic monitoring of restricted areas • Continuous maintenance of erosion control structures including concrete channels and check dams, and bio-remediated areas for continued effectiveness. 	SPMU-ESO; SMEnv; Focal NGO; Community Leaders; Site Committee
17	<p><u>Closure of temporary office, staging areas and decommissioning of project</u></p>	Community members; Residential homes;	<ul style="list-style-type: none"> • Enforce agreed measures to render the site safe and usable post construction to the satisfaction of the community 	SPMU-ESO; NRO, PE, Focal NGO; Community Leaders;

Item No	Impacts	Receptor(s)	Proposed Mitigation Measures	Responsibility Party
	Damage to land forms and vegetation <ul style="list-style-type: none"> • Ensure that agreements with the community and landowners on post construction hand-over are kept. 		and landowners.	Site Committee
18	<u>Erosion control system failure management</u> <ul style="list-style-type: none"> • Check dams that are not properly constructed may suffer damage that could reduce the structural integrity of the erosion control structures during post-construction phase. • Structures built in the channelization for stabilization purposes should be observed for damage especially during rainy seasons and after heavy storms. Any damage observed should be repaired immediately to avoid further damage and the eventual collapse. 	Community members;	<ul style="list-style-type: none"> • Ensure periodic monitoring of erosion control structures • Continuous maintenance of erosion control structures including concrete channels and check dams, and bio-remediated areas for continued effectiveness. 	Community Leaders; PE Site Committee CBOs/CDOs

Analysis of Project Alternatives

Consideration of alternatives related principally to ways of improving the proposed intervention activities and/or attempting to avoid or minimize potential significant negative impacts. Different alternatives were evaluated consistent with the various components of the Tudun Wada/Mabera project intervention. For the proposed project, the alternatives considered include: delayed project alternative; a do-nothing alternative; and the planned project alternative. The selection of the planned project alternative was premised on several considerations, including the desirability/acceptability of the project, the government's position or inclinations to the project, the potential environmental and social impacts of the project, the economic viability of the project and impact to human life.

Training Programmes

The Contractor shall be required to provide occupational health and safety awareness training and workshops for the workers. The health, safety and environmental training and awareness will be extended to Tudun Wada Mabera community members and local residents.

Gender-Based Violence/Sexual Exploitation & Abuse (GBV/SEA)

The Contractor shall be required to prepare and submit a Gender Based Violence/SEA Management Plan to the SPMU for approval and adopted for the contractor's implementation. Specific inductions and awareness programmes shall be implemented for all employees on GBV issues. The GBV/SEA awareness will be extended to Tudun Wada Mabera community members and local residents. Workers will be required to report any GBV/SEA issues to the construction management.

Labor Influx, Child Labor, Health and Safety Issues

Implementation of the Tudun Wada Mabera Flood/Erosion Intervention Project will result in an influx of persons seeking gainful employment with the project contractors or to gain any social privileges within the project communities. There will be increased pressure on existing social service resources like water, electricity, transportation, etc. in the communities due to the influx of persons. The Contractor shall be required to develop and implement an occupational and community health and safety plan that contributes to a healthy workforce and local community, and must ensure that children are not inadvertently engaged to do work on the construction site. The use of child labour shall be strictly prohibited.

The Plan shall evaluate possible hazards that may be associated with labor influx into the project areas. The health and safety plan shall be submitted to the SPMU and FPMU for necessary approvals prior to implementation. The Contractor shall fully comply with ESHS provisions and standards and bear the cost of implementation.

Grievance Redress Mechanism (GRM)

A mechanism through which complaints and disagreements can be smoothly resolved has been structured for this project. As part of the grievance redress mechanism, formation of a three-level grievance redress committee (GRC) starting with a community grievance redress committee (C-GRC) has been structured to receive and document all public complaints relating to the project. Currently, there is a system of customary avenue that exist in each of the communities to deal with dispute resolution in the community and this will be employed as the "court of first appeal", where relevant. It is anticipated that this community system together with the structured GRM will allow unencumbered platform for people to express their dissatisfaction over any environmental and social (E&S) issues arising from the project.

The SPMU has also opened public complaints/suggestion boxes (placed at the SPMU office and at the project site) for Communities to bring up their complaints. This ensures that Communities can forward their grievances at absolutely no cost. All grievances or complaints must be registered and compiled regularly for project management. The devised mechanisms are fundamental to achieving transparency in the ESMP process. The SPMU shall follow the guidance of the World Bank to put in place a GBV-sensitive GRM system that has strong elements of confidentiality, empathy and protection and services for survivors.

Contractor Responsibility for Implementation of ESMP

The Contractor shall be responsible for implementing all impact mitigation measures as detailed under the Section *Environmental and Social Management Plan* (ESMP) of this Report for the project. Prospective Construction Contractors are therefore required to competitively bid for the implementation of the Impact Mitigation Measures. The Mitigation Measures are contained in Tables 6.1 of the ESMP

Report.

Bidding Contractors are also required to include as part of their costs all elements associated with (i) ESMP Management, (ii) Mitigation Monitoring, and (iii) Capacity Building & Trainings as provided in Table 6.8 of the ESMP Report. This shall be a one line item in the BEME to ensure adequate budget.

Bidding Contractors are further required to provide Environmental, Social, Health and Safety (ESHS) Performance Guarantee to the tune of the SPMU-specified sum or percentage of the project cost in accordance with the new World Bank ESHS requirement.

For purposes of clarity, ALL BIDDING CONTRACTORS shall obtain as part of the bidding process a full copy of this ESMP Report prepared for this project to fully understand the scope of the ESMP implementation and required mitigation actions. In the event that the ESMP Report is not provided, the contractor shall request for it from the SPMU as part of the bidding process requirements.

Contractor’s Environmental and Social Management Plan (C-ESMP)

The contractor is required to provide a C-ESMP to guide its operation during the project implementation – the provision of the project ESMP notwithstanding. This management plan is expected to address all that the contractor plans to do at different phases following the prepared ESMP.

Budget

The budget estimate for the E&S safeguards as determined under this ESMP, including cost for administration, monitoring and evaluation of **₦17,692,500.00** (Seventeen Million Six Hundred and Ninety Two Thousand Five Hundred Naira) only for the Tudun Wada/Mabera project. The budget estimate is summarized in the Table below:

Breakdown of Cost Estimates

S/No	ITEM	RESPONSIBILITY	COST BREAKDOWN IN (N)			COST ESTIMATE IN NAIRA (N)
			Pre-Construction Phase	Construction Phase	Post-Construction Phase	
1	MITIGATION	SPMU/ Contractor	(To be built into Contractor costs)			
2	MANAGEMENT	SPMU/ SML	1,950,000.00	3,100,000.00	2,600,000.00	N7,650,000.00
3	MONITORING	SPMU/ FPMU/ FML/ SML/ Environmental Consultants/ NGOs	1,350,000.00	3,700,000.00	1,300,000.00	N6,350,000.00
4	CAPACITY BUILDING & TRAININGS	SPMU/ MOH/ Consultants/ Contractor	1,000,000.00	1,100,000.00	750,000.00	N2,850,000.00
Sub-total						N16,850,000.00
5	CONTINGENCY (5%)					N842,500.00
GRAND TOTAL						N17,692,500.00

The proposed budget will facilitate the implementation of the various ESMP management, monitoring plan and capacity building measures to be executed by the SPMU and should be made an integral part of financing for the Tudun Wada/Mabera intervention and development project. The specific Environmental and Social safeguards obligations for the contractor should be incorporated into the contract specifications along with other contract provisions.

The estimated mitigation cost for the environmental and social management Plan has been developed with due consideration in the three project phases (pre-construction, construction and post-construction) to the following factors:

- The magnitude of the flood control problem;
- The type of technology to be employed;
- The volume of the project affected households and persons; and,
- The area of coverage of the proposed project.

Disclosures

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

CHAPTER 1: INTRODUCTION

1.1 Background

The Government of Nigeria is implementing the multi-sectoral Nigeria Erosion and Watershed Management Project (NEWMAP), which is financed by World Bank (WB), Global Environment Facility (GEF), the Special Climate Change Fund (SCCF), and the Federal Government of Nigeria (FGN). NEWMAP was initiated by the FGN and is currently being implemented in 21 states of the country, namely Anambra, Abia, Cross River, Edo, Enugu, Ebonyi, Imo, Delta, **Sokoto**, Akwa Ibom, Gombe, Plateau, Kogi, Kano, Ondo, Oyo, Katsina, Borno, Niger, and Nasarawa States. The project is designed to support the participating States in reducing vulnerability to flood and erosion and to develop the states' watershed.

The development objective of NEWMAP is to rehabilitate degraded lands and reduce long-term flood and erosion vulnerability in target areas. In Sokoto State, NEWMAP activities involve medium-sized civil works such as construction of infrastructure and/or stabilization or rehabilitation of existing degraded stormwater drainage systems and flood plains as well as small works in the small watershed where erosion gullies develop and expand. The lead agency at the FGN level is the Federal Ministry of Environment (FME_{env.}), Department of Erosion, Flood and Coastal Zone Management. The Sokoto State Ministry of Environment through the State Project Management Unit (SPMU) is responsible for NEWMAP implementation at the State level.

The location coordinates of Nigeria are latitude 9°4'55.2"N and longitude 8°40'31"E. Sokoto State is located in the Northwest geopolitical zone of Nigeria and takes the shape of a mushroom extending longitudinally from 4°08'E to 6°52'E in the northern part and from 4°52'E to 5°02'E in the southern part of the state. The State stretches between approximately latitude 11°30'N and 13°52'N. The State was carved out of old Northwestern State in 1976 and is bounded to the South and East by Zamfara State, to the West by Kebbi State, and in the North by the Niger Republic. The capital city of Sokoto State is Sokoto Town.

Tudun Wada/Mabera communities is one of the many towns and cities in Sokoto State whose communities are perennially devastated by floods and soil erosion resulting from storm water flow. The flood and erosion hazards of the communities have caused major property losses to residents and remain a serious threat to lives in the communities. The non-existence of stormwater drainage systems in the communities has over the years become a major cause of severe floods and erosion hazards in the communities creating severe structural and environmental damages in all the Tudun Wada/Mabera communities. These damages include destructions to homes, properties, and farmlands as well as causing unprecedented siltation of community streams.

Due to the non-existence of stormwater drainage channels or systems, most access roadways in Mabera metropolis are completely submerged during heavy rainfalls making the roads unusable and vehicular movements very difficult or halted. It is anticipated that the damaging impacts of the floods and erosion resulting from the non-existence of stormwater drainage channels within and outside the various communities will increasingly be more devastating to the residents with each cycle of the rainy season. Urgent intervention is therefore needed at the communities to salvage the environment, save lives, property and infrastructure and to restore the

people’s confidence in Government. In an effort to redress the impacts of flooding and erosion within and around the communities of Tudun Wada/Mabera, the Sokoto State Government (SKSG) has targeted to construct new stormwater drainage systems and rehabilitate the existing systems through the NEWMAP opportunity. Figure 1.1 is the map of Nigeria showing the location of Sokoto State while Fig. 1.2 shows Sokoto State showing the Local Government Areas (LGAs) and the project locations.



Fig. 1.1: Map of Nigeria Showing Location of Sokoto State

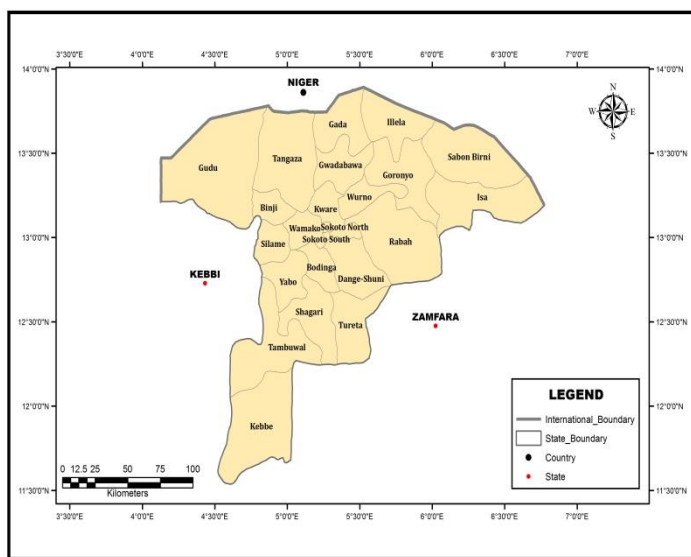


Fig. 1.2: Map of Sokoto State Showing LGAs & Project Locations
(Source: Von.gov.ng)

The development objective of NEWMAP is to rehabilitate degraded lands and infrastructures, and reduce long-term flood and erosion vulnerability in target areas. In Sokoto State, NEWMAP activities involve medium-sized civil works such as construction of infrastructure and/or stabilization or rehabilitation of flood plains as well as small works in the watershed where erosion develops and expand or pervades the land.

1.2 Description of Proposed Intervention

The project goal is to design and develop effective stormwater drainage systems for Tudun Wada/Mabera communities with proper channelization to appropriately convey stormwater from various areas of the communities to safe locations at the outskirts. The safely discharged water is expected to flow into the nearby natural river systems.

1.2.1 Project Description

A general description of the project activities for the project area is as given in Table 1.1. The location coordinates of the communities that make up Tudun Wada/Mabera

are also shown in the Table. The satellite imageries showing the general areas of the Tudun Wada/Mabera project is shown in Figure 1.3.

Table 1.1 Mabera Project Areas - Activity Descriptions

S/No	Project Area	Location Coordinates		Activity Description
		Easting	Nothing	
1	Mabera Community	N13° 1.696'	E005° 15.760'	Stormwater drainage construction; Access roads, and watershed rehabilitation
2	Nakasari Community	N13° 2.609'	E005° 16.079'	Stormwater drainage construction; Access roads, and watershed rehabilitation
3	Gagi Community	N13° 02.760'	E005° 16.359'	Stormwater drainage construction; Access roads, and watershed rehabilitation
4	Kurfi Community	N13° 03.194'	E005° 16.854'	Existing drainage rehabilitation; Stormwater drainage reconstruction; Access roads and watershed rehabilitation

Source: Consultant Field Data (November 2019)

The proposed remedial intervention in Tudun Wada/Mabera consists of a total of seventeen drains with a total length of 18.59Km. The layout of the proposed drainage networks is shown in Fig. 1.5 while the individual lengths of the drains are as shown in Table 1.2. Drain 1 discharges into a existing drainage channel at Kurfi, which empties into River Sokoto after crossing the Eastern Bye Pass Road. Drain 3 discharges into an existing natural drainage corridor within a flood plain area in the southern part of Tudun Wada/Mabera, while Drains 2 and 4 are linked to existing drainage channels within Tudun Wada/Mabera. These existing drainage channels are proposed to be demolished and reconstructed to appropriately designed sizes.

Essentially, the proposed flood and erosion control measures for the Mabera project comprise of (1) Reconstruction of existing stormwater drainage channels; and (2) Construction of new stormwater drainage channels. The proposed control measures include the main structures for the drainage bed system and the bank stabilization measures. The designed drainage bed system and bank stabilization include the following:

- Drain Inlet Structure;
- Lined canal for the total length;
- Exit system/outlet structure
- Gabion retaining wall;
- Slope cutting with geo-textile and grass; and,
- Bio-remediation grass planting.

Table 1.2: Dimensions of the Proposed Tudun Wada/Mabera Drainage Works

Drain Name	Catchments Area (sq.m)	Length of Drain (km)	Length from farthest point of catchment to outlet (m)	Slope (%)
Drain 1A	1,737,618	0.965	1,776	1.12
Drain 1B	4,800,874	3.315	4,889	1.05
Drain 1.1	179,800	0.819	819	0.80

Drain 1.2	136,741	0.811	811	1.35
Drain 2	700,889	0.792	1,965	0.33
Drain 2.1	294,022	1.173	1,173	0.40
Drain 2.1.1	115,757	0.769	769	0.13
Drain 2.2	240,142	1.028	1,028	0.21
Drain 2.2.1	58,783	0.391	391	0.18
Drain 3	2,227,240	0.703	1,746	0.92
Drain 3.1	473,625	1.320	1,320	0.28
Drain 3.2	1,101,863	1.043	1,043	0.63
Drain 4	654,564	2.223	3,385	0.40
Drain 4.1	156,726	1.140	1,140	0.20
Drain 4.1.1	2,680	0.077	77	0.58
Drain 4.1.2	10,113	0.253	253	0.05
Drain 4.2	354,931	0.946	946	0.24
Drain 4.2.1	165,313	0.822	822	0.25

Source: Enplan Group Engineering Design Report (Sept. 2019)

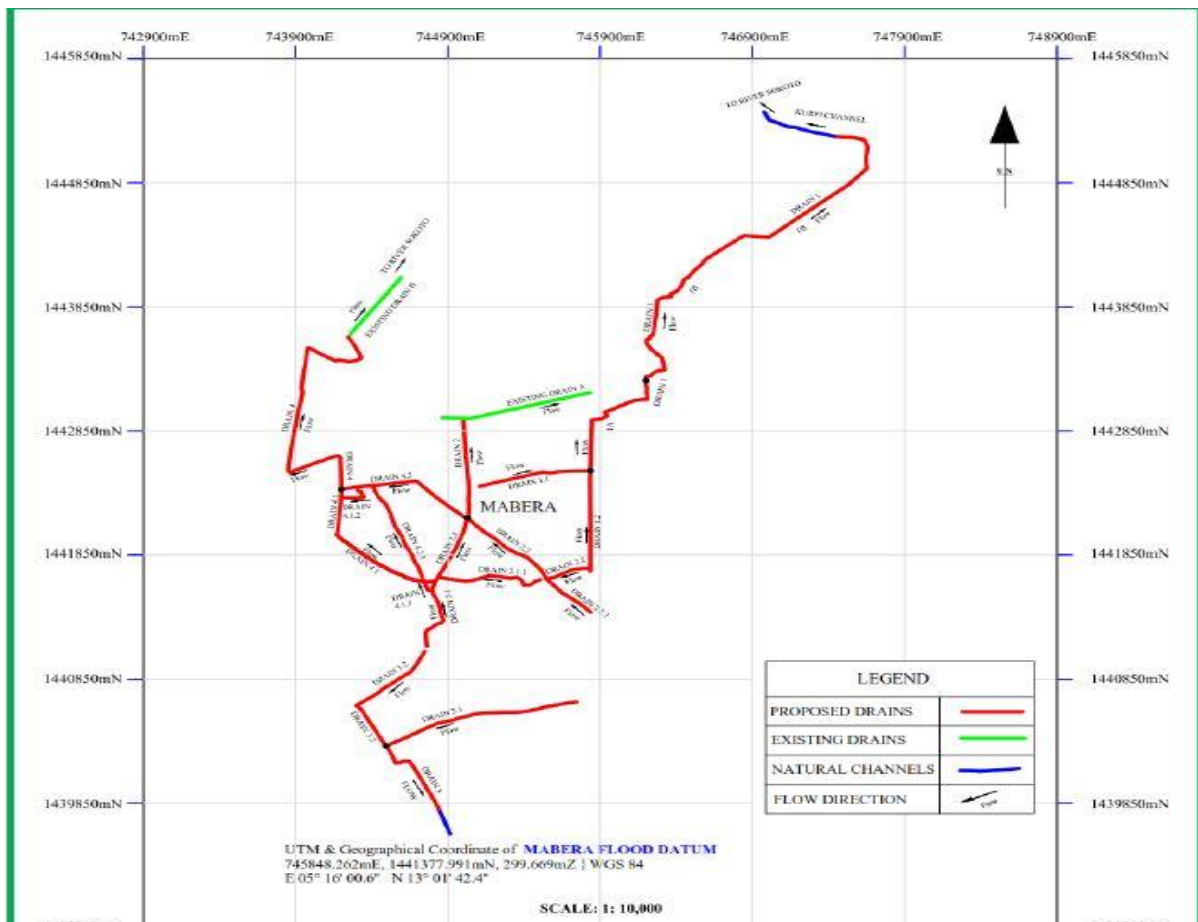


Fig. 1.5: Mabera Drainage System Layout

Source: Enplan Group Engineering Design Report (Sept. 2019)

Civil Construction Works:

- The key activities in putting up the civil works include:
 - cutting and filling for percentage recovery
 - concrete casting
 - assembling of structures and,
 - slope stabilization.
- The foundations of the lattice structures and concrete casting may be dug mechanically. The depth will be consistent with the geotechnical study and the engineering designs.
- Vegetation clearing will be done manually.
- A number of transport vehicles shall be employed in the project but there will be no on-site maintenance of vehicles.
- Powered equipment is expected to be used in the construction (as required) as well as earth moving equipments such as excavators, compactors, bulldozers and pay loaders;
- Skilled and unskilled labour shall be employed in the project.

1.2.2 Project Area Terrain Features:

1.2.2.1 Tudun Wada/Madera Terrain Features:

The Mabera community of the project area is located at Longitude 05⁰ 15'E and Latitude 13⁰ 1'N east of the Sokoto main town. The Mabera community in general is one of the major communities in the State that have flooding issues during the rainy season, mainly due to non-existence or non-effectiveness of storm water drainage systems within the community. The few existing drainage structures in the community are either of inadequate drainage size (capacity) or poorly constructed, and in some cases concrete structures surrounding culverts have been washed away.

The main aim of the intervention project is to design and implement an effective storm water drainage system with proper channelization to properly discharge storm water within Mabera, to a safe location at the outskirts of the community. The water is expected to be safely discharged into a nearby natural flow corridor, then to a drainage channel in Kurfi, and finally to a tributary of the Sokoto River.

Mabera is sandwiched between the Sokoto main city and the dual carriage eastern bye pass road within the Sokoto metropolis, and is substantially affected by flooding during the rainy season. The area is an unplanned settlement that have gradually become integrated into the Sokoto metropolis, but does not have the necessary infrastructures including roads and drainages. Buildings are erected arbitrarily and the project designs indicate that it may only be possible to provide adequate and effective drainage facilities within the communities as separate systems. There is an urgent need for drainage facilities within the community.



Fig. 1.3: General Satellite View of Tudun Wada/Mabera Project Areas
 (Source: OTG Graphic Designs, 2019)

1.2.2.2 Nakasari Terrain Features:

Nakasari community is a newly developed high-density residential area close to the newly constructed Eastern Bye-Pass road within the Sokoto Metropolis. The area

and residential buildings were developed randomly without the necessary and appropriate government developmental planning approvals. Necessary infrastructure such as roads and drainages was not considered at the commencement of its development. The resultant effect is the massive flooding of the area during the rainy season leading to lots of damages to existing structures and sometimes loss of lives.

Although the satellite communities like Mabera and Nakasari provide relatively affordable accommodation, this comes at a significant social and environmental costs. A key area in which the satellite communities are currently underserved is in basic social amenities. The unplanned housing development has inevitably been accompanied by a parallel lack of installation and development of key social services.

1.2.2.3 Gagi and Kurfi Terrain Features:

Gagi and Kurfi communities are located in relatively remote and rural areas. These areas provide the natural corridors through which stormwater flows to the outfall.

The proposed stormwater drainage corridors as designed are shown within the project area in Figure 1.4. The proposed drainage works are approximately 6.83km in total length and generally pass through level terrains of the built up areas within Mabera and Nakasari communities, as well as through the rural areas of Gagi and Kurfi communities.

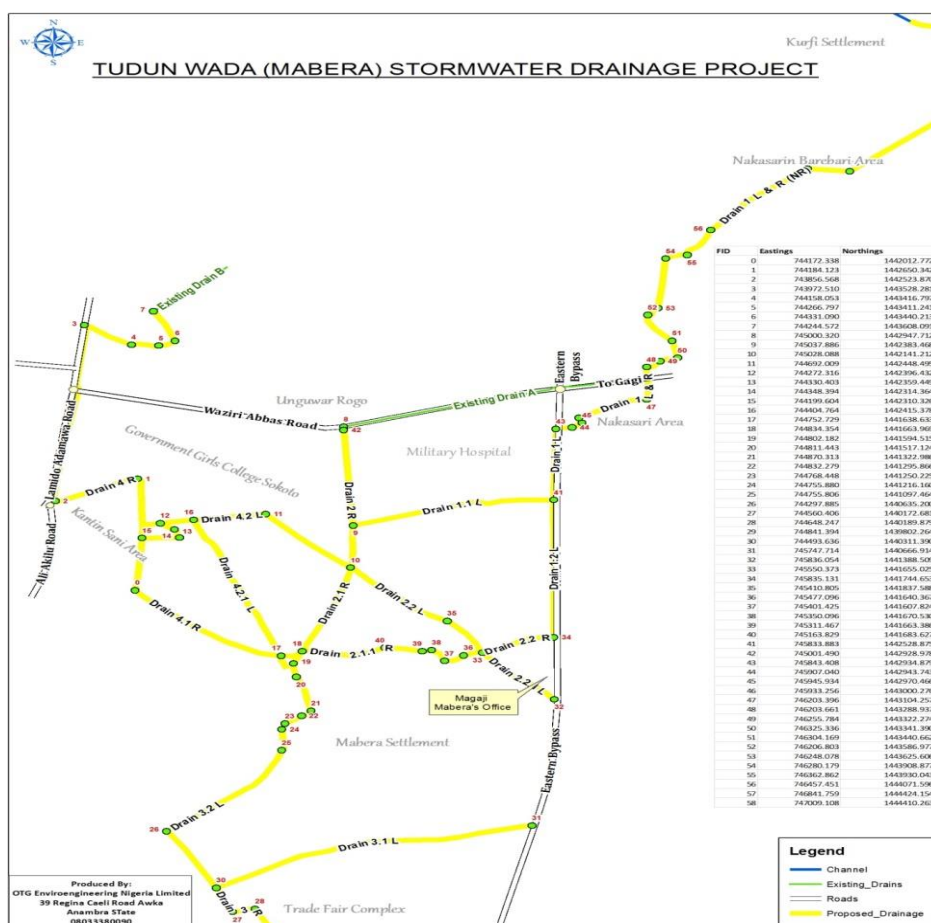


Fig. 1.4: Tudun Wada/Mabera Project Areas Showing Proposed Drainage Corridors (Source: OTG Graphic Designs, 2019)

1.3 Rationale for NEWMAP Intervention

Tudun Wada/Mabera Community is one of the metropolitan areas of Sokoto State whose residents experience incessant flooding every year due to heavy rainfalls. The flood and erosion hazards within this town has caused loss of properties to the residents and also continue to pose serious threats to lives and properties to community members. Many community members have also lost their homes, lands and properties to the devastating floods and erosive actions of stormwater.

It is envisaged that the perennial floods and the erosive impacts of stormwater will increasingly be more devastating to the communities with each passing raining season and as the density of settlements increase in the catchment area. There is palpable fear of losing lives particularly children, to the floods among the residents of the area while economic activities are often disrupted with increased cost of movements. Involuntary resettlement can cause loss of income, assets, and community ties that, especially among the poor, can be essential for survival and well being. In extreme cases, involuntary resettlement can lead to the dissolution of families, impoverishment and health problems. Urgent intervention is therefore needed in the areas of flood and erosion control as well as management of the environment to ensure that Tudun Wada/Mabera is environmentally salvaged including saving lives, properties, and to restore the people's confidence in Government.

In an effort to redress the impacts on the Tudun Wada/Mabera community resulting from the perennial floods and the erosive actions of the stormwater flows, the SKSG has targeted to rehabilitate and redevelop the Tudun Wada/Mabera drainage works through the NEWMAP opportunity.

1.4 Rationale for ESMP

The World Bank safeguard policies are designed to ensure that projects proposed for financing by the Bank or its affiliate Agencies are environmentally and socially sustainable, and thus improve the decision-making process associated with the project. The NEWMAP project is being funded by the World Bank and other affiliate agencies. The ground interventions as proposed for the Tudun Wada/Mabera project site will address, prevent and expectedly reverse the perennial flooding and land degradation within the project areas, and will involve construction of civil works and rehabilitation of the existing flood plain. These activities, according to the NEWMAP ESMF, trigger the WB Safeguard Policies that include Environmental Assessment (OP/BP 4.01), Involuntary Resettlement (OP/BP 4.12), Cultural Physical Property (OP 4.11).

In fulfillment of the World Bank safeguard policy requirements, and considering the high magnitude and level of significance of the environmental and social impacts associated with the Tudun Wada/Mabera stormwater drainage intervention, the ESMP serves as a safeguard instrument that documents the necessary mitigation, monitoring and institutional actions to be carried out with the implementation of the subproject to eliminate adverse environmental and social impacts or reduce them to an acceptable level.

The Tudun Wada/Mabera project consist of remedial structural and non-structural developments that include civil works and earth works, and vegetative protection to prevent further erosion and land degradation as well as provide aesthetic view along the stormwater drainage corridors. These activities will result in several

environmental and social impacts which must be considered and properly addressed to ensure that the environment is not further degraded unreasonably and the socioeconomic life of the people is not adversely disrupted. Consequent upon these, this ESMP is required to provide necessary procedures and criteria that will guide the proposed Mabera stormwater drainage interventions in accordance with the World Bank Safeguard Policies and the Nigerian national environmental policies, guidelines and assessment procedures as well as those of Sokoto State and the local agencies.

1.5 Objective and Scope of the Consultancy Services

The objective is to prepare an Environmental and Social Management Plan (ESMP) for the Tudun Wada/Mabera stormwater drainage intervention project. This ESMP specifically identifies and assesses the environmental and social impacts that may be associated with the planned intervention project as designed and all other activities aimed at rehabilitating the drainage corridors within the project watershed. The ESMP also identifies, evaluates and documents the set of mitigation, monitoring and institutional actions to be taken before, during and after remedial construction and rehabilitation works to eliminate any identified adverse environmental and social impacts, offset the impacts or reduce the impacts to acceptable levels.

The potential impacts associated with the phases of the designed site intervention consisting of pre-construction, construction, and operation and maintenance (O&M) are developed and appropriate mitigation measures established for the impacts. This Environmental and Social Management Plan (ESMP) includes measures needed to implement the identified actions, addressing the adequacy of the monitoring and institutional arrangements for the upper and lower watersheds on a sustainable basis. The ESMP provides necessary institutional framework and monitoring actions to be taken before, during and after the construction and development works.

This ESMP also includes measures necessary to implement identified actions, addressing the adequacy of the monitoring and institutional arrangements for mitigation of all identified environmental and social impacts associated with the project on a sustainable basis. The mitigation measures adopted are guided by and consistent with recommendations in the updated Environmental and Social Management Framework (ESMF) for NEWMAP.

The following project-specific background documents were reviewed and together with collected field-based information and data formed basis upon which analytical determinations were made for this ESMP:

- Updated Environmental and Social Management Framework (ESMF)
- NEWMAP Project Appraisal Document (PAD)
- NEWMAP Project Implementation Manual (PIM)
- World Bank Safeguards policies
- Intervention design
- ToR For ESMP

1.6 Approach and Methodology

The approach adopted to achieve project objectives included the conduct of distinct phases of activities carried out. The sequence of the phases of activities conducted broadly included:

- i) Gathering of site and project information as well as intrusive data acquisition;
- ii) Review of applicable environmental and social regulations and statutory

- requirements including the WB operational policies;
- iii) Stakeholders'/community consultations and participation;
 - iv) Development of potential environmental and social impacts and associated mitigation measures;
 - v) Development of appropriate environmental and social management systems/procedures as well as necessary institutional arrangements;
 - vi) Development of budgetary estimates and identification of the sources of funds for implementing the ESMP; and,
 - vii) Preparation of the required environmental and social management plan (ESMP) report.

The overall study was based on both quantitative data and qualitative inputs collected through research of historical environmental and social data for the project area, and the census/socio-economic survey data (the census questionnaire and socio-economic survey questionnaire has been integrated into one basic document to enhance effectiveness). Besides the quantitative data collection method, a number of other tools were also used for eliciting information. These tools will included (a) Focused Group Discussion (FGD); (b) Community meetings; and (c) Key informants' interviews.

The engineering designs for the project as provided by the engineering design Consultants were used to identify existing features or aspects of the design that could impact on the project communities. Information and data gathering involved a broad spectrum of activities that included interviews and discussions with community members who have historical knowledge of the site and the flooding and erosion problems in the affected areas including the history of specific site flooding. It also involved other physical and intrusive study of the natural, social, economic and cultural environments of the project area. The environmental and social management systems/procedures were developed to establish sound basis for mitigation, monitoring and management at the project level.

1.7 Phases of Intervention Works:

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

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

1.7.1 Pre-construction Phase

As part of the pre-construction stage, SMeNv/SKS-NEWMAP commissioned ENPLAN Group Limited to develop the detailed engineering design for the remedial intervention and development of the stormwater drainage systems in Tudun Wada/Mabera communities. The preparation of this ESMP and a separate Resettlement Action Plan (RAP) forms part of the pre-construction phase. The commencement of the remedial construction activities is expected to begin after the completion of the ESMP and RAP process.

1.7.2 Construction Phase

The construction of the flood and erosion control infrastructure for the Tudun Wada/Mabera communities and the drainage systems development activities, will require the use of existing access roadways to reach sections of the project

locations. Some of these access roadways will need to be rehabilitated as part of the construction works.

The preparation of the construction staging areas will require some localized vegetation clearance along some of the stormwater drainage corridors and the removal of incipient solid waste materials. Materials arising from excavations for the drainage corridors, foundations, stabilization walls (soil, rock etc.) and installation of gabions would be used to fill appropriate areas. The foundations will be in-filled with cement supplied via ready-mix-cement trucks or alternatively mixed on site. Vegetation clearing may be done manually or mechanically. A number of transport vehicles will be employed in the project but there will be no on-site maintenance of vehicles. The power equipment is expected to be used in the construction including power saws and compressors to break hard ground (if required). Earth moving equipment such as excavators, compactors, bulldozers and pay loaders will also be used at the site. Additionally, skilled and unskilled labor will be employed during the project implementation.

1.7.3 Post-Construction (Operations & Maintenance) Phase

Routine visual inspection and maintenance of the rehabilitated stormwater drainage corridors are expected. Access rights may need to be retained through the community watershed association to allow for maintenance works in the future. The flood and erosion control corridor will require routine periodic maintenance of the site infrastructure (culverts, gabions, drainage channels, roadways etc) as well as necessary oversight of any economic trees associated with the project.

1.8. Summary of the Structure of the ESMP Report

The structure and organization of this report are as follows:

- Executive Summary;
- Chapter 1: Introduction;
- Chapter 2: Institutional and legal framework;
- Chapter 3: Description of environmental baseline conditions;
- Chapter 4: Socioeconomic characteristics and Consultations with stakeholders;
- Chapter 5: Assessment of potential impacts and analysis of alternatives;
- Chapter 6: Environmental and social management plan (ESMP);
- Chapter 7: Conclusions and recommendations;
- Chapter 8: Decommissioning and abandonment;
- References; and,
- Annexures.

CHAPTER 2: INSTITUTIONAL AND LEGAL FRAMEWORK

This ESMP is guided by the requirements of the relevant and applicable state, national and international regulation, guidelines, conventions, industrial best management practices including the World Bank safeguard policies that are triggered by the project. The relevant legal and institutional framework applicable to NEWMAP has been fully discussed in the ESMF. These legal requirements and regulations are summarized below:

2.1 World Bank Environmental and Social Safeguard Policies

2.1.1 Triggered WB Safeguard Policies

The WB Integrated Safeguard Data Sheet (ISDS) for NEWMAP indicates that only three of the WB Safeguard Policies may be triggered by the project. These include OP 4.01 Environmental Assessment; OP 4.12 Involuntary Resettlement and OP 7.50 Projects on International Waterways. Based on the scope of construction and rehabilitation works required in the stormwater drainage rehabilitation intervention at Tudun Wada/Mabera communities as well as the specific rehabilitation activities proposed, Table 2.1 (Triggered Safeguard Policies for Tudun Wada Madera Project) summarizes the World Bank Safeguard Policies determined to be triggered by the project.

Table 2.1: Triggered Safeguard Policies

WB Safeguard Policy	Triggered by NEWMAP?		Triggered by MABERA Rehab Project?		Applicable To Project Due To	How Project Addresses Policy Requirements
	YES	NO	YES	NO		
Environmental Assessment (OP/BP4.01)	[x]	[]	[x]	[]	Civil works with site-specific impacts	ESMF prepared for NEWMAP & site specific mitigation measures developed in this ESMP
Natural Habitats (OP/BP4.04)	[]	[x]	[]	[x]	NA*	NA
Pest Management (OP 4.09)	[]	[x]	[]	[x]	NA	NA
Physical Cultural Resources (OP/BP 4.11)	[]	[x]	[x]	[]	This policy is not triggered by NEWMAP. However, the existence of cultural relics within the project areas may be an issue for consideration	This ESMP spells out appropriate site specific mitigation measures in the event of existence of any cultural relics
Involuntary Resettlement (OP/BP4.12)	[x]	[]	[x]	[]	Restriction of access to sources of livelihood.	RPF prepared for NEWMAP will guide required resettlements at the MABERA project locations. A standalone RAP is necessary to spell out site specific issues to be addressed & how.
Indigenous Peoples (OP/BP4.10)	[]	[x]	[]	[x]	NA	NA
Forests (OP/BP4.36)	[]	[x]	[]	[x]	NA	NA

WB Safeguard Policy	Triggered by NEWMAP?		Triggered by MABERA Rehab Project?		Applicable To Project Due To	How Project Addresses Policy Requirements
	YES	NO	YES	NO		
Safety of Dams (OP/BP4.37)	[]	[x]	[]	[x]	NA	NA
Projects in Disputed Areas (OP/BP7.60)	[]	[x]	[]	[x]	NA	NA
Projects on International Waterways (OP/BP7.50)	[x]	[]	[]	[x]	Sokoto state is not a coastline state in Nigeria. The subproject therefore does not trigger this policy	NA

NA* = Not Applicable

The applicable World Bank safeguard policies identified for Tudun Wada/Mabera project include: OP 4.01 Environmental Assessment, OP 4.11 Physical Cultural Resources and OP 4.12 Involuntary Resettlements. These World Bank safeguard policies are summarized as follows:

2.1.2 Environmental Assessment (EA) (OP 4.01):

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

2.1.3 Physical Cultural Resources (OP 4.11):

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

2.1.4 Involuntary Resettlement (OP 4.12):

Key objectives of the World Bank's policy on involuntary land acquisition are to avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs; assist displaced persons in improving their former living standards, income earning capacity and production level, or at least in restoring them; encourage community participation in planning and implementing resettlement; and provide assistance to affected people regardless of the legality of land tenure. The policy covers not only physical relocation, but any loss of land or other assets resulting in relocation, or loss of shelter; loss of assets or access to assets; loss of income sources or means of livelihood whether or not the affected people must move to another location. When the policy is triggered, a Resettlement Action Plan (RAP) must be prepared. An abbreviated plan may be developed when less than 200 people are affected by the project. In situations, where all the precise impacts cannot be assessed during project preparation, provisions are made for preparing a Resettlement Policy Framework (RPF). The RAP/RPF must ensure that all Bank's policy provisions detailed in OP 4.12 are addressed particularly the payment of compensation for affected assets at their replacement cost.

2.2 Federal Policy, Legal, Regulatory and Administrative Frameworks

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

The applicable environmental laws include the Environmental Impact Assessment Act No. 86 of 1992; the National Guidelines and Standards for Environmental Pollution Control in Nigeria (March 1991); the National Environmental Standards and Regulations Enforcement Agency (establishment) Act 2007 (NESREA), the Land Use Act 1978 (modified in 1990); the Forestry Act 1958; and the National Agricultural Policy 1988.

2.2.1 National Policy on Environment

The national policy on environment, 1989 (revised 1999), provides for “a viable national mechanism for cooperation, coordination and regular consultation, as well as harmonious management of the policy formulation and implementation process which required the establishment of effective institutions and linkages within and among the various tiers of government – federal, state and local government”. The defined guideline and strategies provide for the effective management of the environment in the following 14 major areas:

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

2.2.2 National Environmental Impact Assessment Act 1992:

National EIA Act 1992, Clause 2 provides that public or private sector of the economy shall not undertake or embark on or authorize projects or activities without prior consideration of the effects on the environment. 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 sectarian guidelines.

2.2.3 Nigerian Land Use Matters

The basic legal framework for the acquisition of land in Nigeria is the Land Use Act 1978 as amended under the Amended Land Use Act of 2004, Chapter L5 under the laws of the Federation of Nigeria. The Part 1 of the amended Act 2004 vests all land within the urban areas of any Nigerian State in the Executive Governor of that state. Land within the rural areas of the state is vested on the Local Government. The Part VI, Section 29 of the law provides for compensation to the holder of any land title when such land is to be acquired for public purposes. For developed land, the Governor (in the case of urban areas) or Local Government (in the case of rural areas) may, in lieu of compensation, offer resettlement in any other place as a reasonable alternative accommodation and in acceptance of resettlement, the holder's right to compensation shall be deemed to have been duly satisfied.

Although the Land Use Act is not strictly an Act for environmental protection, protection of the environment is one of the considerations which a holder of

certificate of occupancy has to observe.

2.2.4 National Erosion and Flood Control Policy 2005:

The general soil erosion & flood control guidelines provide necessary instructions for soil and water resources users to develop, implement and monitor plans that are to assure erosion and flood hazard mitigation. The maintenance of levees and other protective structures are also to be developed at areas with potential impacts. In addition to this, all requests for project plan approvals must include soil type and drainage pattern/structures in and around project area and the likely impact of the project on these duly certified.

2.2.5 NESREA Establishment Act, 2007.

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

The following NESREA National Environmental Regulations are considered relevant in this study:

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

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

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

2.2.7 National Waste Management Regulations of 1991

This regulation which is updated under the National Environmental (Sanitation and Waste Control) Regulations 2009, S.I. No. 28 mandates the collection, treatment, and disposal of solid and hazardous waste from municipal and industrial sources. It provides the legal framework for the adoption of sustainable and environment friendly practices in environmental sanitation and waste management to minimize pollution.

2.2.8 Approved National Forestry Policy 2006

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

The Forest Policy encourages and supports an aggressive establishment of

plantations of economic trees of both exotic and indigenous species. It provides for the preservation of forest and the setting up of forest reserves, and also provides goals, targets and implementation strategies for the management, development and use of forests and their resources and products. Nigeria is at present a wood deficit nation. The policy on forest resources management and sustainable use is aimed at achieving self-sufficiency in all aspects of forest product 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.

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

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

2.3 Other Relevant Acts and Legislations at Federal Level

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

2.3.1 The Basel Convention on the Control of Transboundary Movement of Hazardous Waste and Disposal, 1989

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

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

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

2.3.3 Agenda 21 - UN Conference on Environment and Development

At the United Nations Conference on Environment (also the Earth Summit) – held in Rio de Janeiro (1992), with recommendations from the WHO Commission, more than 150 member states adopted Agenda 21 - an action plan to guide future

strategies for health and environment activities on a national and international level. This fact provided the background for FEPA's EIA framework to ensure environmental sustainability of all types of activities in the oil and gas industry (FEPA, 1995).

2.3.4 Public Health Legislations and regulations

Several countries have legislation and regulations that stipulate the administrative and policy framework for conducting health impact assessment for a development project, whether as part of an EIA or a standalone study. In addition, a number of international agencies have endorsed this process, such as the World Banks, Asian Development Commission, and the World Health Organizations. In Nigeria, the Public Health Law (L.N47 of 1955, Cap 103) provides justification for the execution of developmental projects under guidelines that promote health by protecting the environment and safeguarding the health of humans.

2.3.5 WHO Health and Safety Component of EIA, 1987

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

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

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

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

2.3.7 United Nations Guiding Principle on the Human Environmental

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

2.3.8 The Rio Declaration on Environmental and Development

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

Other relevant international conventions include:

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

2.4 State Legislations

2.4.1 Sokoto State Waste Management Act

This Act provides for the effective development and maintenance of sanitation in all areas of the State. The law further provides for proper disposition of excavated silt or earth and other construction materials after any construction project or repair works. Open burning of wastes is prohibited with stipulated penalties.

2.5 Gaps between Nigerian Legislation and World Bank Policies

The gaps between the triggered Nigerian current legislation and WB policies as they relate to this project are summarized in Table 2.2 below:

Table 2.2: Gaps between Nigeria Legislation and WB Policies

Project Triggered Policies	Nigerian Legislation	World Bank Policy	Gaps Between the Policies
OP 4.01 Environmental Assessment	National EIA Act 1992, Clause 2 provides that public or private sector of the economy shall not undertake or embark on or authorize projects or activities without prior consideration of the effects on the environment. 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 sectorial guidelines. Responsibility for monitoring of EIA activities lies with the NESREA and State ministries of environment but these agencies lack the logistic capability to carry out the tasks assigned to it by the law	An EA is conducted to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. Any World Bank project that is likely to have potential adverse environmental risks and impacts in its area of influence requires an EA indicating the potential risks, mitigation measures and environmental management framework or plan.	Nigeria currently has a comprehensive framework for assessing and managing the environmental impacts of development projects. However, in comparison with the World Bank Safeguard Policies, it would appear that the Nigeria framework lacks the provision of clear requirements or guidance in the assessment of the impact of an activity on public health. In this case the policy of the bank prevails.
OP 4.11 Physical Cultural Resources	National Commission For Museums and Monuments Act of 1990, Chapter 242 seeks to protect and preserve any objects of archaeological interest wherever they may be found. Any person who discovers an object of archaeological interest in the course of operations permitted under section 19 of this Act shall notify the Commission.	The Bank seeks to assist countries to manage their physical cultural resources and avoid or mitigate adverse impact of development projects on these resources. This policy is triggered for any project that requires an EA.	There is no difference in the framework of both policies. Both policies provide for discovery and documentation and management of physical cultural resources. However, responsibility for monitoring of activities and enforcement under the Nigerian Regulations is effectively lacking. In this case the policy of the bank prevails.
OP 4.12 Involuntary Resettlement	The basic legal framework for the acquisition of land in Nigeria is the Land Use Act 1978 as amended under the Amended Land Use Act of 2004, Chapter L5 under the laws of the Federation of Nigeria. The Part 1 of the amended Act 2004 vests all land within the urban areas of any Nigerian State in the Executive Governor of that state. Land within the rural areas of the state is vested on the Local Government. The Part VI, Section 29 of the law provides for compensation to the holder of any land title when such land is to be acquired for public purposes. For developed land, the Governor (in the case of urban areas) or Local Government (in the case of rural areas) may, in lieu of compensation, offer resettlement in any other place as a reasonable alternative accommodation and in acceptance of resettlement, the holder's right to compensation shall be deemed to have been duly satisfied. Although the Land Use Act is not strictly an Act for environmental protection, protection of the environment is one of the considerations which a holder of certificate of occupancy has to observe.	Key objectives of the World Bank's policy on involuntary land acquisition are to avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs; assist displaced persons in improving their former living standards, income earning capacity and production level, or at least in restoring them; encourage community participation in planning and implementing resettlement; and provide assistance to affected people regardless of the legality of land tenure. The policy covers not only physical relocation, but any loss of land or other assets resulting in relocation, or loss of shelter; loss of assets or access to assets; loss of income sources or means of livelihood whether or not the affected people must move to another location. When the policy is triggered, a Resettlement Action Plan (RAP), must be prepared. An abbreviated plan may be developed when less than 200 people are affected by the project. In situations, where all the precise impacts cannot be assessed during project preparation, provisions are made for preparing a	Essentially, there is no difference in the main framework of both policies. Both policies require that compensation be paid for land acquired for public benefit. The Nigerian regulations however while lacking clear responsibility for monitoring of activities associated with compensations further lack provisions of logistics to carry out the tasks assigned to the legal enforcement agency. Lands that would be acquired for this project shall be fully compensated for in accordance with the World Bank policy and principles.

Project Triggered Policies	Nigerian Legislation	World Bank Policy	Gaps Between the Policies
		Resettlement Policy Framework (RPF). The RAP/RPF must ensure that all Bank's policy provisions detailed in OP 4.12 are addressed particularly the payment of compensation for affected assets at their replacement cost	

The summary descriptions of the WB Safeguard Policies are included as Annexure III.

CHAPTER 3: DESCRIPTION OF ENVIRONMENTAL BASELINE CONDITIONS

3.1 Introduction

This Section discusses the project area of influence as well as the general and specific baseline conditions that characterize the project area. The discussions are in three parts consisting of (i) the project area of influence; (ii) general environmental conditions; and, (iii) site specific environmental conditions focusing on the Tudun Wada/Mabera stormwater drainage development corridors that make up the project area.

3.1.1 General Conditions

The project area environmental characteristics which cut across the Tudun Wada/Mabera stormwater drainage corridors are discussed under Sections 3.2 through 3.7. The geologic and soil characteristics of the project area and the extent to which implementation of the proposed project could be affected by soil characteristics and other natural environmental factors are summarized below. The natural environmental factors include climate and vegetation, topography and landforms, hydrogeology and hydrologic patterns. Information sources for this evaluation include published literature, geotechnical investigations conducted by Enplan Group - the engineering design Consultant for this project and the physical observations made during site visit in the course of the Consultancy.

Prevailing climatic conditions were sourced from online and literature sources complimenting field data to establish the project area rainfall, ambient temperature, wind direction and speed, atmospheric pressure and relative humidity. Information and data relating to the vegetation, topographic, geological, hydrogeological, hydrological and hydraulic nature of the area were used to fully characterize the sub-watershed. Road transect or quadrat method was used to sample flora/fauna.

3.2 Baseline Environmental Setting

3.2.1 Climate

The latitudinal position of Sokoto State and its interior location away from the sea determine its climate and therefore its two main seasons (dry season from November to May and Wet season from June to October). The dry and rainy seasons in Nigeria come into existence due to the movement of the north-east winds and the south-west winds, respectively. The south-westerly winds are full of moisture and blusters from the Atlantic Ocean whereas the north-easterlies are dry and dirt-laden winds that primarily blow from the deserts of Sahara. The hot and dry Harmattan (northeast) winds from the Sahara sweep across Sokoto State and the project areas between November and February at wind speeds of between 2.3 mph and 6.15 mph, carrying a reddish dust from the desert while the southwest winds bring cloudy rainy weather between late June and October of each year. The Sokoto climate is mostly hot with maximum day temperature reaching 40⁰C during the peak of the hot season (May).

Typically, the area is affected by two of the wind patterns, the harmattan wind from the Sahara which is responsible for the cool dry months of November to February (about 24⁰C) and the Southwest Monsoon Trade Winds blowing across the Atlantic Ocean which is responsible for the rains of June to October as shown in Figure 3-1. Average relative humidity is put at 42%. The average rainfall is from about 800mm to 1000mm. (Tukur, A 2014). Figure 3-1 shows the plot of average monthly

temperature and rainfall distribution through the year.

Sokoto State falls within the dry sub-humid agro-climatological zone of Sudan and Guinea Savannah vegetation zone. Generally, the climate of the project area is semi-arid tropical climate with marked wet and dry seasons. Virtually no rain falls in the project areas during the northern hemisphere winter. The relative humidity generally ranges from 17 to 84 percent. During the months December to February, 'harmattan' dust associated with the low-level anticyclones centred Northeast of Nigeria, occurs when high level westerlies oscillate into low Latitudes. Air temperatures vary through the year with relative coldness between November to March, with daily maximum temperatures of 30°C to 42°C and minimum temperatures of 15°C to 29°C. During April and May, the temperature rises to the maximum. (Ibrahim, A 1990).

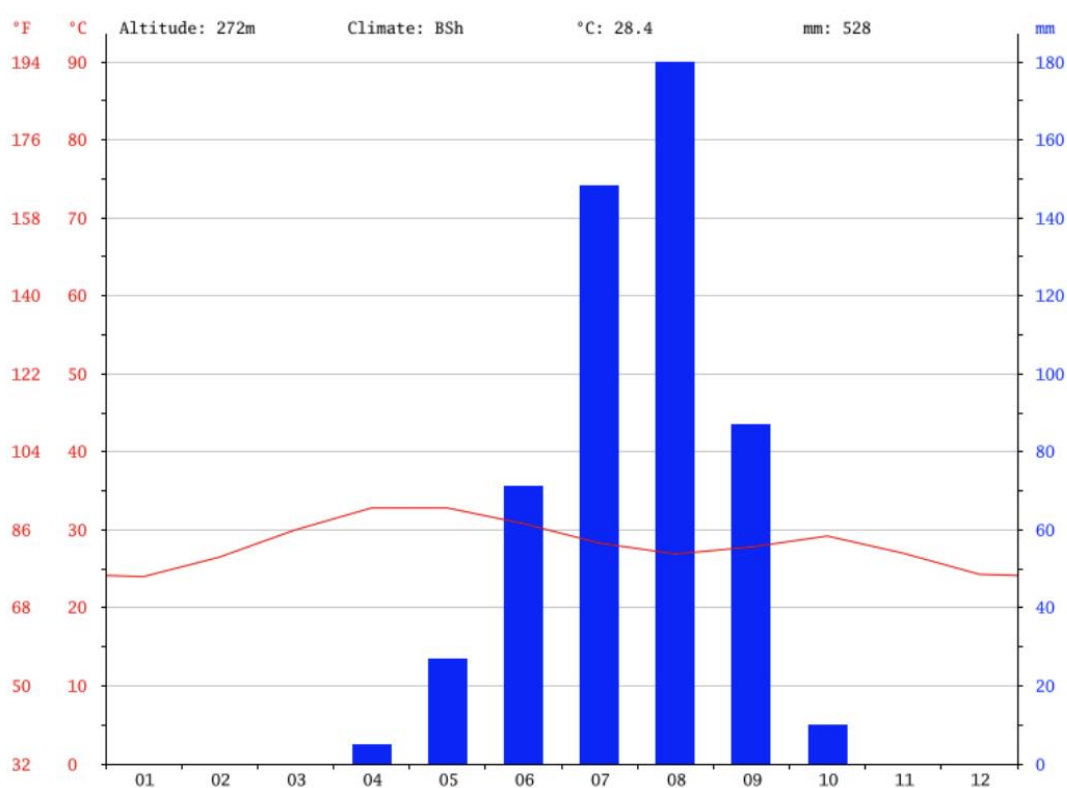


Fig. 3.1: Temperature and Rainfall Distribution in Project Areas
(Source: Climate-data.org)

3.2.2 Geology and Hydrology

Geologically speaking, Mabera, Nakasari, Gagi and Kurfi areas which are located in Sokoto metropolis falls within the Sokoto Basin, which is part of an extensive elongated sedimentary basin underlying most of the North-west Nigeria and Eastern part of Niger republic. The Sokoto basin is characterized by many geological formations which include, Illo/Gundumi, Taloka, Wurno Dukamaje, Dange, Kalambaina, Gamba and Gwandu formations (Mathew, 2002). The Sokoto basin consists of sediments whose ages range from the Cretaceous to the Eocene. The study area lies within the Dange, Wurno and Kalambaina Formations.

Sokoto metropolis of which the communities in question are part of is geologically underlain by the Kalambaina Formation which consist of marine, white locally clayey limestone and

shale. The limestone often contained lime mud and is richly fossiliferous. The thickness of the formation varies due to erosion and sub-surface dissolution. The maximum thickness in boreholes is more than 20m, but usually only about 12m of the section is exposed.

The shallow hand dug wells in Maberu area are mostly recharged by the sandy flood plain aquifers of the Rima river and the static water level (SWL) is about 15 meters. Other wells that are sunk deeper receive their water from the calcareous (limestone) aquifers of the Kalambaina formation. Recently due to over abstraction of the limestone aquifer, cone of depression (lowering of water table) is beginning to be observed in shallow wells dug around the area. Productive motorized boreholes of high yield encountered are deep wells of about 100 meters or deeper. Hand dug wells and shallow boreholes tapping the Kalambaina limestone aquifer are generally seasonal.

In the Nakasari, Gagi and Kurfi areas, static water level is high and in some places especially at Kurfi area gets as shallow as 5 meters because of the low lying nature of the topography. The hand-dug wells are recharged by the sandy River Sokoto flood plain aquifers. The areas are drained by the River Sokoto which snakes its course farther downstream.

The geologic and soil characteristics of the project area and the extent to which implementation of the proposed project could be affected by soil characteristics and other natural environment factors are summarized below. The natural environmental factors include climate and vegetation, topography and landforms, hydrogeology and hydrologic patterns.

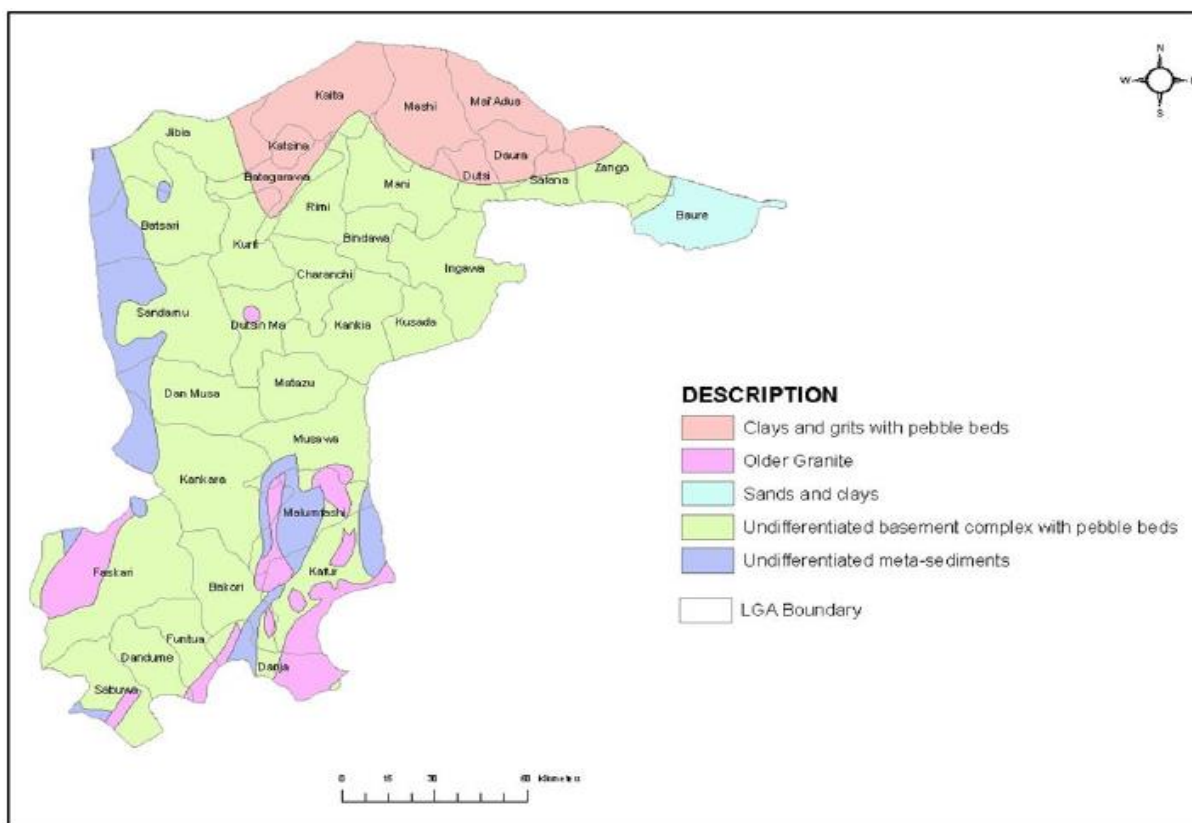


Fig. 3.2: Geology of Sokoto State

Source: Enplan Group Engineering Design Report (Sept. 2019)

3.2.3 Soil Types

The soils around proposed Tudun Wada/Maberu drainage corridors are predominantly silty

sand and clayey sand due to the sandy nature of the wind-blown desert sand. However, there are some deposits of Aeolic sand along the inverts of the drains.

3.2.4 Biodiversity

The ecological survey of the immediate project area provides necessary information about the wildlife (vegetation cover and fauna) of the area, which is a vital indicator of its ecological dynamics. It also provides baseline information that can be useful for monitoring and the assessment of project implementation effectiveness.

3.2.4.1 Vegetation

Sokoto state is predominantly Sudan Savanna which consists of scattered trees with sparse shrubs and grass. The trees here grow long tap roots and thick barks that make it possible for them to withstand the long dry season. The grass too has long durable roots which remain underground after stalks are burnt away or wilted in the dry season only to germinate with the first rains. This area has been subjected to many years of bush burning and over grazing. Trees such as *Azadirachia indica* (Neem) and *Perkia biglobosa* (Locust Bean) are now being planted to check against desert encroachment and erosion.

The vegetative cover of the project area is highly heterogeneous due to severe anthropogenic disturbance. Sampling of flora and fauna in the project area was conducted using quadrats in each of the identified land use categories and 100% enumeration of trees within each quadrat was carried out. Known species and others species of interest were identified and classified using standard taxonomic procedures. A listing of plant species with frequent or abundant distribution identified in the various categories are shown in Table 3-1

Table 3.1: Listing of Prominent and Indicator Plant Species Found at Tudun Wada/Mabera Project Area

S/N	Species	Family	Life form	Common name	Local Name	Distribution
1	<i>Ocimum gratissimum</i>	Fabaceae	Tree	scent leave	Daddooya	Common
2	<i>Celtis australis</i>	Cannabaceae	Tree	Nettle tree	Cuwo	Common
3	<i>Ziziphus mauritiana</i>	Rhamnaceae	Tree	Gujube tree	Magarya/ Samo	Common
4	<i>Mitracarpus maxwelliae</i>	Rubiaceae	Herb	Girdlepod	Yar wati	Common
5	<i>Aristolochia albida</i>	Aristolochioideae	Herb	Kurtu	Kadacin kasa	Common
6	<i>Acacia nilotica</i>	Mimosaceae	Tree	Thorn Mimosa	Bagaruwa	Common
7	<i>Maerua crassifolia</i>	Capparaceae	Tree	Maerruwa plant	Jirga	Common
8	<i>Crotalaria sp</i>	Fabaceae	Shrub	Pattlepods	Jar bii raana	Common
9	<i>Ceratotheca sesamoides</i>	Pedaliaceae	Herb	False sesame	Yando	Common
10	<i>Lannea microcarpa</i>	Aacurdiaceae	Herbs	Tree grapes	Faaruu	Common
11	<i>Calotropis procera</i>	Hyceaepocynaleae	Herb	Apple of Sodom	Tùmfááfiiyáá/ tùmfàáfíí	Common
12	<i>Piliostigma thonningii</i>	Fabaceae	Herb	Camel Foottree	Kalgoo	Common
13	<i>Anogeissus leiocarpus</i>	Combretaceae	Herb	African Birch	Kwankila	Common
14	<i>Combretum micranthum</i>	Combretaceae	Herb	Kinkeliba	Geeza	Common
15	<i>Combretum ghaselense</i>	Combretaceae	Herb	Kangoon creeper	Turamniya/Tura r tarauniya	Common
16	<i>Guiera senegalensis</i>	Combretaceae	Herb	Moshi medicine	Sàábàràà	Common

S/N	Species	Family	Life form	Common name	Local Name	Distribution
17	<i>Prosopis africana</i>	Fabaceae	Herb	Pavcarvao	Kirya	Common
18	<i>Banhinia ruteslens</i>	Fabaceae	Herb	White orchid-tree	Tirga	Common
19	<i>Parkinsonia aculeate</i>	Fabaceae	Herb	Jerusalem thorn	Bàgààrúúwáí Mákkà	Common
20	<i>Acacia sieberana</i>	Fabaceae	Herb	White thorn	Farar kaya	Common
21	<i>Mimosa pigra</i>	Fabaceae	Herb	Giant sensitive plant	Dan kunya	Common
22	<i>Ziziphus abyssinica</i>	Rhamnaceae	Herb	Catch throne	Mágaryáá	Common
23	<i>Balanites aegyptiaca</i>	Zygophyllaleae	Herb	Desert date	Ádúúwàà	Common
24	<i>Euphorbia balsamifera</i>	Euphorbiaceae	Herb	Spurge	Aguwa	Common
25	<i>Boscia senegalensis</i>	Capparaceae	Herb	Alzen	Lilo	Common
26	<i>Acacia hebecladoides</i>	Fabaceae	Herb	Candle thron	Bakar kayaa	Common
27	<i>Nymphaea lotus</i>	Nymphaeaceae	Herb	Water-lily	Bado	Common
28	<i>Adansonia digitata</i>	Malvaceae	Herb	Monkey –bread tree	Kulambali	Common
29	<i>Moringa oleitera</i>	Moringaceae	Herb	Drumstick tree	Zoogale	Common
30	<i>Rogeria adenophylla</i>	Pedaliaceae	Herb		Loodaa	Common
31	<i>Borassus aethiopum</i>	Arecaceae	Herb	Palmyra palm	Giginya	Common
32	<i>Hyphaene thebaica</i>	Arecaceae	Herb	Doum palm	Gòòríbà	Common
33	<i>Tamarindus india</i>	Fabaceae	Herb	Famarind	Tsáámííyáá	Common
34	<i>Pergularia tomentosa</i>	Apocynaceae	Herb		Fatacco	Common
35	<i>Azadirachta indica</i>	Meliaceae	Tree	Neem tree	Gadina/ dogo yaro	Common
36	<i>Ficus sur</i>	Moraceae	Tree	Cape fig	Hagucuwa /Haguguwa	Common
37	<i>Ipomoea muricata</i>	Convolvulacea	Tree	Lavender flower plant	Yáryàádíí	Common
38	<i>Senna occidentalis</i>	Fabaceae	Shrub	Coffee senna	Sàngáásàngàà	Common
39	<i>Eucalyptus camandilensis</i>	Myrtaceae	Tree	River red gom	Turara	Rare
40	<i>Alchornea cordifolia</i>	Euphorbiaceae	Herb	Chrsitmas bush	Bambami	Common
41	<i>Bergia suffruticosa</i>	Elatinaceae	Herb	Water wort plant	Jishiya	Common
42	<i>Schrankia leptocarpa</i>	Fabaceae	Herb	Sensitive plant	-	Common
43	<i>Acacia macrothyrsa</i>	Tabaceae	Tree	Cacia	Gaba cara	Common
44	<i>Feretia apopdanthera</i>	Rubiaceae	Tree	Feretia	Kurukuru	Common
45	<i>Ademium obesum</i>	Apocynaceae	Tree	Desert rose	Gariya	Rare
46	<i>Asparagus africana</i>	Asparagaceae	Tree	Asparagus	Sarka	Rare
47	<i>Erythrophleum africanum</i>	Fabaceae	Tree	African Blackwood	Sàmbèèrúú	Common

S/N	Species	Family	Life form	Common name	Local Name	Distribution
48	<i>Sorghum bicolor</i>	Poaceae	Herb	Guinea corn	Dawa	Common
49	<i>Solanum incanum</i>	Solanaceae	Herb	Garden egg	Layo	Common
50	<i>Aristolochia albida</i>	Aristolochideae	Herb	Birthwort, pipevine	Kadacin kasa	Common
51	<i>Ipomoea asarifolia</i>	Convolvaceae	Herb	Ginger-leaf morning-glory	Duman kadaá	Most Common
52	<i>Digitaria debilis</i>	Poaceae	Herb	Finger –grass	Ahrkiyaa	Rare
53	<i>Diospyros mespiliformis</i>	Ebenaceae	Tree	Jackalberry	Kaiwaa	Rare
54	<i>Psidium guajava</i>	Myrtaceae	Tree	Guava	Góóbàà	Rare
55	<i>Mangifera indica</i>	Anacardiaceae	Tree	Mango	Màngwàrò	Common
56	<i>Pennisetum purpureum</i>	Poaceae	Grass	Elephant grass	Yambama	Common
57	<i>Mitracarpus hirtus</i>	Rubiaceae	Herb	Button grass	Yar wati	Common

Source: Sokoto NEWMAP ESMP Field Survey, December 2019.

Table 3.2: Major Cultivated/Agronomic Species at Tudun Wada/Mabera Project Site

S/N	Species	Family	Life Form	Common Name	Local names (Hausa)	Distribution
1	<i>Allium sativum</i>	Amaryllidaceae	Herb	Garlic	Tàfànnúúwáá	Common
2	<i>Capsicum annum</i>	Solanaceae	Herb	Pepper	Tàttààshíí/shom bo	Common
3	<i>Ipomoea batatas</i>	Convolvulaceae	Herb	Sweet potato	Dankali	Common
4	<i>Anacardium occidentale</i>	Anacardiaceae	Tree	Cashew	Yazawa	Rare
5	<i>Manihot esculenta</i>	Eupobiaceae	Herb	Cassava	Rogo	Common
6	<i>Zea mays</i>	Poaceae	Herb	Maize	Masara	Common
7	<i>Musa paradisiaca</i>	Musaceae	Herb	Plantain	Ayaba	Rare
8	<i>Eucalyptus camandilensis</i>	Myrtaceae	Tree	River red gom	Turara	Rare
9	<i>Terminalia catapa</i>	Combretaceae	Tree	Umbrella Tree	Bawshi	Rare
10	<i>Vigna Unguiculata</i>	Fabaceae	Herb	Cowpea	Wake	Common
11	<i>Ixora spp</i>	Rubiaceae	Shrub	Ixora	Dan miski	Rare
12.	<i>Allium cepa</i>	Amaryllidaceae	Herb	Onion	Albasa	Common
13.	<i>Oryza sativa</i>	Gramineae	Herb	Rice	Shinkafa	Common
14	<i>Citrus sinensis</i>	Rutaceae	Tree	Orange	Lemo	Rare
15	<i>Zingiber Officinale</i>	Zingiberaceae	Herb	Ginger	Citta	Common
16	<i>Arachis hypogaea</i>	Fabaceae	Herb	Groundnut	Gyada	Common
17	<i>Terminalia spp</i>	Combretaceae	Tree	Cameroon Tree	Bawshi	Rare
18	<i>Pennisetum glaucum</i>	Poaceae	Herb	Millet	Gero	Common

S/N	Species	Family	Life Form	Common Name	Local names (Hausa)	Distribution
19	<i>Mangifera indica</i>	Anacardiaceae	Tree	Mango	Màngwàrò	Common
20	<i>Gossypium hirsutum</i>	Malvaceae	Herb	Cotton	Auduga	Rare
21	<i>Solanum melongena</i>	Solanaceae	Herb	Garden egg	Yáálóó	Rare
22	<i>Sesamum indicum</i>	Pedaliaceae	Herb	Benniseed	Ridi	Common
23	<i>Musa sapientum</i>	Musaceae	Herb	Banana	Ayaba	Common
24	<i>Saccharum officinarum</i>	Poaceae	Herb	Sugarcane	Rake	Common
25	<i>Sorghum bicolor</i>	Poaceae	Grass	Guinea corn	Dawa	Common

Source: Sokoto NEWMAP ESMP Field Survey, December 2019.

3.2.4.2 Animal Inventory of the Watershed

Domestic Animals:

These include mammal such as goats, sheep, cattle, camel, donkey and aves such as birds, local fowls and agricultural fowls.

Wild Animals:

The terrestrial animals include: *Rattus spp* (Rat); *Funisciurus anerythus* (squirrel); *Hyperolius spp* (African frog), *Lepus capensis* (Brown Hare). The aquatic animals include: *Tilapia spp* (cat fish); *Cymbacephalus beauforti* (Crocodile fish) while the reptiles include: *Iguana iguana* (Green lizard), *Crocodylus niloticus* (Crocodile).

Table 3.3: Animal and Livestock Species At Tudun Wada/Mabera Site

S/N	Species	Common/Local Name	IUCN Threat Status
1	<i>Lepus capensis</i>	Brown Hare//Zono	Not Listed
2	<i>Cricetomys gambianis</i>	Pouched Rat /Burgu	Not Listed
3	<i>Funisciurus anerythus</i>	Striped Squirrel/Kurege	Not Listed
4	<i>Iguana iguana</i>	Green Lizard/Kadangare	Not Listed
5	<i>Agama agama</i>	Common Lizard/Kadangare	Not Listed
6	<i>Chamaeleo dilepis</i>	Flap necked Chameleon /Kulba	Not Listed
7	<i>Hyperolius spp</i>	African reed frog/Kwado	Not Listed
8	<i>Milvus migrans</i>	Black kite / Kyebebe	Not Listed
9	<i>Tyto alba</i>	Barn Owl/Mujiya	Not Listed
10	<i>Polyboroides radiates</i>	Hawk/Balbela	Not Listed
11	<i>Neotis denhami</i>	Bustard /mamanin	Not Listed
12	<i>Columba guinea</i>	Spekled pigeon/Fakara	Not Listed
13	<i>Numidia meleagris</i>	Helmeted guineafowl zabo	Not Listed
14	<i>Danaus spp</i>	Butterfly /malam budelittafi	Not Listed
15	<i>Rana ridibunda</i>	Marsh frog/kwado	Not Listed

S/N	Species	Common/local Name	IUCN Threat Status
16	<i>Bos taurus</i>	Cattle/shanu	Not Listed
17	<i>Ovis aries</i>	Sheep/Tumaki	Not Listed
18	<i>Capra aegagru</i>	Goat/awaki	Not Listed
19	<i>Equus africanus</i>	Donkey/ jaki	Not Listed
20	<i>Rattus norvegicue</i>	Rat/bera	Not Listed
21	<i>Oryctolagus cunicuti</i>	Rabbit/zomo	Not Listed
22	<i>Camelus dromedanus</i>	Camel/Rakumi	Not Listed
23	<i>Latis niloticus</i>	Nile perch/giwa ruwa	Not Listed
24	<i>Gallus gallus</i>	Chicken/Kaza	Not Listed
25	<i>Falco tinnunculus</i>	Common kestrel / Taltabara	Not listed
26	<i>Sitophilus oryzae</i>	Weevil eater / Dale	Not listed
27	<i>Eleutherodaetylus marnockii</i>	Common water frog	Not listed
28	<i>Cymbacephalus beauforti</i>	Crocodile fish	Not listed
29	<i>Tilapia nilotica</i>	Catfish/gargaza	Not listed
30	<i>Gymnacus niloticus</i>	Frankfish / yauri	Not Listed
31	<i>Meleagris spp</i>	Turkey/talotalo	Not listed
32	Alligator mississippiensis	Alligator / Damo	Not listed
33	Dendroaspis polylepis	Black mamba/ bakin maciji	Not listed
34	Vespula germanica	Wasps	Not listed
35	Opodiphthera eucalypti	Moths	Not listed
36	Eleutherodactylus marnockii	Cliff frog/kwado	Not listed
37	Crocodylus spp	Crocodile/kada	Not listed

Source: Sokoto NEWMAP ESMP Field Survey, December 2019.

3.2.5 General Geomorphology

3.2.5.1 Slope Instability and Subsidence

The stability or instability of a slope is greatly dependent upon factors such as gradient, available water content, existing vegetation, and stresses (natural and anthropomorphic) affecting the slope. For example, a denuded, saturated slope could be further destabilized and fail if it was to be stressed by considerable earth moving activities. The terrain of the project area is relatively of uniform surfaces.

Land subsidence is the loss of surface elevation due to removal of subsurface support. Subsidence has many causes, including seismically induced stresses and the extraction of mineral or liquid and gas deposits. Although mineral and gas can and do cause subsidence, it is more common for subsidence to occur as a result of groundwater extraction in excess of groundwater recharge. There are no known studies on subsidence in the project area or

surrounding region. However, subsidence in the region as a whole may be limited because the various geologic and hydrologic conditions associated with subsidence are not known to occur in the project area.

3.2.5.2 Natural Drainage Corridors

Major rivers which originate in or traverse Sokoto state include Tinkisso, Sankarani, Milo, Bani, Mekrou, Alibori, Sokoto, Sota, Rima, etc. These rivers contain water only during the rainy season and have little or no water during the dry season.

Survey maps that included Satellite Imagery and Topographic profiles were used to guide interpretations of storm water flows throughout the project area. The watershed drainage features were identified through interpretation of 5-meter contour intervals topographic map. Drainage features within the scope of this investigation included any topographic feature that could potentially concentrate surface runoff, including convergent topography, swales and existing channels.

3.2.6 Archaeology and Cultural Heritage:

There are no World Heritage Sites or areas of cultural importance that would be impacted by the proposed project, nor are there any archeologically sensitive areas. However, there is the existence of several burial grounds & other cultural relics within and inclose proximity to the project areas. This ESMP spells out appropriate site specific mitigation measures for any burial ground and other cultural relics that maybe found during the project implementation.

3.2.7 Traffic and Transport Infrastructure:

The project area is served by several intra-linkage roads which are now severely degraded by the floods and erosion. The access roads to Tudun Wada/Mabera project area currently experience low level of traffic flow due to developmental and flooding/erosion problems. This is envisaged to gradually improve once the flood and erosion control intervention project is completed, and as additional residential areas develop and the road surfacing is improved.

3.2.8 Waste Management:

Waste management provision in the project area is generally lacking. Solid wastes are generally handled in individual homesteads and are either burnt or disposed of in small earth fills to rot. The major type of toilet facility owned by the households in Mabera project catchment areas and with which it disposes fecal wastes was covered pit latrines. Most of the people defecate in open spaces. In most cases, the wastes are indiscriminately disposed of in the environment. There are no structured waste collections within the Mabera catchment areas resulting, to a large extent, in wastes being indiscriminately dumped in isolated places. There are also no effective sewerage works in the project areas.

3.3 Site-Specific Baseline Environmental Setting

3.3.1 Tudun Wada/Mabera Communities Baseline Setting

Soil, water and air samples were collected from various locations within the proposed Tudun Wada/Mabera project area. The matrix of sampling media and sampling locations for the drainage corridors are shown in Table 3.4. The collected samples were submitted to MGG Laboratory for analyses to assess the baseline environmental conditions within the project area.

Table 3.4: Sampling Locations and Coordinates along the Drainage Corridor

SAMPLING LOCATIONS AND COORDINATES ACROSS THE TUDUN WADA/MABERA STORMWATER DRAINAGE CONTROL SITE				
SAMPLE MEDIA	SAMPLE MODE	SAMPLE LOCATION	CODE	COORDINATES
TUDUN WADA/MABERA SITE				
SOIL SAMPLE	TARGETED	TAFARKI ROAD	TWM/SS/01	N 13 ^o 01.987' E 5 ^o 15.760'

SAMPLING LOCATIONS AND COORDINATES ACROSS THE TUDUN WADA/MABERA STORMWATER DRAINAGE CONTROL SITE				
	RANDOM	RIJIYAR YARTUTU	TWM/SS/02	N 13°01.891' E 5°15.269'
	TARGETED	KANTIN SANI - IDDI ROAD (MASSALACIN BIN ABBAS MOSQUE)	TWM/SS/03	N 13°02.066' E 5°15.545'
	TARGETED	TRADE FAIR COMPLEX	TWM/SS/04	N 13°00.859' E 5°15.440'
GROUND WATER SAMPLE	TARGETED	TAFARKI ROAD	TWM/GWS/01	N 13°01.987' E 5°15.760'
	TARGETED	RIJIYAR YARTUTU	TWM/GWS/02	N 13°01.891' E 5°15.269'
	TARGETED	KANTIN SANI - IDDI ROAD (MASSALACIN BIN ABBAS MOSQUE)	TWM/GWS/03	N 13°02.066' E 5°15.545'
	TARGETED	TRADE FAIR COMPLEX	TWM/GWS/04	N 13°00.859' E 5°15.440'
AIR QUALITY	RANDOM	TAFARKI ROAD	TWM/AS/01	N 13°01.987' E 5°15.760'
	TARGETED	RIJIYAR YARTUTU	TWM/AS/02	N 13°01.891' E 5°15.269'
	TARGETED	KANTIN SANI - IDDI ROAD (MASSALACIN BIN ABBAS MOSQUE)	TWM/AS/03	N 13°02.066' E 5°15.545'
	RANDOM	TRADE FAIR COMPLEX	TWM/AS/04	N 13°00.859' E 5°15.440'

3.3.1.1 Soil Analytical Conditions

Representative near-surface soil samples for laboratory analysis were collected from five locations (targeted and random) points along the proposed Tudun Wada/Mabera drainage corridors. Two targeted locations were selected from areas with observed environmental conditions that suggest contamination while three locations were randomly selected to depict general conditions along the drainage corridor. The sample locations are shown in Table 3.4. Each near surface soil sample (0 - 6 inches depth) was collected using the Dutch hand auger and put in a properly labeled self-sealing plastic bag for shipment to the FMEnv-certified MGG Resources Laboratory at Nsukka for chemical analysis. The baseline analytical results of the soil samples are summarized in Table 3.5.

Table 3.5: Baseline Soil Quality Analysis for Tudun Wada/Mabera Site

S/N	PARAMETERS TESTED	UNITS	NESREA/ FMENV LIMITS	ANALYTICAL RESULTS				
				SS1	SS2	SS3	SS4	
1	pH (KCl)	-	-	9.6	8.8	9.8	9.4	
2	pH (10% solution @ 25°C)	-	6.5-9.0	10.4	9.5	10.6	10.1	
3	Nitrate	mg/kg	-	3.00	0.96	4.20	2.44	
4	Moisture	%	-	8.23	33.87	23.15	21.51	
5	Electrical conductivity	µS/Cm	-	5.00	5.00	9.00	6.00	
6	Soil Colour	-	-	Whitish	Whitish	Darkish	Whitish	
7	Potassium (K ⁺)	mg/kg	-	0.04	0.13	0.03	0.04	
8	Magnesium (Mg ²⁺)	mg/kg	-	2.80	3.60	3.00	2.60	
9	Calcium (Ca ²⁺)	mg/kg	-	5.20	12.40	10.40	6.20	
10	Sodium (Na ⁺)	mg/kg	-	0.02	0.07	0.01	0.02	

S/N	PARAMETERS TESTED	UNITS	NESREA/ FMENV LIMITS	ANALYTICAL RESULTS				
				SS1	SS2	SS3	SS4	
11	Available Phosphorus	mg/kg	5	1.87	20.52	18.65	2.80	
12	Organic Matter	%	-	0.20	3.27	0.54	0.40	
13	Nitrogen	%	-	0.05	0.17	0.07	0.06	
14	Organic Carbon	%	-	0.12	1.99	0.31	0.23	
15	Iron (Fe ²⁺)	mg/kg	-	0.98	1.22	3.55	0.49	
16	Lead (Pb ²⁺)	mg/kg	164	1.00	0.25	0.50	0.50	
17	Copper (Cu ²⁺)	mg/kg	100	Bdl	0.13	Bdl	0.03	
18	Zinc(Zn ²⁺)	mg/kg	-	0.37	0.61	0.47	0.17	
19	Grain Size Distribution (Coarse Sand)	%	-	51.00	39.00	42.00	25.00	
20	Grain Size Distribution (Clay)	%	-	7.00	9.00	7.00	7.00	
21	Grain Size Distribution (Silt)	%	-	1.00	5.00	3.00	5.00	
22	Grain Size Distribution (Fine Sand)	%	-	40.00	47.00	48.00	63.00	
23	Textural Class	-	-	Sandy	Sandy	Sandy	Sandy	

3.3.1.2 Surface Water Condition

No surface water was found throughout the proposed Tudun Wada/Mabera project area. Consequently no surface water was sampled for laboratory analysis.

3.3.1.3 Ground Water Condition

To assess the groundwater conditions, three representative samples of groundwater were collected along the proposed Tudun Wada/Mabera drainage corridors. Their locations are as shown in Table 3.3. The water samples were collected in a clean sampling bottle for laboratory analysis. The water sample bottles were sealed, labeled and preserved in an ice-filled chest before shipping to the MGG Resources Laboratory at Nsukka for chemical analyses. The summary of baseline analytical results of the surface and ground water samples are as shown in Table 3.6.

Table 3.6: Baseline Groundwater Quality Analysis for Tudun Wada/Mabera Site

S/N	PARAMETERS TESTED	UNITS	NESREA/ FMENV LIMITS	WHO LIMITS	ANALYTICAL RESULTS			
					GW1	GW2	GW3	GW4
1	Temperature	° C	40	32-34	32.2	33.8	34.8	28.8
2	pH	-	6.5 - 8.0	6.5-8.5	7.70	8.0	8.60	7.20
3	Taste	-	NS	Nil	Has taste	Has taste	Has taste	Has taste
4	Appearance	-	NS	Nil	Turbid	Turbid	Turbid	Turbid
5	Odour	-	NS	Nil	Has odour	Has odour	Has odour	Has odour
6	Total Dissolved Solids	mg/L	2100	500	690.00	564.00	415.00	207.00
7	Conductivity	µS/Cm	1000 µS/Cm	1500	1340	1088.00	830.00	414.00
8	Total hardness	mg/L	NS	120-180	508.00	184.00	276.00	24.00
9	Chloride	mg/L	NS	250	147.68	52.54	66.74	56.80
10	Fluoride	mg/L	NS	2.0	0.21	0.23	0.25	0.24
11	Sodium	mg/L	10	20	7.86	6.48	7.19	7.19
12	Potassium	mg/L	NS	NS	12.61	12.61	4.49	2.55
13	Sulphate	mg/L	250	250	4.04	0.01	8.09	43.73
14	Sulphide	mg/L	NS	0.2	0.47	0.19	0.11	0.15
15	Ammonia	mg/L	NS	1.5	0.22	0.25	0.06	0.27
16	Nitrate	mg/L	50	10	0.43	0.09	0.12	0.07
17	Phosphate	mg/L	5	5	0.01	0.01	0.04	0.01
18	DO	mg/L	6	6	4.00	4.24	4.00	5.20
19	BOD	mg/L	6	6	14.40	32.00	17.60	24.00
20	COD	mg/L	30	NS	48.00	106.40	58.40	80.00
21	Chromium	mg/L	0.1	0.03	Bdl	Bdl	0.06	0.12
22	Copper	mg/L	3	2	0.03	0.06	Bdl	0.09
23	Iron	mg/L	1	0.3	0.86	Bdl	1.35	0.24
24	Zinc	mg/L	< 1	0.01	0.03	0.61	0.03	0.17
25	Lead	mg/L	0.1	0.01	Bdl	0.03	Bdl	0.25
26	Nickel	mg/L	0.1	0.2	Bdl	0.20	0.31	Bdl
27	Manganese	mg/L	0.01	0.02	Bdl	Bdl	0.13	Bdl
28	Silver (Ag ⁺)	mg/L	< 1	0.10	Bdl	Bdl	0.03	Bdl
29	Calcium	mg/L	NS	NS	76.80	40.00	28.8	24.00
30	Magnesium	mg/L	NS	NS	92.20	144.00	247.20	124.00
31	Total Alkalinity	mg/L	NS	NS	34.00	62.00	108.00	76.00
32	Hydroxide	mg/L	NS	NS	Nil	Nil	Nil	Nil
33	Bicarbonate	mg/L	NS	NS	32.00	58.00	86.00	68.00
Microbial Analysis								
34	<i>E.coli</i>	cfu/ml	0	0	3.0 x 10 ⁰	1.0 x 10 ⁰	1.0x 10 ⁰	3.0 x 10 ⁰
35	Total coliform	cfu/ml	0	0	6.0 x 10 ¹	1.0 x 10 ²	2.0 x 10 ¹	4.0 x 10 ¹
36	Total viable counts	cfu/ml	NS	NS	7.0 x 10 ²	5.0 x 10 ³	2.0 x 10 ⁶	3.0 x 10 ³

µS/Cm = MicroSiemens per centimeter
 Bdl = Below detectable level
 mg/L = milligram per litre
 cfu = Coliform forming units.

3.3.1.4 Air Quality

Air quality assessment was carried out at several locations along the proposed Tudun Wada/Mabera drainage corridor where active construction operations are anticipated and where human activities are expected to be high. Samples were collected using the Dragner CMS Gas Analyzer. Ambient air was drawn into the calibrated equipment at the targeted locations and subsequently the digital readings for the various parameters were read off the instrument. The location coordinates for each sampling location are also given. The parameters measured as part of the air quality assessment included carbon monoxide (CO), Ammonia (NH₃), Hydrogen Sulphide (H₂S), Sulphur Dioxide (SO₂), Nitrogen Oxides (NO_x), Volatile Organic Carbon (VOC) as well as suspended particulate matter (SPM). The baseline analytical results of the air pollution indicators within and around the project corridor are shown in Table 3.7.

Table 3.7: Baseline Air Quality Analysis for Tudun Wada/Mabera Site

S/N	PARAMETERS TESTED	UNITS	NESREA/ FMENV LIMITS	ANALYTICAL RESULTS				
				AS1	AS2	AS3	AS4	
1	Hydrogen Sulphide (H ₂ S)	Mg/Nm ³	5	1.00	0.00	1	2.00	
2	Carbon monoxide (CO)	Mg/Nm ³	500	0.00	0.00	2.00	0.00	
3	Nitric Oxide (NO)	Mg/Nm ³	300	3.99	5.38	6.36	6.35	
4	Nitric dioxide (NO ₂)	Mg/Nm ³	300	2.42	1.59	1.48	1.46	
5	Sulphur dioxide	Mg/Nm ³	500	1.24	1.43	1.25	1.24	
6	Hydrogen Cyanide (HCN)	Mg/Nm ³	NS	3.62	3.66	3.76	2.71	
7	Ammonia (NH ₃)	Mg/Nm ³	NS	3.22	3.42	3.12	3.10	
8	Oxygen	Mg/Nm ³	NS	20.8	20.8	20.8	20.8	

BDL = Below detectable limit.

MGA = M40 Gas Analyser

Ppm = Parts per million.

3.3.1.4 Noise and Vibration:

The proposed Tudun Wada/Mabera project area runs generally along several areas of high density residential neighborhoods. Noise levels were measured using the Digital Sound Level Meter (BAFX Products), Type BAFX3370. Ambient noise exposure levels were taken at four locations along the drainage corridor. The recorded minimum and maximum ambient levels ranged from 48.5dB to 77.0dB. These noise levels may be considered moderate ambient levels but are below the FMEnv regulatory standard of 90dB. The baseline noise levels are shown in Table 3.8. The baseline particulate matter levels are shown in Table 3.9.

Table 3.8: Tudun Wada/Mabera Project Site Noise Readings

S/N	NOISE READING LOCATIONS	MINIMUM (dB)	MAXIMUM (dB)	COORDINATES
1.	TAFARKI ROAD	50.1	77.0	N13 ⁰ 01.987'; E5 ⁰ 15.760'
2.	RIJIYAR YARTUTU	48.5	70.8	N13 ⁰ 01.891'; E5 ⁰ 15.269'

S/N	NOISE READING LOCATIONS	MINIMUM (dB)	MAXIMUM (dB)	COORDINATES
3.	KANTIN SANI - IDDI ROAD (MASSALACIN BIN ABBAS MOSQUE)	59.1	73.4	N13 ⁰ 02.066'; E5 ⁰ 15.545'
4.	TRADE FAIR COMPLEX	63.7	75.2	N13 ⁰ 00.859'; E5 ⁰ 15.440'

Table 3.9: Tudun Wada/Mabera Project Site Particulate Matter Readings

S/N	PM READING LOCATIONS	PM 2.5	PM 10
1.	TAFARKI ROAD	26.6	45.3
2.	RIJIYAR YARTUTU	11.5	15.8
3.	KANTIN SANI - IDDI ROAD (MASSALACIN BIN ABBAS MOSQUE)	10.8	13.4
4.	TRADE FAIR COMPLEX	4.3	5.8

3.3.2 Evaluation of Baseline Analytical Results

Soil Condition

Environmental contaminants in soil generally can be of concern to human health. Heavy metals are a class of elements that include lead, copper, arse-nic, and cadmium, and can be toxic to humans and plants if ingested in high enough quantities. Soils have often been the landing spot for heavy metals, chemicals, and wastes as byproducts of industrial and agricultural pollutants. Many of these metals are present in soils naturally, usually in small amounts, although the natural level may vary. (Saunders & Buob, 2018).

Lead poses the greatest concern because it is the most common contaminant and is most likely to exceed health based guidance values (McBride et al., 2014). Lead does not degrade and can remain in the soil for thousands of years. Lead accumulates on the top 1-2 inches of the soil as it binds tightly to soil particles and organic matter. In addition to lead, cadmium and mercury are the most likely to pose the greatest health risk to humans. Elevated levels of copper, nickel, and zinc can cause plant toxicity, while cadmium and arsenic can be of concern to human health.

The project location of Tudun Wada/Mabera is considered high density population community. People, particularly children are likely to go to or wander into the construction zones thus increasing exposures to the health hazards associated with dusts and emissions from equipment and vehicles.

It is envisaged that during project implementation, construction activities such as soil excavation, stockpiling and haulage of soil materials, equipment and vehicular movements will all result in site soil dusts. These activities will essentially increase exposure of and bring residents, workers, passersby in contact with soil as well as inhalation of dusts.

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

Groundwater Quality

Contaminants in groundwater which are relied upon as drinking water source by communities pose serious health risks to the residents. People can suffer acute or chronic health effects from almost any contaminant if they are exposed to extraordinarily high levels (as in the case of a spill). In drinking water, microbes, such as bacteria and viruses, are the contaminants with the greatest chance of reaching levels high enough to cause acute health effects.

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

Based on the analytical results obtained for all the groundwater samples collected from within Tudun Wada/Maberu, the groundwater conditions at the project site are within environmentally acceptable quality limits. All results are below the FMEV. and NESREA regulatory guideline limits.

Air Quality

Air quality assessment was carried out at several locations where active construction operations are anticipated and where human activities are expected to be high. The analytical results of the baseline air quality indicators within and around the Tudun Wada/Maberu project corridors show concentrations below the regulatory threshold limits. Field (in-situ) air sampling was carried out using the Dragner CMS Gas Analyzer. Ambient air was drawn into the calibrated equipment at the targeted locations and subsequently the digital readings for the various parameters were read off the instrument.

The parameters measured as part of the air quality assessment included carbon monoxide (CO), Ammonia (NH₃), hydrogen sulphide (H₂S), sulphur dioxide (SO₂), nitrogen oxides (NO_x), hydrogen cyanide (HCN) as well as oxygen (O₂). Analytical results obtained were reviewed against the appropriate regulatory limits to determine any potential health risk levels.

Noise and Vibration

The regulatory threshold limit for noise is 90 dB. All noise readings obtained at the various Tudun Wada/Maberu locations with the project area are below this regulatory limit. During the project construction phase, it is typically expected that noise levels will increase from the use of heavy equipment and project vehicular movements at the sites.

CHAPTER 4: SOCIOECONOMIC CHARACTERISTICS AND CONSULTATION WITH STAKEHOLDERS

4.1 Description of Socioeconomic Environment

4.1.1 Introduction:

The overall project study was based on both quantitative data and qualitative inputs collected through research of historical environmental and social data for the Tudun Wada/Mabera project area, and the census/socio-economic survey data (the census questionnaire and socio-economic survey questionnaire was integrated into one basic document to enhance effectiveness). Qualitative inputs through consultations and discussions with potential project affected persons (PAPs), local community members and other stakeholders provided additional information for inclusion in the assessment. The affected communities - Mabera, Nakasari, Gagi and Kurfi have been mobilized to contribute actively to project implementation and to sustainably maintain the works following implementation.

The socioeconomic elements and characteristics of the project area considered in this study include population, land use and tenure system, social setups, economic activities, education, vulnerability profile, gender, religion, settlement and migration patterns and health services system for Tudun Wada/Mabera Communities. Qualitative and quantitative mixed method of assessment was adopted in this project because it offered an effective means of interacting widely with the stakeholder groups, the Sokoto NEWMAP team, as well as individual stakeholders and affected persons. Participatory community meetings, public discussions as well as discussions with key informants (Community elders, Local leadership, and Sokoto NEWMAP Officers, among others) were held in the course of study.

4.1.2 Socioeconomic Study

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

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

Essentially, the comprehensive questionnaire for data collection that was used captured the following information:

- a) Household bio-data (demographic information);
- b) Livelihoods;
- c) Inventory of structural and nonstructural assets including land, common properties, houses, economic trees and cash crops.

4.1.3 Public/Stakeholder Consultation:

This was conducted as part of the participatory approach aimed at gaining good knowledge of the social issues/risks associated with the project as perceived by the communities. Public meetings were held at the respective community facilities located within the project immediate impact areas. Table 4.1 show a matrix of the meetings held with the Tudun Wada/Mabera communities and the locations where the meetings, socioeconomic/census documentations were held within the project communities. Minutes of, and attendance to the meetings are included in Annexure V - VIII.

Table 4.1: Schedule of Community/Stakeholder Meetings and Socioeconomic Documentation

DISTRICT/ COMMUNITY	TYPE OF MEETING	LOCATION	DATE(S) HELD	NO OF ATTENDEES
MABERA DISTRICT COMMUNITY	Community Leadership Consultation	Magaji Mabera Palace	Nov 24, 2019	123
	Community Sensitization	Magaji Mabera Palace	Nov 25, 2019	144
	Focal Group Discussions (Men, Women and Youth)	Magaji Mabera Palace	Nov 25, 2019	Men-17 Women-53 Youth-34
	Socioeconomic/Census Documentation	Magaji Mabera Palace	Nov 26-27, 2019	362
		Mabera Kantin Sani	Nov 26-27, 2019	75
GAGI DISTRICT COMMUNITY	Community Leadership Consultation	Gagi Community Square	Nov 26, 2019	19
	Socioeconomic/Census Documentation	Gagi Community Square	Nov 26-27, 2019	172
KURFI DISTRICT COMMUNITY	Community Leadership Consultation	Kurfi Community Square	Nov 26, 2019	54
	Socioeconomic/Census Documentation	Kurfi Community Square	Nov 26-27, 2019	83

4.1.4 Use of Maps and GIS:

Survey maps as well as high resolution Digitalglobe Quickbird imageries (2019) were used to identify and map out the project areas identifying any locations of structures relative to the project corridors.

The qualitative analysis involved an assessment of information obtained during the stakeholders' consultations and public participation forums and discussions. The socioeconomic study provided necessary primary quantitative data for each project assessment. This quantitative data included:

- Household census of the people within the respective project areas;
- Establishing the socioeconomic profile of each project area population including health related status of respondents;
- Establishing the structural assets to be affected by each project;
- Establishing the area of land to be affected by each project.

4.2 Description of Cultural Environment

4.2.1 Population

Based on the 2006 national population census records and the 3.04% annual population growth factor recommended by the national population commission (NPC), Tudun Wada/Mabera communities and Sokoto South LGA have projected populations of 322,518; and 239,837; respectively for 2018.

4.2.2 Ethnic Groups

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

Tudun Wada/Mabera are essentially urban centers whose residents are generally trading, commercial and agricultural men and women. The local dwellers rear domestic animals such as goats and sheep, and maintain farms lands most of which are cultivated with groundnut, maize, potato and millet. Each District village traces its origin from genealogical ties. Politics in the communities are done within the framework of clanism. Clans are the basic point of cultural and political identity for the citizens. Clanism and kinship are the elemental forces in control of political and cultural institutions as well as service points. As previously stated, the project areas is significantly urban.

4.2.3 Religion

The people of Mabera, Gagi and Kurfi communities including residents of Nakasari are mostly of Islam religion (Muslims). A very small fraction of the population is of the Christian or other faith.

4.3 Land Use Pattern

There are three major types of customary land tenure system in the project area – (1) individual land ownership; (2) family land ownership; and. (3) communal land ownership. Individual ownership may be for indigenes or for residents of the community. Family lands (as well as individual lands) are inherited from generational relatives. Communities retain family lands which may never be sold. Such family lands are generally retained for communal development and sometimes are rotationally shared among the members of the community for agricultural purposes but are not for sale.

The Mabera project area can be characterized as a predominantly urban setting and a minor rural section with residential and agricultural properties occupying most sections of the communities and land areas. Over 80% of the land use in project area is fully developed infrastructurally. The remaining land area is committed to agricultural production of food crops. The crops include rice, onions, garlic, maize, millet, groundnuts, tomatoes, potatoes, wheat, sorghum, guineacorn, vegetables, etc.

4.3.1 Cultural Resources

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

4.4 Analysis of Socioeconomic Survey

The measurement of precise impacts of the project on persons living or earning their living within the project areas cannot be effectively established without appropriate and accurate social and economic baseline data. The socioeconomic study helps to assess the social and economic changes that may occur in the living conditions of the project area populations as a result of the project impacts.

4.4.1 Objectives of the Socioeconomic Survey

The primary objectives of the socioeconomic survey are as follows:

1. To collect information regarding existing socioeconomic conditions of the Mabera project area populations;
2. To use the collected socioeconomic information to develop baseline data for the assessment of the social and economic impacts of the project;
3. To analyze the patterns of relationships that exist among various socioeconomic or demographic components of the project areas;
4. To obtain perceived views of respondents on the effects of the project on the environment and their vulnerability to socioeconomic changes due to the project; and,
5. To provide a benchmark for any further information needed to monitor and evaluate improvements in the future.

The respondents to the socioeconomic survey included the following:

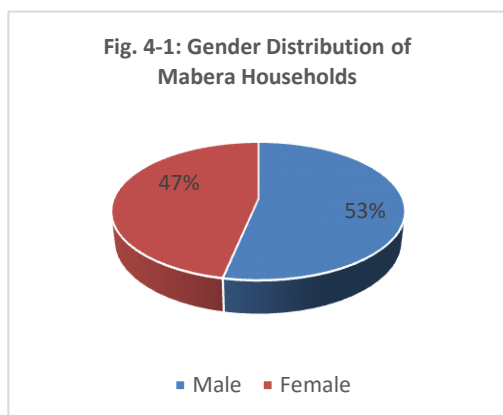
- (1) Owners of any buildings or structures located within 5 meters from the outermost edges of the Tudun Wada/Mabera drainage corridors;
- (2) Owners of any buildings or structures located in areas to be used as construction staging areas during the construction phase of the project;
- (3) Residents/tenants of the buildings or structures identified in items (1) and (2) above whether the structures are permanent or temporary; residential or commercial;
- (4) Land owners within the proposed drainage construction/rehabilitation areas whose lands would be required for the purpose of the project;
- (5) Economic trees/crops owners within the drainage setbacks which lands would be required for the construction/rehabilitation purposes.

The socioeconomic survey was conducted in conjunction with the census of the project affected persons to profile the impacted project area and provide baseline data against which mitigations measures and support will be measured. The analysis is based on respondents to the questionnaire administered to residents of Tudun Wada/Mabera communities who are most likely to be impacted by the project. On the basis of the responses obtained in the exercise, the following determinations are made.

4.5 Specific Maberu Socioeconomic Surveys

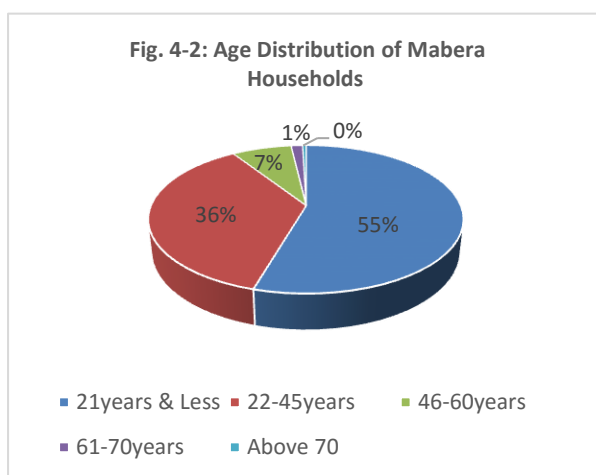
4.5.1 Respondent and Household Distribution in Project Area

The following Sections show how the residents of the project area responded to the socioeconomic survey administered to them. A total of 253 questionnaires were administered to potential PAPs within the project communities with a 100% return. Based on the survey, the 253 respondents with 1574 household members were documented for Maberu Districts.



4.5.2 Gender, Age and Household Size Distribution

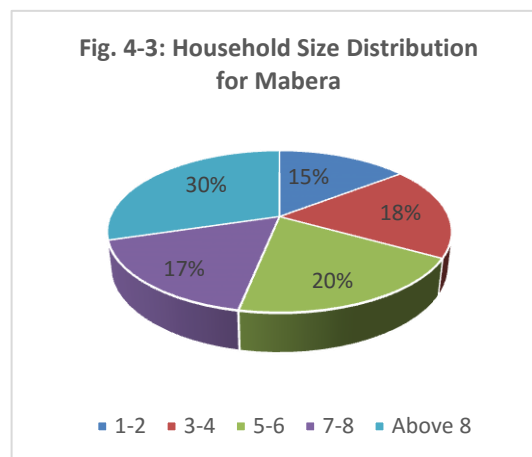
The survey data indicated male/female distribution of 53/47% for households in Maberu. The household data is reflected in Figure 4-1.



Men and women in the project area are generally mainly involved in farming. Both men and women are significantly involved in the general pursuits of livelihoods.

The age distribution data (Figure 4-2) indicated that the percentage of

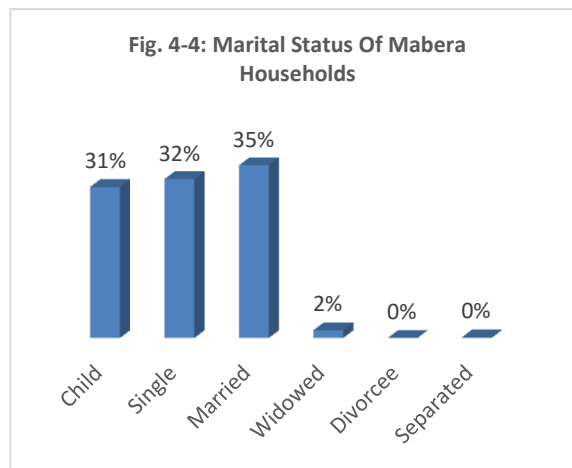
household members 21 years of age and below for Maberu project area is 55%. About 1% of the households are in their 60s and above. The survey further showed that 36% are within the youthful ages of between 22 and 45 years while 7% of the household members are between the ages of 46 and 60 years. There is strikingly a high percentage of children below 21 years (55%) in the households (Figure 4-2).



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

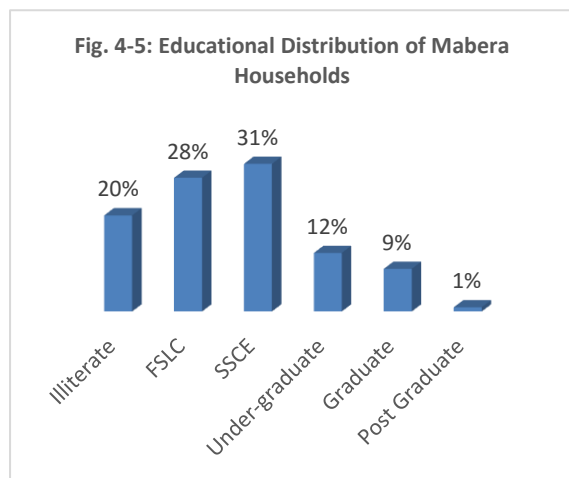
4.5.1.3 Marital Status of Respondents

The survey data showed that 35% of respondents in the project area are married, 31% are children of non-marriageable age, 32% are single and 0.2% widowed. (Figure 4-4)



4.5.1.4 Access to Education

The survey responses indicated that in the project community, the population of schooling age who never attended school is 20%; 28% had basic primary school education (FSLC), 31% attended Secondary school (SSCE), 12% are Undergraduates, 9% are Graduates and 1% had a Post-Graduate degree. (Figure 4-5)



20%; 28% had basic primary school education (FSLC), 31% attended Secondary school (SSCE), 12% are Undergraduates, 9% are Graduates and 1% had a Post-Graduate degree. (Figure 4-5). The very low literacy level within the project affected area is reflected in the significantly low number of existing educational infrastructure support within the area.

4.5.1.5 Access to Health Infrastructure

The common diseases within Tudun Wada/Mabera communities include diarrhea, malaria, typhoid, pneumonia, cough, skin diseases, deficiency diseases, eye diseases, ear diseases, and

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

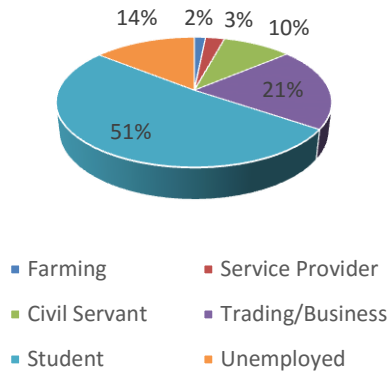
4.5.1.6 Access to Socioeconomic Infrastructure

The socioeconomic infrastructures (roads system, electric power and access to water) in the Tudun Wada/Mabera project area are generally in poor state. Public access to potable water is non-existent and power is generally not steady. Implementation of the Tudun Wada/Mabera project will result in an influx of persons seeking gainful employment with the project contractors or to gain any social privileges within the project communities. It should be anticipated that there will be increased pressure in the demand for social infrastructures and amenities in the communities resulting from influx of persons during the implementation of the project. The influx of persons will inevitably put pressures on existing social service resources like water, electricity, transportation, etc. in the communities. The use of existing facilities will be on the rise.

4.5.1.7 Occupational and Income Distribution of Respondents

The occupational distribution data from the questionnaires indicated that of surveyed households in the Mabera project area, 2% are farmers, about 24% are employed in the private sector, 10% are civil servants, 50.4% are students and 9.6% are unemployed (Figure 4-6).

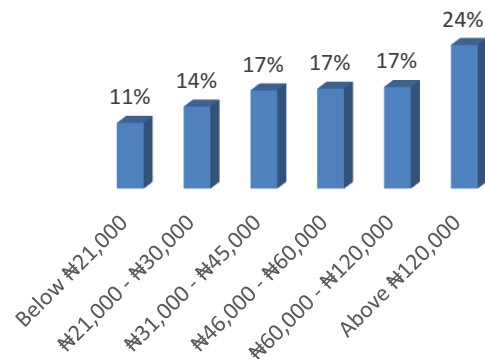
Fig. 4-6: Occupational Distribution of Mabera Households



The main source of income for the households surveyed came from farming and trading/business across the community. Based on the income data provided in Mabera, 11% earned less than N21,000 monthly, 14% earned between N21,000-30,000 monthly, 17% earned N31,000-45,000 monthly, 17% earned N46,000-60,000 monthly, 41% earned above N60,000 monthly (Figure 4-7). The margin of error in the information provided on incomes may be significant considering that some of the

respondents may have grossly inflated data provided with the intent to receive compensations in accordance with incomes indicated in the survey. The data provided could not be independently verified.

Fig. 4-7: Monthly Income Distribution of Mabera Households



4.5.1.8 Household Waste Disposal

Most of the respondents in the communities indicate that their household wastes are disposed of at convenient locations including crevices and drainage channels. In many areas, the wastes are also indiscriminately dumped inside the water canals or at illegal dumpsites created only as a matter of convenience. Solid waste management in the project areas is a considerable hazard to the health of the population and the effective functioning of the storm water drainage systems. The unmanaged refuse causes regular obstruction of the storm water drainage systems.

Most residents in the project communities dispose their domestic refuse randomly outside their residential compounds and the flood-prone areas are also treated as de facto waste disposal sites. The situation in the communities are indeed a reflection of the poor waste management and waste disposal mechanisms in most part of the state. As with other parts of the country, majority of households typically dispose of their domestic refuse inappropriately outside their residences. During the wet season, solid waste is transported by flowing storm water through unplanned drainage paths leaving a trail of refuse.

4.5.1.9 Desirability of the Project

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

4.5.1.10 Potential Security Risk Challenges

As severally indicated, implementation of the Mabera project will result in an influx of persons seeking gainful employment with the project contractors or providing social services of various types or to gain any social previlages within the project

communities. Different types of persons, including criminals of sorts, may be expected to find their ways into the project communities within this time. Such movement of persons will inevitably increase the potential for criminal activities within the Maberera project communities. It should therefore be anticipated that there will be increased pressure in the demand for police services and other security issues in the project area. Additionally, the cumulative unemployment levels in Maberera communities resulting from the influx of employment seeking persons to the area will pose its own security risks for both the communities and the security institutions.

4.5.1.11 Conflict Resolution

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

4.6 Public/Stakeholders' Consultation and Participation

The public participation process is a critical component of this ESMP development and required identifying and working with all stakeholders and the project communities, including potentially affected individuals or group of persons, from the beginning of the process. The direct involvement and active participation of relevant stakeholders and the local people in the planning and management processes of the project assures that any potential disharmonious issues within the community are resolved speedily. There will also be maximization of resource use and increased benefits and expanded opportunities for the communities in the project areas.

The consultation process with the people of Maberera was driven in a manner that encouraged active and sustained participation of the community members, particularly the project area communities. This was to promote community ownership of the project and to enhance sustainability. Consultations and stakeholder involvement in the project gave the villages and the potentially PAPs the opportunity to make contributions aimed at strengthening the project while avoiding any negative impacts and reducing possible conflicts. The consultations will remain an ongoing exercise throughout the entire project to minimize chances of possible conflicts. This phase also involved the administration of pre-defined socio-economic questionnaires at the household level for potentially affected areas along the drainage corridor.

4.6.1 Community Participation

Community participation improves understanding of the project and communication between the SPMU, the consultants or contractors and the community. The decision-making process for the project will also be enhanced by actively involving relevant stakeholders, especially the project affected persons and organizations with a stake in the project.

4.6.2 Objectives of the Community Consultations

The aims of the public participation and consultation process are:

- Solicit inputs, views and concerns from the each affected community as they relate to the project and obtain local and traditional knowledge that may be useful for decision-making;

- Facilitate consideration of alternatives, mitigation measures and trade-offs, and ensure that important impacts are not overlooked and that benefits are maximized;
- Reduce conflict through the early identification of contentious issues; and increase public confidence in the project.
- Provide opportunity for the public to influence the project designs and implementation in a positive manner and improve transparency and accountability in decision-making.

4.6.3 Public Consultation Methodology

The methodology adopted in this ESMP for carrying out the consultation process include a qualitative and quantitative mixed method that offers an effective means to interact widely with the project communities and stakeholder groups. Essentially, the approach is based on a participatory approach that included community meetings, public discussions as well as discussions with key informants (District Heads, Village Heads, Council members, Local Authorities, and Sokoto NEWMAP Officers among others). A brief description of these methods is as follows:

1. **Rapid Assessment Technique:**
This involved a quick professional assessment of the project potential impacts based on nearness of residential/commercial assets to the drainage corridors and dam areas, anticipated nature and intensity of impacts, and the significance of the impacts within the proposed project areas. Any affected property owner is directly engaged in discussions to create and gain better understanding between the parties.
2. **Socioeconomic Survey:**
This involved the administration of structured questionnaire designed to provide socioeconomic profile of households/families resident or doing business within the project area as well as formal and informal discussions with focus groups, including the community traditional and administrative leadership.
3. **Public Meetings:**
This was conducted as part of the participatory approach aimed at gaining good knowledge of the social issues/risks associated with the project as perceived by the communities. Public meetings were held at different locations within the project immediate impact areas.

4.6.4 Stakeholders' Identification

Generally, five broad categories of stakeholders were identified by the study based on the degree to which the project activities affected or involved such persons or group of persons. The five groups of stakeholders were actively consulted and encouraged to participate in the project development process. These stakeholders are grouped as shown in Table 4-2.

These individuals and groups of persons include those who live in close proximity to the drainage corridor; those who will hear, smell or see the development; those who may be forced to temporarily relocate because of the project; those who have interest either traditionally or administratively, over developmental activities or policy changes for the project area (they may or may not live in proximity of the project); and, those who infrequently use the land on which the project is located.

The adopted process consists of:

- i) Identification of any parties whose line of duties whether officially, socially, economically or culturally have direct or indirect bearing on any aspects of project activities. These parties may include individuals, groups, institutions or organizations that may be affected by the dam rehabilitation activities;
- ii) Establishment of the stakeholders list and identification of specific stakeholder interests in relation to the project. The issues considered include: (a) the project's benefit(s) to the stakeholders; (b) potential changes to the routine activities of the stakeholders that may occur due to the project; and, (c) the project activities that may cause damage or conflict for the stakeholder;

Table 4-2: Identified Stakeholder Groups

GROUP	DESCRIPTION	ROLE(S) IN COMMUNITY PROCESS
Group-1	Individuals or group of persons whose day-to-day lives/livelihoods may be directly affected by project activities. These are people who either reside or carry out their day livelihood activities within the proposed Drainage corridor plus 5meters on either side of the drainage corridor.	The identified persons or group of persons in this category will ultimately represent the project potentially-affected persons (PAPs) or households (PAHs)
Group-2	Individuals or group of persons whose day-to-day traditional or administrative functions include oversight of developmental activities within the project areas.	This category of persons serves as mobilization points around which the Consultant will reach out to the other members of the community.
Group-3	Individuals or group of persons whose daily activities (including farming) bring them in close proximity to the project area. These are people who either reside or carry out their daily livelihood activities outside the channelization corridor but within the communities in which the project is located.	This category of persons may or may not be affected by the project but may be significant contributors to the long term sustainability of the project.
Group-4	CBOs, FBOs and NGOs who provide frequent interface with the community members who may be directly or indirectly affected by the project activities.	This group of organizations essentially provides on a continuous basis spiritual and physical welfare as well as environmental health of the community.
Group-5	Individuals or group of persons who are political office holders and have significant responsibilities toward community members and developments within the project areas.	This group of individuals is collectively responsible for the political and general socio-economic development of the community, among others within their respective political zones.

4.6.5 Community Meetings

The ESMP Consultant team met with Tudun Wada/Mabera community groups between November 24 and 27, 2019 to gain knowledge of the community perspective on the issues associated with the stormwater drainage in their respective communities. The initial community meetings were facilitated by the SPMU and were held at the Palace of the District Heads. Attendance to the meetings included the District Heads as well as the various Village Heads.

At each of the community meetings, the ESMP Principal Consultant explained the purpose of the meeting and formally introduced members of the study team to the communities. He further provided an overview of the ESMP as related to the Mabera project and also highlighted the objectives, activities, outputs and work schedule of the assignment. He called upon the community members to render sustained support by providing any necessary information/data to the Consultant and also to

other Consultants or Contractors that may be associated with the project implementation. Thereafter, the Consultant called for questions, comments, observations or suggestions from the respective communities to which answers and necessary responses were provided. Summaries of the minutes of each of the community meetings and the list of participants are provided in Annex V - VIII.

The meetings with the enlarged communities were held within the project corridor villages and within the respective assembly grounds for the communities. The community meetings for Mabera, Gagi and Kurfi communities were attended by 144, 19, and 54 persons, respectively, including the principal community leaders and members of the communities. Additionally, focus group discussions (FGD) with the men, women and youths of the Tudun Wada/Mabera project area including the Nakasari, Gagi and Kurfi communities were held between November 24-27, 2019.

4.6.6 Participants' Feedback – Comments and Concerns

During the Mabera, Gagi and Kurfi communities' meetings, the District Heads expressed the appreciation and gratitude of the community to NEWMAP, the Sokoto State Government, the Federal Government and the World Bank for the proposed intervention works. Several other participants expressed their views, and made comments and suggestions relative to the project. All the speakers promised to give full cooperation and support to the activities of the Consultant and the project. Photos taken at the various community meetings are included in Annex V - VIII.

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

1. Community safety with the next cycle of the rainy season. The community was quite apprehensive of the worsening flood situation particularly in relation to safety risks posed to existing homes and human lives;
2. Continued flooding in the area would lead to damages and loss of crops and livestock, personal possessions, spread of diseases such as typhoid, cholera, diarrhea, and malaria;
3. Loss of access to roadways, crop lands and pasture.
4. Physical displacement of vulnerable persons during project implementation.

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

Consultations and stakeholder involvement in the project will continue in a manner that gives the communities and the project affected persons (PAPs) the opportunity to make contributions aimed at strengthening the development project while avoiding negative impacts as well as reducing possible conflicts. The consultations will also remain an ongoing exercise throughout the entire project, particularly with the potentially affected individuals and households relating to resettlements and compensations to minimize chances of every possible conflict.

Information and data gathering involved a broad spectrum of activities that included interviews and discussions with community members who have historical knowledge of the site and the history of flooding and erosion problems in the affected areas. It also involved other physical and intrusive study of the natural, social, economic and cultural environments of the project areas. Table 4-3 gives the list of identified stakeholders with their areas of interest and responsibilities in the project. The list includes government functionaries, NGOs, FBOs and CBOs among others.

Table 4-3: List of Stakeholders and Their Responsibilities

GROUPS	IDENTIFIED STAKEHOLDER	AREA OF INTEREST IN PROJECT
Group-1	Residents of Mabera, Nakasari, Gagi and Kurfi Communities, particularly those that reside within the project corridors	PAPs/PAHs
Group-2	Office of the Community Association Chairmen for the affected communities.	Development and welfare of the respective Communities
Group-3	Persons who reside outside the project Communities, but have businesses or means of livelihoods within the project areas	Individualized livelihood issues
Group-4	Community-based Organizations	Watershed protection and management
	Faith-based Organizations in the Communities	Community spiritual and physical welfare
	Non-governmental Organizations	Protection of environmental health of communities
Group-5	Office of the Chairman – Sokoto South LGA	Development of the Sokoto South LGAs
	Office of the Hon. Member – Sokoto State House of Assembly representing Mabera, Nakasari, Gagi and Kurfi	Development of the Mabera, Nakasari, Gagi and Kurfi Communities in the state constituencies
	Office of the Hon. Member – Federal Constituency representing Tudun Wada/Mabera	Development of Sokoto South federal constituency
	Office of the Distinguished Senator – representing Tudun Wada/Mabera	Development of Sokoto South Senatoral Zone

CHAPTER 5: ASSESSMENT OF POTENTIAL IMPACTS AND ANALYSIS OF ALTERNATIVES

5.1 Introduction

This chapter discusses the methods/techniques used in assessing and analyzing the potential social and environmental impacts of the Maberu project and, also discusses the alternatives to the proposed project and reasons for their rejection. The likely future scenario without the project was also considered. The details of methods used in arriving at the significant potential social and environmental impacts of the project are included in Annex XXI and the impact assessment process is depicted in Figure 5.1.

The beneficial and adverse potential environmental, economic, social and cultural impacts are identified based on professional judgment and the use of unranked pair-wise comparison approach (Canter and Sadler, 1997). Other factors in predicting the potential impacts include the results of public consultations. The potentially significant environmental and social impacts of the project as well as the suitable mitigation measures are discussed.

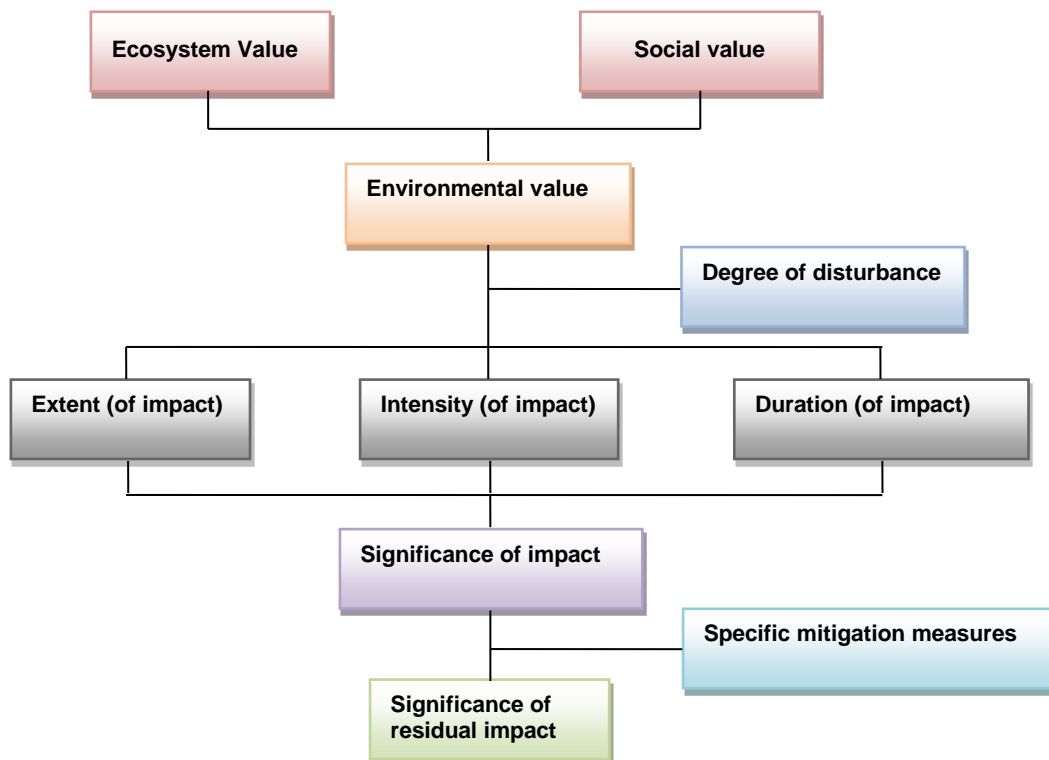


Figure 5-1 : Standard Flowchart for a Systematic Approach to Impact Assessment
(Source: OTG Consultant, 2019)

The assignment of responsibilities for implementation of the ESMP and the associated costs are presented in Chapter 6.

As previously indicated under Chapter 1, the envisaged project activities will include:

1. Civil Construction Works:
 - cutting and filling for percentage recovery
 - compaction of soils
 - concrete casting

- assembling of structures
- Slope stabilization
- Digging of foundations of the lattice structures
- Vegetation clearing
- Deployment and movement of transport vehicles and power equipment
- Use of earth moving equipment such as excavators, compactors, bulldozers and pay loaders;

2. Bio-Engineering Remedial Works:

- Terracing;
- Structured vegetation;
- Specific trees planting with known root strength
- Economic trees planting

Overall, this project is aimed at halting or minimizing the environmental and social damages being caused by the incidence of flooding and soil erosion in the project area and beyond. This is, in the overall a positive impact. The envisaged areas of potential impacts (positive and negative) on the socioeconomic, cultural and biophysical environments which could result from the proposed project include:

Environmental Impact Areas:

- 1) Air quality
- 2) Surface water quality
- 3) Groundwater quality
- 4) Noise and vibrations
- 5) Degradation of arable land in the project area.
- 6) Biodiversity conservation.
- 7) Siltation of stream.
- 8) Ecological diversity in stream watershed.
- 9) Public Health and safety
- 10) Visual effects.
- 11) Traffic and transportation
- 12) Earth movements
- 13) Solid and liquid wastes
- 14) Soil erosion and flooding vulnerability
- 15) Climate change
- 16) Landscape change

Social Impact Areas:

- 1) Economic Activities:
 - Sources of livelihoods.
 - Employment generation
- 2) Damage to Infrastructure:
 - Residential & commercial buildings
 - Roads, drainages, utilities, etc.
- 3) Community Effects:
 - Displacement of persons.
 - Isolation of settlements.
 - Migration of communities.
- 4) Gender Based Violence (GBV) and Sexual Exploitation & Abuse (SEA)
- 5) Damage to archaeological and cultural resources
- 6) Land use restrictions

The evaluation of the social environment requires assessment of the need for land for the project as proposed and the remedial alternatives by conducting the following:

- Analysis of watershed to determine drainage corridors and the consequential storm water flow path resulting from anthropogenic activities within the project areas;
- Development of conceptual remedial alternatives based on the field surveys and the analysis of the watershed;
- Evaluation of the availability of land for proposed project or alternatives.

Following the collection of primary socio-economic data on the communities, a qualitative and quantitative analysis of the data was conducted to assess direct impacts on project population. Existing environmental conditions that impact on human health and safety was evaluated to ascertain imminent risks that may be associated with the project. Specifically, analytical data on the ambient air and surface water quality was used to assess potential health risk concerns to residents within the Maberera project corridors.

Potential environmental impacts at the Maberera site were developed in accordance with the grouped and project-phased impact identifiers contained in the ESMF for NEWMAP. The project phases are pre-construction, construction, and operation and maintenance phases. The potential impacts that arise from all the information/data sources identified were developed and presented in matrix/table format for the Maberera project.

The evaluation of the level of significance of environmental impacts was done within the current value system. The tools which were used to define the boundaries for, or regulate every intervention activity and their impacts comprise relevant laws, policies, plans, standards, objectives, limits of acceptable change, performance targets or other environmental quality goals which have a bearing on the proposed activity and its associated impacts.

In assessing the social impacts, the measureable changes in human population, communities and social relationships resulting from the intervention project were identified. The social variables were evaluated under the following general headings:

1. Population characteristics;
2. Community and institutional structures;
3. Political and social resources;
4. Individual and family changes; and,
5. Community resources.

A matrix/table relating project changes to social impact assessment variables were developed.

5.2 Analysis of Potential Impacts Triggered by Maberera Project

The potential impacts as listed above are organized considering the critical phases of the project from the construction phase to the operation (post-construction) phase and summarized based on whether the envisaged project impact areas will result in positive or negative impacts. Impact emphasis is placed particularly on the construction and operation phases of the project. These are summarized as shown in Table 5.1.

Table 5.1: Summary of Potential Impact Areas Triggered by Project

S/No	Potential Positive Impact		Potential Negative Impact	
	Impact	Aspects of Project that Trigger Impact	Impact	Aspects of Project that Trigger Impact
PROJECT CONSTRUCTION PHASE				
1	Increased value and usefulness of assets in community	Construction of new, and rehabilitation of existing degraded, drainage channels and eroded lands within the project areas.	Damage to structures/buildings	Construction of drainage channels along corridors with existing structures/buildings
2	Safety of Lives and Properties	Flood and erosion prevention and control	Displacement of people.	Land acquisition for drainage right of way, etc. reasons
3	Employment Generation	Site clearance, excavation, loading and offloading of materials and delivery services; drivers, security services, provision of goods and services to construction workers e.g. food kiosks and other shops.	Degradation of off-site land	Soil excavations for backfill materials at identified borrow pits or off-site sources.
4	Protection to building structures.	Stabilization of existing buildings or structural assets within the project corridors during construction.	Loss of means of livelihoods.	Loss of crop lands and economic trees along the proposed project corridors.
5	Gender based violence & Sexual exploitation and Abuse	Construction worker selection or determination based on gender; Subjection of women to general discrimination and work place abuse or violence or sexual exploitation.	Loss of vegetation	Site clearances.
6	PROJECT OPERATIONS PHASE (POST-CONSTRUCTION)		Damage to archaeological and cultural resources	Presence of community burial grounds and other potential cultural relics in the vicinity of project areas
7	Increased community awareness and enhancement of local capacity	Active involvement of project communities in awareness campaigns and capacity building. Training of community members and local residents in health, safety and environmental awareness	Air quality/pollution	Emissions from construction vehicles, plant and equipment. Excavation and earth moving operations. Exhaust emissions from poor maintenance of plant and equipment or over revving of engines.
8	Improved knowledge on erosion and flood control	Community knowledge of causes of erosion and flooding, and capacity to prevent and control flooding and erosion throughout the watershed.	Surface and ground water quality	Suspended particles releases from earthworks. Spillages of fuel and other petroleum products.
9	Improved and Sustained infrastructure	Maintenance of floods and erosion control infrastructure for continued effectiveness.	Noise and vibrations	Noise and vibrations from moving vehicles, excavators, generators, power tools, and

S/N o	Potential Positive Impact		Potential Negative Impact	
	Impact	Aspects of Project that Trigger Impact	Impact	Aspects of Project that Trigger Impact
	(drainages, electric poles, etc).			compressors during construction.
10	Improved site access roadways	Rehabilitation of site access roads before and/or after construction to allow for movement of machinery and for the delivery of materials.	Public and Occupational Health and safety	Construction operations - excavations, construction traffic, stockpiled materials Recruitment of children to work on construction sites. Life in construction workers camp. Waste disposal practices, sanitation and prostitution.
11	Enhanced community leadership	Formation of various community committees to facilitate sustainable post-construction monitoring and maintenance.	Visual effects.	General construction works and activities
12	Improved public recreation areas through land use restrictions	Bio-remediation of erodable land and conversion for long term use as community recreation areas.	Traffic and transportation	Traffic movements associated with site staff, delivery of materials and the removal of waste during construction
13	Restoration of vegetation and other vital trees	Replanting of vegetation cleared during construction activities	Earth movements	Construction operations due to unstable soil profiles from site excavations.
14	Improved flood and erosion control structures post construction	Post-construction maintenance of flood and erosion control structures and bio-remediated areas	Solid and liquid wastes	Generation of waste during construction including off specification materials such as cement, wood, plastic, paper and domestic waste from construction areas and worker camps.
15	BLANK	BLANK	Climate change	Exhaust emissions from construction vehicles, plant and equipment. Emissions from poorly maintained plants and equipment or over revving of engines.
16	BLANK	BLANK	Landscape change	Project cut and fill and soil movement along the project corridor.
17	BLANK	BLANK	Pressures on Off-site Resources	Sourcing of construction materials such as sand from river beds or burrow pits. Increased demand for construction materials

N/A = Not Applicable

5.3 Potential Impacts Significance Rating for Mabera Project

Table 5-2 summarizes the detailed analysis of the impact significance ratings for each of the potential project impact areas for the proposed Mabera stormwater drainage intervention project.

Table 5-2: Significance Ratings for Mabera Project Impact Areas

S/No	Potential Impact Area	Consequence Rating	Probability Classification	Impact Significance
PROJECT CONSTRUCTION PHASE				
1	Loss of means of livelihood	Medium	Definite	Medium
2	Loss of physical assets	Very High	Definite	Very High
3	Displacement of persons	High	Definite	High
4	Degradation of land	Medium	Improbable	Low
5	Vegetation loss	Medium	Definite	Medium
6	Loss of archaeological and cultural resources	Medium	Definite	Medium
7	Air Quality	High	Definite	High
8	Surface/ground Water	Medium	Definite	Medium
9	Noise and Vibrations	High	Definite	High
10	Stream ecological diversity	High	Possible	Medium
11	Safety and health	High	Definite	High
12	Visual Effects	Very Low	Improbable	Insignificant
13	Traffic and transportation	High	Definite	High
14	Earth movements	Very High	Possible	Medium
15	Solid wastes	Medium	Definite	High
16	Liquid wastes	Medium	Definite	Medium
17	Climate change	Medium	Possible	Low
18	Landscape change	Medium	Definite	Medium
19	Gender Based Violence & Disparity	High	Possible	Medium
20	Off-site Resources	High	Probable	Medium
OPERATION & MAINTENANCE PHASE				
1	Damage to erosion control structures	Medium	Possible	Low
2	Site access roadways rehabilitation	High	Definite	High
3	Erosion & flood control capacity	High	Improbable	Low
4	Enhanced community leadership	Medium	Possible	Low
5	Land use restrictions	High	Definite	High

5.4 Identified Social and Environmental Impacts

The impact significance outcome of Table 5.2 indicating the social and environmental impact categories that will suffer medium to high impact levels during the Construction and Post-construction Phases of the project implementation is summarized below: The other environmental and social impact categories will suffer low to insignificant impact levels from the project as shown in the Table.

Project Construction Phase:

- Loss of means of livelihood
- Loss of physical assets

- Displacement of persons
- Vegetation loss
- Loss of archaeological and cultural resources
- Air quality and Dust
- Surface and ground water quality
- Noise and vibration
- Stream ecological diversity
- Public/Occupational Health and Safety
- Traffic and Transport
- Earth movement (during construction and post construction phases)
- Solid wastes
- Liquid wastes
- Landscape change
- Gender based violence/Sexual abuse and exploitation
- Off-site Resources

Operation & Maintenance (Post Construction) Phase:

- Site access roadways rehabilitation
- Land use restriction

5.5 Analysis of Alternatives

The consideration of alternatives relates principally to ways of improving the proposed intervention activities and/or attempting to avoid or minimize potential significant negative impacts. Usually there are several alternatives to any project. Different alternatives were evaluated consistent with the various components of the Tudun Wada/Mabera intervention project. These alternatives include: demand-based; activity-based; location-based; process-based; sequencing or phasing; material-based; and the “no project” alternatives. The consideration of these alternatives intertwined with the identification of mitigation measures.

The potentially significant impacts associated with considered discrete alternatives were evaluated to a point of clear emergence of optimum alternative. The process of accomplishing this has been documented as well as the criteria used in the comparison. This section discusses the alternatives to the proposed project and reasons for their rejection. The likely future scenario without the project is also considered. The selection of a particular alternative is premised on several considerations, including the desirability/acceptability of the project, the government’s position or inclinations to the project, the potential environmental and social impacts of the project, the economic viability of the project, etc. For the proposed Tudun Wada/Mabera project, a number of alternatives were considered and these include: **delayed project alternative**; **a do-nothing alternative**; and **the planned project alternative**. A summary of these alternatives is presented below:

Delayed Project Alternative

This option means that the project will not be implemented at this time; rather, a delay will be in effect until such a time when certain conditions are met or requirements fulfilled. This kind of option is usually adopted when there are regulatory requirements that need to be met, when the political and economic climate is inclement for project implementation or in a period of war. Presently, the country is not at war neither is Sokoto State. Furthermore, the government of Nigeria is vigorously encouraging and courting foreign direct investment and socio-economic development. The planned project can attract foreign investment, in addition to all the added values indicated earlier. Therefore, delaying the project will in turn delay the realization of the positive benefits expected from the project. In addition, given the very high level of inflation in Nigeria’s economy, a delay of one year could potentially cause up to a 25% increase in project costs. Therefore, the option of delaying the project is not considered a viable option.

The Do-Nothing (No-Project) Alternative

This alternative assumes that the entire project concepts will be cancelled and scrapped. There will be no improvement or changes in the present state of the Tudun Wada/Mabera stormwater drainage systems as well as the access roads to and from the project areas. This is an inferior alternative when compared to the option of going ahead with the project. Although if this option is taken, it would mean that the negative environmental and social impacts of the project would be completely avoided; however, not implementing the project will also result in:

- (i) Continued devastation by flooding and soil erosion of the residential areas of Tudun Wada/Mabera communities;
- (ii) Continued fears and anxiety over potential loss of lives, people's homes, farmlands and ancestral assets, including cultural heritage will persist with each rainy season;
- (iii) Continued lack of rural access and mobility and increased pains in movement within the Tudun Wada/Mabera communities;
- (iv) Continued lack of economic empowerment, development and transformation of the Tudun Wada/Mabera communities; and,
- (v) Failure to generate employment opportunities as anticipated.

Therefore, the "Do-Nothing" or No-Project Alternative will worsen the present situation and worsen poverty at the same time. In addition, most of the affected communities where agricultural activities dominate will still be cut off due to lack of effective road linkages. The "Do-Nothing" or No-Project Alternative is therefore not a viable option.

The Tudun Wada/Mabera Intervention Project (Proposed Project) Alternative

The Tudun Wada/Mabera intervention project Alternative requires the rehabilitation of the existing primary stormwater drainage corridors, and improve (upgrading, rehabilitation and maintenance) the existing access roads and secondary drainage channels to an acceptable safety and environmental standard. New drainage channels are to be constructed along pre-defined road corridors. The advantages associated with this alternative far outweigh the disadvantages. Although initial costs would be high; the accrued social, economic, political and cultural benefits far outweigh the no-project alternative. The objective of the intervention project is to eliminate floods and soil erosion in the project areas while salvaging the agricultural lands of the affected areas and also boost agricultural production through the provision of access roads for easy transportation of products. Moreover, hitherto post-harvest losses will be reduced and thus creating more benefits to the farmers in particular and Sokoto State in general.

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

CHAPTER 6: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

This Environmental and Social Management Plan (ESMP) is necessary to achieve the health, safety, and environmental regulatory compliance objectives of the project. The environmental and social management systems/procedures are developed to establish sound basis for mitigation, monitoring and management at the project level. The E&S requirements are integrated into existing procedures to ensure that project bottlenecks are not created. To this end, the Plan has focused on specific steps to be taken with respect to implementation of the mitigation measures and monitoring activities for the environmental and social impacts identified in Chapter 5.

The plan highlights the specific mitigation measures that would be taken and the entities responsible for carrying out the mitigating measures. The ESMP also contains a monitoring plan indicating the responsible parties, the frequency of monitoring, key indicators and the reporting format, and provides for necessary capacity building to facilitate the ESMP implementation. Cost estimates for implementation of the various measures, monitoring plan and capacity building are also given. The projected implementation budget will enable the ESMP to be an integral part of financing for the construction and maintenance works in the project.

6.1 Mitigation Measures for Implementation

Based on the environmental and social impact categories identified in Chapter 5 (see Section 5.4), the ESMP implementation for the Maberu project will address measures that cover the following impacts during the construction and the post construction (operation and maintenance) phases of the project implementation:

Social Impacts:

- Loss of means of livelihood
- Loss of physical assets
- Displacement of persons (temporary)
- Loss of physical cultural resources
- Land use restriction

These impacts are addressed hereunder as Community and PAPs Issues Management.

Environmental Impacts:

- Air quality and dust
- Surface and ground water quality
- Noise and vibration
- Vegetation loss
- Public/Occupational Health and Safety
- Traffic and Transportation
- Earth movement
- Solid and liquid wastes
- Landscape change

These impacts are addressed hereunder as:

- 1) Dust control and air quality management;
- 2) Water resources, erosion control and flood prevention management;
- 3) Noise and vibration exposure management;
- 4) Flora and fauna removal management;
- 5) Public and occupational health and safety management;
- 6) Construction operation and slope stabilization;
- 7) Road diversion and accident prevention;
- 8) Waste management;
- 9) Temporary project office site management; and,

10) Post construction management.

The mitigation measures to address the above environmental and social impact categories as well as the monitoring and responsibility roles for the different phases of the project implementation are discussed under Section 6.2 below.

6.2 Environmental and Social Impact Mitigation Measures

The environmental and social impacts mitigation measures to address the identified impact categories for the Tudun Wada/Mabera intervention project areas (Mabera, Nakasari, Gagi and Kurfi) are presented in Table .6-1. These mitigation measures will be implemented by the Contractor selected for the Mabera project who shall be solely responsible through the course of the project and shall be contractually required to develop all the necessary site-specific management plans associated with the mitigation of the impact areas. The monitoring aspects of the project implementation shall be carried out by other identified Agencies and organizations including the SPMU-ESO, SMeNV., SMOw, SMLS, Community leaders, Site Committees, NGOs/CBOs, etc in accordance with the provisions and requirements of this ESMP.

Table 6.1: Summary of Impacts and Mitigation Measures for Mabera Project

Item No	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
	Environmental and Social Impact	Mitigation Measures	Monitoring	Responsibility
PRE CONSTRUCTION				
1	<p><u>Impacts on Community and PAP Management (Loss of physical assets; Loss of means of livelihood; Displacement of persons (temporary)</u></p> <ul style="list-style-type: none"> • Possible damage to building structures and other structural elements within the specific Tudun Wada/Mabera communities; • Permanent acquisition of land for setback to be used for site stabilization; • Temporary use of land for project staging areas, erection of workers' camp and temporary offices (Agreement between Communities and Contractor). • Croplands and economic trees within setback lands may be destroyed during site stabilization. 	<ul style="list-style-type: none"> • Appropriate compensations shall be paid for structural damages; project acquired lands; temporary use of lands; destroyed crops and economic trees. • Compensation to persons (PAPs) within the specific Tudun Wada/Mabera communities who will need to be temporarily relocated prior to beginning of construction activities. • Create awareness among the specific Tudun Wada/Mabera community members and sensitize the people to all project activities • Seek the consent of Tudun Wada/Mabera Communities and landowners to erect the site office for the specified duration of the project; • Sign Agreement with Community and for the temporary acquisition of land; • Agree on other measures to render the site safe and usable to the satisfaction of the landowners at completion of project. • A stand-alone Resettlement Action Plan has been prepared for this project 	<ul style="list-style-type: none"> • No. of public complaints recorded in the specific Tudun Wada/Mabera communities; • Level of awareness and understanding of Tudun Wada/Mabera Communitiesmembers; • No of Tudun Wada/Mabera Community members that attend trainings; • Level of satisfaction among Tudun Wada/Mabera PAPs; • No of women gainfully employed by project; • No of other businesses induced by project in the Communities; • Questionnaires, direct observations and interviews. 	<p>SPMU-SLO ; Focal NGO SMeNV.; SMLS.; Tudun Wada/Mabera Communities Leaders; Site Committee</p>

Item No	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
	Environmental and Social Impact	Mitigation Measures	Monitoring	Responsibility
	<ul style="list-style-type: none"> Construction activities may affect persons with critical health conditions, including old persons, children and other vulnerable persons, such persons may be temporarily relocated for the construction phase. Possible disagreement over siting of staging areas and temporary facilities between community and contractor 	<p>addressing impacts on Tudun Wada/Mabera communities and the PAP management. The SPMU shall be required to implement the RAP in accordance with the provisions therein.</p> <ul style="list-style-type: none"> To be resolved in accordance with provisions in the Agreement by the Tudun Wada/Mabera Communities and landowners and the Contractor. 		
2	<p><u>Community Cultural Heritage</u></p> <ul style="list-style-type: none"> There may be cultural relics in the vicinity of some project areas which could be impacted during construction activities. 	<ul style="list-style-type: none"> Relocation of identified cultural relics; Compensation for any damaged cultural relic or for relocation issues. The Contractor shall be required to prepare and submit a Cultural Heritage Management Plan to the SPMU for approval and adoption for the contractor's implementation 	<ul style="list-style-type: none"> Protection of all identified treasure finds 	SPMU-SLO ; Focal NGO ; SMEnv.; SMLS.; Tudun Wada/Mabera Communities Leaders; Project Site Committee
3	<p><u>Public/Stakeholders Participation</u></p> <ul style="list-style-type: none"> Effective project implementation requires active involvement and cooperation of the project community. 	<ul style="list-style-type: none"> Build capacities within Tudun Wada/Mabera communities Incorporate community feedback into project implementation process Disseminate project ESMP findings to Tudun Wada/Mabera Communities; Ensure that period of inaccessibility to land is as short as possible Awareness campaigns and capacity building. The Contractor shall be required to prepare and submit a Stakeholders' Engagement Plan to the SPMU for approval and adoption for the contractor's implementation 	<ul style="list-style-type: none"> No of active participants from Tudun Wada/Mabera communities and other stakeholders 	SPMU-SLO, ESO; Focal NGO; SMOW; SMEnv; SMOH; Tudun Wada/Mabera Communities' Leaders; Project Site Committee
4	<p><u>Vegetation and Biomass Removal Management</u></p>	<ul style="list-style-type: none"> Mark out areas for clearance & where possible use manual method of 	<ul style="list-style-type: none"> Areas of stressed vegetation; 	SPMU-ESO, NRO; Focal NGO; SMOW;

Item No	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
	Environmental and Social Impact	Mitigation Measures	Monitoring	Responsibility
	<ul style="list-style-type: none"> • Damage to the natural and planted vegetation on any acquired setback lands during site clearance, areas for siting of temporary office and workers camp. • Impact on flora and fauna. • Impact on wild life. 	vegetation clearing; <ul style="list-style-type: none"> • Undertake selective clearance by removing tall woody species leaving saplings for quick regeneration of vegetation; • Prevent colonization by invasive species. • Prevent damage to critical ecosystems and habitats. • Prevent destruction of flora and fauna. • The Contractor shall be required to prepare and submit a Vegetation and Biomass Management Plan to the SPMU for approval and adoption for the contractor's implementation 	<ul style="list-style-type: none"> • Size of cleared vegetation areas 	SMLenv; SMOH; Tudun Wada/Mabera Communities Leaders; Project Site Committee
CONSTRUCTION PHASE				
5	<u>Dust and Air Quality Management</u> <ul style="list-style-type: none"> • Air pollution is expected from dust and emissions from construction vehicles, plant and equipment. • Dust is generated by excavation and earth moving operations and causes nuisance to residents and other sensitive receptors. • Exhaust emissions occur from poor maintenance of plant and equipment or over revving of engines. 	<ul style="list-style-type: none"> • Dust generation will be controlled mainly by the use of water, especially in the dry season. • Use of water tanker for purposes of water dousing to control dust emission. • Erection of speed control signals and ramps mounted in communities; • Covering of hauling trucks carrying sand and other aggregates; • Covering of heaped material e.g. sand will be covered; • Use of nose masks by all workers at road maintenance/works sites. • Surfaces of vegetation along the maintenance road will be monitored to verify the effectiveness of dust suppression method. • The Contractor shall be required to prepare and submit an Air Quality Management Plan to the SPMU for approval and adoption for the contractor's implementation. 	<ul style="list-style-type: none"> • No. of public complaints; • Level of particulates in air • Level of other air pollutants • Vegetation surfaces free of dusts • Ambient air monitoring using standard methods 	SPMU-ESO; Focal NGO SMOH.; Tudun Wada/Mabera Communities Leaders; Project Site Committee
6	<u>Water Resources, Erosion and Sedimentation, Run-off Control Management</u>	<ul style="list-style-type: none"> • Location for heaping construction material (e.g. sand and other aggregates) not less than 50m from water bodies and drainage channels (i.e. a separation distance of 50m will be 	<ul style="list-style-type: none"> • No of complaints from Tudun Wada/Mabera Community members; • Absence of sediment build up around project areas; 	SPMU-ESO, PE; Focal NGO; SMOW; Tudun Wada/Mabera Communities Leaders;

Item No	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
	Environmental and Social Impact	Mitigation Measures	Monitoring	Responsibility
	<ul style="list-style-type: none"> Increased sedimentation and runoff may result from activities during the construction works. Earthworks release suspended particles into watercourses, which can have temporary detrimental effects on water organisms. Spillages of fuel and other petroleum products cause contamination of the soil and water resources. Excavation at the borrow pits may cause land degradation in the vicinity of the borrow pits; may cause soil erosion and siltation of nearby roads. 	<p>observed);</p> <ul style="list-style-type: none"> Site for fueling of machinery and servicing of equipment will be located at a minimum distance of 100m from any water bodies, wetlands and drainage channels; Embankment erection around fueling and other liquid or spill-able storage sites in order to limit or contain such material from escape to potentially pollute water resources; Side drains (where appropriate) will be provided with settling basins near water bodies to remove silt and debris from road surface and construction site run-off, before discharge to adjoining streams or rivers; Adequate side drains provided to carry run-off into drainage channels to prevent erosion; Culverts of suitable capacity constructed to contain and direct flow, especially at peak flow and run-off; Road maintenance works to be carried out off peak rainy season; Provision of toilets and urinal at locations not less than 50m away from water bodies; and Adequate worker awareness on sanitation and measures to avoid water resource contamination. The Contractor shall be required to prepare and submit a Water management Plan and an Erosion and Sedimentation Management Plan to the SPMU for approval and adoption for the contractor's implementation. 	<ul style="list-style-type: none"> Absence of flooding in construction areas; No of spills & repairs made; Use of standard monitoring methods 	Project Site Committee
7	<p><u>Noise and Vibration Exposure Management</u></p> <ul style="list-style-type: none"> Noise will emanate 	<ul style="list-style-type: none"> Equipment servicing plan will be prepared and strictly followed to ensure efficient machinery performance and optimum noise generation. Stationary equipment shall 	<ul style="list-style-type: none"> No of complaints from Tudun Wada/Mabera Community members; Absence of structural failures; Absence of debris 	SPMU-ESO; Local NGO; SMOW; SMOH; Tudun Wada/Mabera

Item No	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
	Environmental and Social Impact	Mitigation Measures	Monitoring	Responsibility
	<p>from moving vehicles, excavators, generators, power tools (e.g. for vegetation clearing), and compressors during construction.</p> <ul style="list-style-type: none"> • Vibrations may come from soil compaction equipment and other vibroequipment to be used at the dam area. 	<p>be sited at safe distances from sensitive areas to minimize noise impacts</p> <ul style="list-style-type: none"> • Workers operating noisy equipment will not be exposed continuously for more than 3 hours a day. • Workers will be provided with ear plugs. • Workers handling vibrating equipment or parts will be given pads to absorb the vibrations and will not be exposed continuously for longer than 3 hours a day. • Sanctions (ranging from a warning to dismissal) will be instituted by the contractor against workers who do not observe the use of appropriate PPEs 	<p>accumulation;</p> <ul style="list-style-type: none"> • No of debris removals & repairs made; • Sensor measurements around workplace 	<p>Communities Leaders; Project Site Committee</p>
8	<p><u>Occupational/Public Health and Safety Management</u></p> <ul style="list-style-type: none"> • Occupational accident during construction. • Construction operations pose hazards to people living or working near construction areas or employed to work on site. • Excavations, construction traffic and stockpiled materials pose particular threats to children and livestock. • Children may be inadvertently recruited to work on construction sites. 	<ul style="list-style-type: none"> • Health, safety and environmental training and awareness will be extended to Tudun Wada/Mabera Community members and local residents; • Erection of warning signals and use of reflective tapes at approaches to excavations, heaped materials, stationary equipment, etc. • Posting of speed limits of 25km/hr at approaches to construction sites; • Safety meetings held twice a week and documented accordingly; • Inductions and awareness programmes held for all employees on occupational health and safety practices; • A First Aid team formed to provide first aid services to workers and where appropriate make referrals to the nearest Health Centre or hospital; • First Aid team to be trained by a medical team from the Health Centre; • Accident records at construction site and neighbourhoods to be maintained both for workers and the public; • Stocks of PPEs to be maintained and supplied to 	<ul style="list-style-type: none"> •No. of sanitary facilities provided at start of project; •Adherence to stipulated speed limit •Records and No of incidents; •Use of PPEs by workers; •Records of appropriate workers' training; •Record of reinstatement plan for burrow pits; •Record of health and safety meetings •Record of first aid exercises •Hazards assessment 	<p>SPMU-ESO; Focal NGO; SMOH; Tudun Wada/Mabera Community Leaders; Project Site Committee;</p>

Item No	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
	Environmental and Social Impact	Mitigation Measures	Monitoring	Responsibility
		<p>workers regularly as needed; and</p> <ul style="list-style-type: none"> Workers required to wear the appropriate PPEs e.g. helmets, ear plugs, nose masks, vibration pads, hand gloves, etc. The Contractor shall be required to prepare and submit a Community/Occupational Health Management Plan to the SPMU for approval and adoption for the contractor's implementation 		
9	<p><u>Gender Based Violence Management</u></p> <p><u>Labour Influx</u></p>	<ul style="list-style-type: none"> Inductions and awareness programmes held for all employees on GBV/SEA issues; GBV/SEA awareness will be extended to Tudun Wada/Mabera Communitiesmembers and local residents; GBV/SEA records at construction site and neighbourhoods to be maintained both for workers and the public; Workers required to report any GBV/SEA issues to the construction management. The Contractor shall be required to prepare and submit a Gender Based Violence Management Plan to the SPMU for approval and adoption for the contractor's implementation Establishment and operation of an effective GRM accessible to community members to facilitate early identification of problems and targeted mitigating interventions. Provision of information regarding Worker Code of Conduct in local language and inclusion of a cultural sensitization training for workers regarding engagement with local community Sourcing of local workforce against bringing more people, introduction of sanctions for workers 	<ul style="list-style-type: none"> No. of GBV/SEA awareness workshops held; Level of GBV/SEA awareness of workers & others; No. of reported GBV cases No of Greivances recorded No of sensitization workshops help for workers on cultural issues. Tracking and recording the number of project workers recruited for the project within and from outside the project area. No of Road safety trainings held for workers. 	<p>Focal NGO; SPMU-ESO; SLO; SMEnv; SMOH; Tudun Wada/Mabera Communities Leaders; Project Site Committee</p> <p>Contractor</p>

Item No	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
	Environmental and Social Impact	Mitigation Measures	Monitoring	Responsibility
		<p>involved in criminal behaviours and a provision of substance abuse prevention and management program.</p> <ul style="list-style-type: none"> Preparation and implementation of a traffic management plan; construction of additional or separate access roads to project and workers' camp site, conduct road safety training for workers and inclusion of sanctions or fines for reckless driving by workers. 		
10	<p><u>HIV/AIDS and STIs Management</u></p> <ul style="list-style-type: none"> Construction workers camp give rise to health risks associated with poor sexual practices and prostitution. 	<ul style="list-style-type: none"> Provide quarterly HIV/AIDS and STIs awareness programmes for workers and nearby communities; Health and HIV awareness team arranged from the State Health Ministry for the quarterly programmes; Sponsored educational package put together by the team to be implemented to enlighten both workers and communities; Training of peer educators within the work force and in communities by the team; and The contractor to provide free condom supplies and encourage free discussions, counseling and testing. 	<ul style="list-style-type: none"> No. of HIV/AIDS workshops held; Level of awareness of workers & others; Records of peer educators' training; Records of condoms distributed 	<p>Focal NGO; SPMU-ESO; SMOEnv; SMOH; Tudun Wada/Mabera Communities Leaders; Project Site Committee</p>
11	<p><u>Construction Operation and Slope Stabilization</u></p> <ul style="list-style-type: none"> Construction operations will result in topographic alterations. Construction operations may result in landslides, rock cave-ins, and mudflow/flooding. Construction operations can pose earth movement hazards to people working near the construction areas due to unstable soil profiles from site 	<ul style="list-style-type: none"> Maximize local employment (including women) on construction works (there should be a contractual requirement to hire a percentage of local workforce including women) Provide occupational health and safety awareness training and workshops, Use of child labor shall be strictly prohibited Routinely Monitor and maintain construction work for continued stability and quality Shortcomings in the control structures including the check dams (retention basins) should be corrected before they develop into 	<ul style="list-style-type: none"> No. of accidents/incidents; No. of visible warning signs; Level of public awareness; Record of safety meetings held; 	<p>SPMU-ESO, PE; Focal NGO; SMOW; SMOEnv; Tudun Wada/Mabera Communities Leaders; Project Site Committee</p>

Item No	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
	Environmental and Social Impact	Mitigation Measures	Monitoring	Responsibility
	excavations.	serious problems. <ul style="list-style-type: none"> The Contractor shall be required to prepare and submit an Emergency Response and Incident Plan to the SPMU for approval and adoption for the contractor's implementation 		
12	<p><u>Traffic and Transportation Hazards</u></p> <ul style="list-style-type: none"> Traffic movements associated with site staff transportation, delivery of materials and the removal of waste during the construction is likely. Occasional movement of abnormal vehicular loads on local roads may result in temporary diversions. 	<ul style="list-style-type: none"> A temporary structure to be constructed on one lane to allow for traffic flow while work is on-going on the other lane; Traffic wardens to be posted at positions 100m from the construction points on either side of the road to ensure orderly traffic flow; Actual working areas to be secured with barricades; Adequate road warning signs to be posted at vantage points to warn and direct traffic; Traffic and transport associated with project will adhere to existing roads or follow specified routes as established. All measures shall be effectively monitored by Contractor to ensure their implementation. The Contractor shall be required to prepare and submit a Traffic and Vehicle Management Plan to the SPMU for approval and adoption for the contractor's implementation 	<ul style="list-style-type: none"> Effective traffic flow with vehicular & worker safety; Appropriate positioning of road signs, reflectors, speed ramps, control limits, traffic wardens; Records of accidents and near misses No of public complaints. 	SPMU-ESO, PE; Focal NGO; SMOW; SML; Tudun Wada/Mabera Communities Leaders; Project Site Committee
13	<p><u>Waste Management (solid and liquid wastes)</u></p> <ul style="list-style-type: none"> Proposed project will generate waste during construction including off specification materials such as cement, wood, plastic, paper and domestic waste from construction areas and worker camps. This could result in 	<ul style="list-style-type: none"> Waste bins to be provided for the disposal of waste generated; Waste will be segregated into three at source - organic (food residues), recyclables (woods, metals) and non-recyclables (plastic and glass wastes); Organic waste to be composted near the site office to enrich the soil, while plastics and glass are taken to the district dump-sites; 	<ul style="list-style-type: none"> Waste segregation and littering; Emptying of bins at waste dump sites; Waste composting; Indiscriminate defecation; Toilets decommissioning 	SPMU-ESO; Focal NGO; SMOW; SML; Tudun Wada/Mabera Communities Leaders; Project Site Committee

Item No	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
	Environmental and Social Impact	Mitigation Measures	Monitoring	Responsibility
	increased pressure on local waste dump facilities as well as potential for unauthorized disposal and littering if not properly managed.	<ul style="list-style-type: none"> • Topsoil removed from the right of way for maintenance work to be spread on the land to avoid disrupting drainage network; and • Toilets and urinals to be sited at least 100m from any stream or drainage channel and decommissioned at the end of project. • The Contractor shall be required to prepare and submit a Waste Management Plan to the SPMU for approval and adoption for the contractor's implementation 		
OPERATIONS & MAINTENANCE PHASE (POST CONSTRUCTION)				
14	<p><u>Land use restriction</u></p> <ul style="list-style-type: none"> • Use of acquired land associated with the project setbacks will be altered and restricted to community recreational uses. Structures may never be erected on this portion of land but economic trees could be planted. 	<ul style="list-style-type: none"> • Create awareness among community members; • Build capacities within community; • Incorporate community feedback mechanism into process • Ensure periodic monitoring of restricted areas • Continuous maintenance of erosion control structures including concrete channels and check dams, and bio-remediated areas for continued effectiveness. 	<ul style="list-style-type: none"> • Sustained treated flood and erosion healing process 	SPMU-ESO; SMEnv; Focal NGO; Tudun Wada/Mabera Communities Leaders; Project Site Committee
15	<p><u>Closure of temporary office, staging areas and decommissioning of project</u></p> <ul style="list-style-type: none"> • Damage to land forms and vegetation 	<ul style="list-style-type: none"> • Ensure that agreements with the community and landowners on post construction hand-over are kept. • Enforce agreed measures to render the site safe and usable post construction to the satisfaction of the community and landowners. 	<ul style="list-style-type: none"> • Agreements entered with community and landowners for use of land; • Terms of Agreement fulfilled with community and landowners; • Handover of office site as agreed 	SPMU-ESO, NRO; Focal NGO; Tudun Wada/Mabera Communities Leaders; Project Site Committee
16	<p><u>Erosion control system failure management</u></p> <ul style="list-style-type: none"> • Check dams that are not properly 	<ul style="list-style-type: none"> • Any treated erosion areas should be checked regularly and the healing process monitored closely. • Structures built in the channelization for 	<ul style="list-style-type: none"> • Sustained flood healing process 	SPMU – PE Tudun Wada/Mabera Communities Leaders; Project Site Committee CBOs/CDOs

Item No	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
	Environmental and Social Impact	Mitigation Measures	Monitoring	Responsibility
	constructed may suffer damage that could reduce the structural integrity of the erosion control structures during post-construction phase.	stabilization purpose should be observed for damage especially during rainy seasons and after heavy storms. Any damage observed should be repaired immediately to avoid further damage and the eventual collapse.		

6.3 Institutional Responsibilities and Accountabilities

The structure and reporting arrangements for the implementation of the ESMP are integrated into the overall project monitoring and evaluation program for the Tudun Wada/Mabera stormwater drainage rehabilitation project. The key actors as well as the roles and responsibilities of the various institutions in the ESMP implementation are as shown in Table 6.2. The matrix includes listing of all entities (public and private) responsible for designing and implementing the various aspects of the plan. The need for additional capacity building for the involved institutions and actors, including long-term consultation and training program for the implementing agency are also built into the structure.

Table 6.2: Institutional Responsibilities

Institutional Category	Project Implementation Phase	Roles & Responsibilities
Sokoto State Ministry of Environment (SMEnv)	All Phases (Preconstruction, Construction and Post Construction)	<ul style="list-style-type: none"> • Lead role to ensure adherence to the ESMP and applicable standards, environmental and social liability investigations, Monitoring and evaluation process and criteria • Executing agency with overall responsibility for NEWMAP implementation in the State. • Ensure that sufficient funds are made available to the SPMU; • Ensure that SPMU, regardless of financing source, complies with the provisions of the ESMP and WB safeguard policy. • Ensure that SPMU complies with KTSG environmental policies and regulations. • Ensure that the SPMU retain dedicated Technical Support for the project duration including safeguard specialists to oversee ESMP implementation. • Ensure that SPMU monitor environmental protection and mitigation measures in the ESMP and those activities that are embodied in the detailed designs; • Ensure that SPMU has secured environmental clearances certification from FMENV and WB prior to award and/or commencement of civil works contracts; • Ensure that SPMU establishes and implements an environmental grievance redress mechanism, as described in the ESMP, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance • Ensure that the bidding and contract documents include the ESMP; • Ensure that SPMU submits semi-annual monitoring reports on the ESMP implementation to WB and FPMU.
SPMU (Safeguard Officers, PRO, Project Engineer, M&E)	Pre-Construction Phase	<ul style="list-style-type: none"> • Ensure that bidding and contract documents include the ESMP; • Review and approve all required management plans necessary for the pre-construction, construction and post construction phases of the project; • Undertake monitoring of the implementation of the ESMP (mitigation and monitoring measures) with support from the appointed Focal NGO, the Site Committee, the Contractor and other stakeholders. • Report to WB and FPMU on all aspects of social and environmental

Institutional Category	Project Implementation Phase	Roles & Responsibilities
		<p>management and monitoring at required frequency;</p> <ul style="list-style-type: none"> • Submit monthly and quarterly or semi-annual monitoring reports on ESMP implementation to FPMU and WB; • Participate in grievance redress mechanism, as described in the this document, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the sub-project's environmental performance • Based on the results of the ESMP monitoring, identify environmental corrective actions and prepare a corrective action plan • Maintain and manage all funds effectively and efficiently for the project; • Coordinate all policies, programmes and actions associated with the intervention construction works; • Ensure the smooth and efficient implementation of the preconstruction phase of project's various programmes; • Have custody of a copy of the ESMP and disseminate information contained therein accordingly.
	Construction Phase	<ul style="list-style-type: none"> • Cooperate with the Steering/Technical Committees to provide guidance to the technical aspects of all project activities; • Provide oversight of contractors work plan and E&S implementation schedule; • Conduct weekly or routine site inspection and monitor implementation of E&S safeguards; • Receive and review reports from the contractor; • Prepare and submit weekly/monthly and subsequent quarterly and annual reports to the SPMU Project Coordinator, FPMU and the WB.
	Post Construction Phase	<ul style="list-style-type: none"> • Ensure proper closures of all contractor's temporary facilities; • Ensure that the terms of Agreement between the Contractor and the community and land owners are fulfilled.
FPMU	All Phases (Pre-construction, Construction and Post Construction)	<ul style="list-style-type: none"> • Project assessment and monitoring of the ESMP implementation and the construction activities. •
World Bank	All Phases (Pre-Construction, Construction and Post Construction)	<ul style="list-style-type: none"> • Assessment of specific and general project implementation; • Recommend additional measures for strengthening the management framework and implementation performance.
State Ministry of Works	Pre-Construction and Construction Phases	<ul style="list-style-type: none"> • Provide necessary preconstruction and construction support to the SPMU • Site assessment and monitoring of construction works and engineering activities;
State Ministry of Lands & Survey (SMLS)	Pre-Construction Phase	<ul style="list-style-type: none"> • Compliance overseer at State Level, on matters of land acquisition, compensation and other resettlement issues
FMEv, NESREA, Other MDAs	Pre-Construction and Construction Phases	<ul style="list-style-type: none"> • Intervene in areas under their jurisdiction as and when project demands
Contractor (Site Manager, Site Engineers/ Supervisors)	Pre-Construction Phase	<ul style="list-style-type: none"> • Recruit qualified environmental safeguard specialist to ensure compliance with environmental statutory and contractual obligations and proper implementation of the ESMP • Implement all the provisions of the ESMP in coordination with the SPMU and other relevant authorities • Develop and submit for SPMU and FPMU approvals specific management plans as provided in the ESMP. • Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the ESMP • Implement additional environmental mitigation measures for unexpected impacts, as necessary • Develop a work plan which incorporates schedule for E&S safeguards implementation; • Submit the work plan and schedule of E&S safeguard implementation to the SPMU; • Train/create awareness of all personnel/workers on relevant E&S safeguard measures and their obligations; • Ensure land disturbance activities are conducted in accordance with relevant legislation and the ESMP; • Communicate content of ESMP to all employees and contractor agents;

Institutional Category	Project Implementation Phase	Roles & Responsibilities
		<ul style="list-style-type: none"> Provide oversight function during mobilization to ensure adherence to good practice and the ESMP
	Construction Phase	<ul style="list-style-type: none"> Implement all E&S safeguards and other mitigation measures as planned; Submit monthly and quarterly implementation reports on E&S safeguards to SPMU; Comply with BEME specification in procurement of material and construction, and adherence to the ESMP and good construction practices; Ensure land disturbance activities are conducted in accordance with relevant legislation and the ESMP; Provide adequate onsite waste collection bins, ensure proper disposal, not to litter and not to create environmental nuisance; Provide oversight function during construction to ensure adherence to good practice and the ESMP
	Post Construction Phase	<ul style="list-style-type: none"> Provide oversight function during decommissioning to ensure adherence to good practice and the ESMP
Site Committee	All Phases (Preconstruction, Construction and Post Construction)	<ul style="list-style-type: none"> Monitor and ensure compliance to ESMP provisions as well as contractor implementation quality
Local government	All Phases (Preconstruction, Construction and Post Construction)	<ul style="list-style-type: none"> Provide support in monitoring project execution within their domains to ensure compliance with the ESMP and other relevant requirements
Local Community	All Phases (Preconstruction, Construction and Post Construction)	<ul style="list-style-type: none"> Promote environmental awareness; Assist and liaise with other stakeholders to ensure proper siting and provision of approval for such sites; Support with provision of necessary infrastructures and engage/encourage carrying out comprehensive and practical awareness campaign for the proposed project, amongst the various relevant grass roots interest groups.
CDOs	All Phases (Preconstruction, Construction and Post Construction)	<ul style="list-style-type: none"> Ensure community participation by mobilizing, sensitizing community members;
Focal NGO	All Phases (Preconstruction, Construction and Post Construction)	<ul style="list-style-type: none"> Assist to ensure effective response actions, to evolve and devise sustainable environmental strategies and rehabilitation techniques, organize, coordinate and ensure safe use of volunteers in a response action, & provide wide support in management planning, institutional/governance issues and other livelihood related matter, awareness campaigns
General Public	All Phases (Preconstruction, Construction and Post Construction)	<ul style="list-style-type: none"> Identify issues that could derail the project; Support project impacts mitigation measures as well as awareness campaigns.

6.4 Capacity of Sokoto NEWMAP to Implement the ESMPs

6.4.1 Capacity and Training Needs

In order to achieve effective ESMP implementation, there is need to strengthen relevant competencies on environmental and social management at primarily the State level and secondarily, the LGA and community levels including contractors. This will stimulate the required collaboration among the key actors. Experience has shown that strengthening capacity involves more than improving technical skills, developing new systems or establishing quality assurance and improvement standards. While these are important, strengthening capacity is however, essentially about changing behavior towards achieving desired goals.

The capacity building should include equipping individuals with the understanding, skills and access to information and training that enables them to perform effectively. Personnel of the erosion control intervention project need to understand the purpose of the ESMP and their expected roles during its implementation. The target groups for the training will include:

- SPMU Environmental & Social (E&S) Safeguard Officers and Project Engineers (PE);
- Contractor's personnel;
- Construction workers and site personnel; and,
- Select members from the project communities (Tudun Wada/Mabera).

The SPMU Environmental & Social (E&S) Safeguard Officers and contractors will require capacity building in the implementation of the project's environmental and social safeguards and general project planning and management interfaced with E&S components. Capacity requirements are also necessary in the areas of E&S monitoring and reporting, adherence to the required E&S principles, standards and commitments. The construction workers and select members of the project communities will undergo training on public awareness creation/educational techniques (on environmental, social and health issues) and first aid procedures.

6.4.2 Capacity Building Cost

The capacity building plan for the ESMP with the associated cost implications is shown in Table 6.3 below. To enhance the respective roles and collaboration of the relevant stakeholders, the broad areas for capacity building and effective ESMP implementation are identified and shown in Table 6.3.

Table 6.3: Summary of Institutional Capacity and Training Needs with Costs

Programme Description	Participants	Form of Training	Duration	Training Agency	Estimated Cost In (₦) and Project Phase
<u>Understanding the Environment:</u> <ul style="list-style-type: none"> • Concepts, Regulations & Statutory Requirements; • Environmental Management; • Flood and Erosion Prevention & Control; • Stakeholder & Community Participation 	Officials of SMEnv, SEPA, SMOW, SMLS, SPMU, Contractor, Community Leaders, Focal NGO, CBOs & Other Relevant Groups	Workshop	2 Days	External Agency for capacity building or Environmental & Social Specialist	500,000.00 (Pre-Construction Phase)
<u>Scope of Tudun Wada/Mabera Drainage Intervention Project:</u> <ul style="list-style-type: none"> • Environmental & Social Impacts; • Engineering Design and Associated ESMP; • Coordination with Other MDAs and the Community 	Contractor, SPMU Safeguard Officers and Project Engineers, SMENV, SEPA & relevant MDAs, Community Leaders, CDOs, & NGOs	Workshop	2 Days	External Agency for capacity building or Environmental & Social Specialist	500,000.00 (Pre-Construction Phase)
<u>Project Implementation:</u> <ul style="list-style-type: none"> • Civil Works with Bio-remediation in the project; • Roles and Responsibilities of Key Actors; • Environmental Monitoring 	SPMU Project Engineers and Safeguard Officers, Contractors, SMEnv, SEPA	Lecture and Site Visit	2 Days	External Agency for capacity building or Environmental & Social Specialist	600,000.00 (Construction Phase)
<u>Monitoring and Evaluation and GRM:</u> <ul style="list-style-type: none"> • ESMP Monitoring and Reporting Strategy; • Stakeholder and Community Participation 	Contractor, SPMU Safeguard Officers, Engineers, SMEnv, SEPA & relevant MDAs, Community Leaders, CDOs, & Focal NGO	Workshop	2 Days	Environmental & Social Specialists; External Agency engaged for capacity building	500,000.00 (Pre-Construction Phase)

Programme Description	Participants	Form of Training	Duration	Training Agency	Estimated Cost In (₦) and Project Phase
<u>Watershed Protection and Management:</u> <ul style="list-style-type: none"> Alternative income generation programme for stakeholders and skills requirements; Promotion of Agricultural Methods and Technologies for Improving Farm Production and Erosion Prevention; 	Watershed Committee, Community Leaders, LGA Staff, Support Professionals	Workshop	2 Days	World Bank/External Agency Engaged for Capacity Building/ Environmental & Social Specialists	750,000.00 (Post-Construction Phase)
TOTALS					₦2,850,000.00

The capacity building and trainings costs shown in Table 6-3 shall be included as part of the overall project construction cost to be funded by the Contractor as part of preparedness for ESMP implementation. The trainings are to be conducted preparatory to the contractor's mobilization to site. All trainings shall therefore be completed prior to mobilization or latest two weeks after the contractor has mobilized to site.

6.5 E&S Obligations of the Construction Contractors

It is the responsibility of the construction contractors to ensure compliance with all the Engineering Design provisions associated with this project. The SPMU shall not be responsible for any property (whether community, corporate or individual) damaged as a result of actions or activities undertaken or being undertaken by the contractor in the course of executing its contract. In the event of such damage, the contractor shall be fully liable for the cost of such damage.

As part of the construction approval process for the project, a set of environmental and social management plans is needed to address the specific issues identified in this ESMP which may arise in the course of the project. The management plans will need to be developed by the Contractor to address the specific impacts as identified in this ESMP. These management plans are briefly described in the following sections and shall be implemented as part of the overall environmental and social management and monitoring plans for the Tudun Wada/Mabera Stormwater Drainage Project.

6.6 Required Environmental and Social Management Plans

The construction Contractors for the project shall be required to meet the specific E&S safeguard obligations as provided in this ESMP which shall be incorporated into the contract specifications for the project as provided in Annex IV. The contractors shall also be required to develop work programmes for field work to guide and explain how the mitigation measures recommended in this ESMP will be implemented during the Tudun Wada/Mabera project execution. This is in addition to other contractual provisions for the project. The required specific E&S management plans include the following:

6.6.1 Resettlement Action Plan

The WB requires the preparation, in advance of project implementation, of a Resettlement Action Plan/Abbreviated Resettlement Action Plan (RAP/ARAP) where project impacts are known to displace persons within the project community or affect their social and economic well-being. The RAP/ARAP seeks to specifically identify, evaluate and document the set of mitigation, monitoring and institutional actions to be undertaken for the project to eliminate identified adverse community or individual social and livelihood impacts before commencing the remedial construction and rehabilitation works.

The Resettlement Action Plans for the Tudun Wada/Mabera project are being prepared as stand-alone documents and are incorporated accordingly into this Environmental and Social Management Plan by reference.

6.6.2 Public/Stakeholder Consultation Plan

A key element of sustaining stakeholders' support in the project is to sustain the consultations and communication process that has already been effectively established in the course of the preparation of this ESMP. Stakeholders' engagement needs to be enhanced and managed through a well-defined strategy. Table 6.4 provides a summary of the stakeholder consultation activities to be considered in the engagement plan. Public sensitization and consultation will continue throughout the project execution.

The Contractors shall be required to prepare and submit for approval of SPMU and FPMU, comprehensive Stakeholder Engagement Plans. The Plans will provide the Contractor's specific engagement plan to ensure that all segments of the community and other stakeholders are fully and effectively involved in the project decision process.

Table 6.4: Summary of Stakeholder Consultation Plan

Activity	Stakeholders / Community	Timeline
Pre-Construction / Prior to Project Commencement		
Project briefings, site tours, personal meetings, community sessions, consultation meetings	State Government , Local Government, Site committee, Residents of affected areas/ Community and interest groups	As required, subject to project updates and feedback from the community
Development/dissemination of feedback and complaints mechanism and communications procedures	State Government , Local Government, Site committee, Residents of affected areas/ Community and interest groups	As required, subject to any updates on the project
Briefings, Site Tours and Community Sessions for flood control and intervention works	Government authorities, Local communities, Key/ relevant stakeholders	Prior to Work Plan approval
Construction and Operations		
Responding to issues and inquiries as per feedback and complaints mechanism	All stakeholders	Ongoing / as required
Monthly/Quarterly reporting on status of project	All stakeholders	Monthly/quarterly/as required.
Briefings, site tours and community sessions for flood control and intervention works closure plan	Government authorities, Local communities, Key/ relevant stakeholders	Prior to project completion
Prior to Project Closeout/Post-Construction		
Project briefings, site tours, personal meetings, community sessions, consultation meetings with stakeholders	All stakeholders, State Govt , Local Govt, Site committee, Affected residents/ Community/ interest groups	As required, subject to approvals and feedback from the community

6.6.3 Chance Finds/Cultural Heritage Management Plan (CHMP)

The Chance Finds/Cultural Heritage Management Plan (CHMP) is required to address the specific impacts that may occur as a result of any "Archaeological Chance Finds" or existence of cultural heritage resources during the planned construction works. It is anticipated that some of the construction activities associated with the project may impact cultural resources such as the grave yards.

The grave yards identified within the project areas are considered only of local significance and may not be affected by construction. However, if the any grave yard needs to be relocated on account of the project, the local people, community leaders, NGOs and others should reach a consensus and the local people should be involved in the process of relocation. Alternatively, if the graveyard is considered of archaeological and historical value, then the Contractor shall develop a strategy for restoration, conservation and management which shall be implemented.

In the event of any "Archaeological Chance Finds", the construction contractor should comply with the following rules as well as the Federal or State archaeological laws:

- notify relevant departments of such findings,
- request a site inspection,
- completely halt work until inspection results are received, and
- decide whether or not to proceed with further work.

The Contractor shall prepare and submit for approval of SPMU and FPMU, the necessary CHMP to be implemented for the project. The CHMP will set out a formal system by which the Contractor will carry out mitigation measures that will reduce any impacts to the Cultural Heritage. Specifically, the CHMP will provide details regarding the implementation of avoidance, mitigation and management measures for impacts related to the possibility of archaeological chance finds or any existing cultural heritage of significance. The scope of the CHMP will cover pre-construction, construction and post construction/closure phases of the Project.

6.6.4 Occupational/Public Health, Safety and Security Management Plan

Selected Contractor shall be required to develop and implement an occupational and community health and safety plans that contributes to a healthy workforce and local community for the Tudun Wada/Mabera project. The health and safety plan shall be submitted to the SPMU and FPMU for necessary approvals prior to implementation. In developing the Plans, the Contractors shall evaluate possible hazards that may be associated with the project activities such as: (a) imported backfill material; (b) Hazards to the aquatic environment arising from toxic effects of imported material (pH, COD, salinity, dispersed material); (c) Flood hazards due to heavy downpour during the construction period; (d) Physical/mechanical hazards due to the movement of solid material in the event of an accident; (e) Hazards resulting from soil contamination.

Selected Contractor shall also be required to identify who and what can be affected assuming possible scenarios (such as construction failures). Consideration should be given to issues relating to the environment (water, soil, and biota), humans (life, health and living conditions), and economic losses of the population (damage to infrastructure, property) in the event of the possible scenarios. Cooperation between the Contractor, the SPMU and the local community is recommended for emergency planning.

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

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

- Possible pressure on traffic and transportation network associated with construction and operations activities; and
- Possible change in water and air quality associated with construction and operations activities.
- In addition to the potential negative impacts which would require mitigation, the rehabilitation of the dam also has the potential to improve community health safety and security through the following means:
 - Improved access to medical facilities for communities due to the dam rehabilitation and the restoration of connecting roadways;
 - Improved healthcare infrastructure;
 - Improved workforce health awareness;
 - Improved standards of living of direct and indirect employees due to better income in the employees households; and
 - Improved standards of living of vulnerable groups and their households, including support to the elderly within the respective households.

6.6.5 Gender Based Violence/Sexual Exploitation and Abuse Management Plan

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

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

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

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

6.6.6 Vegetation Clearing and Biomass Management Plan

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

The specific objectives of the Plan are to:

- Identify appropriate, ecologically sustainable, and spatially-explicit management actions, such as re-vegetation with native plant species, based on biological and hydrological factors, as well as the reasonableness of costs, local community expectations, and other key considerations.
- Develop monitoring methods to evaluate progress toward Plan objectives, to apply adaptive management to enhance the likelihood of achieving those objectives, and to increase understanding of water and ecosystem interactions.
- Prepare for anticipated changes to the system, such as climate change and land-use changes.

- Prepare for implementation of rapid, active ecological restoration and other management strategies for threatened, endangered, and other native wildlife species potentially displaced by construction activities, and to enhance pollinator habitat.
- Provide consideration of proper implementation techniques, implementation costs, short- and long-term maintenance needs, water use/savings, and wildfire control.

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

6.6.7 Air Quality Management Plan

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

6.6.8 Emergency Response and Incident Plan

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

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

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

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

6.6.9 Water Management Plan

The Contractor shall be required to prepare and submit for approval of SPMU and FPMU, a Water Management Plan. The Plan will provide information about current water uses and charts a course for water efficiency improvements, conservation activities, and water-reduction goals.

An important step in creating a water management plan is to establish a water balance for the project. It is necessary to ensure that water supply, wastewater, storm water issues, and water efficiency Best Management Practices (BMPs) are taken into account prior to commencement of the construction works. Water emergency and other contingency plans should describe how the construction facility will meet minimum water needs during emergency or other water shortages.

6.6.10 Erosion and Sedimentation Management Plan

Selected Contractor shall prepare and submit for approval of SPMU and FPMU, a comprehensive Erosion and Sedimentation Management Plan. Together with this ESMP, the Plan will provide the specific activities to be carried out to protect the environment from erosion and sedimentation within the project area. It is important that an erosion and sediment control plan is effective in preventing illicit discharge. Appropriate consideration should be given to identify potential problems posed by the project area slopes, drainage patterns, and soil types in preparing an effective erosion and sediment control plan.

The erosion and sediment control plan shall be overlaid on the project grading plan(s) or site plan if there is no grading plan.

- The plan shall show what Best Management Practices (BMPs) will be used, when, and where, specific to the project scope, along with the total disturbance area and installation details and notes for the proposed BMPs. Measures will include those necessary to delineate areas of work, prevent erosion of unstable or denuded areas, plan for construction staging and storage logistics, construction of stabilized access points, and proper containment measures for construction materials and waste.
- The name and contact information for the person responsible for maintaining erosion and sediment control measures throughout the construction work shall be included as Erosion Control Point of Contact.
- Location, width, direction of flow and approximate location of top and toes of banks of any watercourses.
- Location and types of existing vegetation on the site. Within 10 meter of any cut or fill, the plan shall identify the location, diameter, species and appropriate elevation at the base of all trees over 0.3 m in diameter measured at 1.5m above average ground level.
- Existing drainage patterns and direction of flow.
- Limits of disturbed areas.
- Areas not to be disturbed and off-limits to construction activity.
- Location of proposed vegetative erosion control measures (e.g., seeding, landscaping), including type, quantity, planting schedule, and irrigation.
- Location and details of all proposed drainage systems, walls, cribbing or other erosion protection devices to be constructed in connection with, or as a part of, the project.

6.6.11 Traffic and Vehicle Management Plan

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

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

Key issues to consider for managing traffic at the construction workplace include:

- Keeping pedestrians and vehicles apart including on site and when vehicles enter and exit the workplace;
- Minimizing vehicle movements;
- Eliminating reversing vehicles or minimizing the related risks;
- Ensuring vehicles and pedestrians are visible to each other;

- Using traffic signs, and,
- Developing and implementing a traffic management plan.

Selected Contractor shall be required to provide appropriate information, training, instruction or supervision necessary to protect all persons from risks to their health and safety. The Contractor must also ensure construction induction training is provided to workers who carry out construction work.

- The Sokoto State NEWMAP will place speed limits and appropriate road signage along all Project roads;
- The Sokoto State NEWMAP will enforce speed limits for safety, air quality, and noise purposes both on the Project site and beyond;
- All Sokoto State NEWMAP drivers should be trained by a road safety specialist; and,
- All vehicles should be properly maintained and undergo periodic safety inspections.
- Observance of speed limits by contractor's vehicles / drivers should be part of the contractual agreements

6.6.12 Waste Management Plan

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

The waste management plan should cover the following:

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

6.6.13 Chemical Management Plan

Selected Contractor shall prepare and submit for approval of SPMU and FPMU, Chemical Management Plan (CMP) for the Tudun Wada/Mabera project. The CMP will provide specific and general guidance in the storage, use and disposal of any chemicals or chemical products associated with activities to be carried out as part of the project. Chemicals are an integral part of everyday life, essential to our economy, our communities and our homes. While chemical substances provide benefits, they may also have harmful effects on human health and the environment if not properly managed.

The CMP is aimed at protecting human health and the environment by assessing chemicals used in the project and by taking action on the chemicals found to be harmful. The CMP

helps protect the project community and their environment from the harmful effects of chemical substances. The CMP will assess the environmental and human health risks posed by the chemical substances to be used in the project, and also develop measures to be implemented to prevent or manage those risks.

6.7 ESMP Monitoring and Evaluation

The objectives of the monitoring and evaluation program are:

- To ensure that the measures suggested herein are carried out accordingly during project implementation;
- To evaluate the efficiency of the proposed mitigation and enhancement measures;
- To investigate the adequacy of the ESMP as well as suggest improvements to it;
- To generate data that could be incorporated in future ESMPs;
- To evaluate what additional enforcement is required for the effective project implementation.

For effective implementation of the ESMP, a monitoring programme has been designed. The monitoring plan indicates the operational links between the impacts identified, indicators to be measured, the methods to be used, frequency of measurements and definition of thresholds indicating the need for corrective actions. The necessary costs and the responsibilities for all aspects of the monitoring arrangements are also identified.

6.7.1 Monitoring and Reporting

Project performance monitoring has the overall objective of achieving the desired outcomes through reporting of measurable events or parameters or aspects that can be monitored and verified. The following monitoring and reporting sequence is proposed for the ESMP implementation at the Tudun Wada/Mabera project.

- The respective Contractors shall submit to SPMU a monthly monitoring report and the ESMP accomplishments during the project implementations,
- The SPMU shall prepare monthly ESMP monitoring and accomplishment reports to be submitted to FPMU and the WB.

This reporting cycle should be repeated as the feedback mechanism scheme to all key players consisting of the affected stakeholders, Site Committee, Focal NGO, CBOs/CDOs, Contractor, SPMU, etc.

6.7.2 Post Construction Monitoring

In the post-construction phase of the project, the respective Site Committees shall be required to maintain continuous monitoring of the Tudun Wada/Mabera project beyond the decommissioning phase. This will ensure that the Tudun Wada/Mabera project rehabilitation/healing process and the associated livelihood programmes are sustained beyond the project closeout. Since the Site Committee will have a big role in sustaining the post construction (operations and maintenance) phase of the project, necessary capacity building trainings will be required to provide its officers/leaders the needed capabilities for formulating necessary policies, systems and procedures. The SPMU and the SMeEnv will be required to ensure that the Site Committees and other CBOs/CDOs are institutionally strengthened.

A summary of the impacts mitigation and monitoring plan for the preconstruction, construction, and post-construction phases with the associated monitoring frequencies, responsible parties and projected costs are presented in Table 6-5.

6.8 Grievance Mechanism and Procedures

It is for the benefit of the MOE/SKSG, NEWMAP, Communities and the PAPs to devise a mechanism through which complaints and disagreements arising from the implementation of the Tudun Wada/Mabera drainage project can be resolved. A Grievance Redress Mechanism (GRM) is necessary in order to prevent and address community issues, reduce

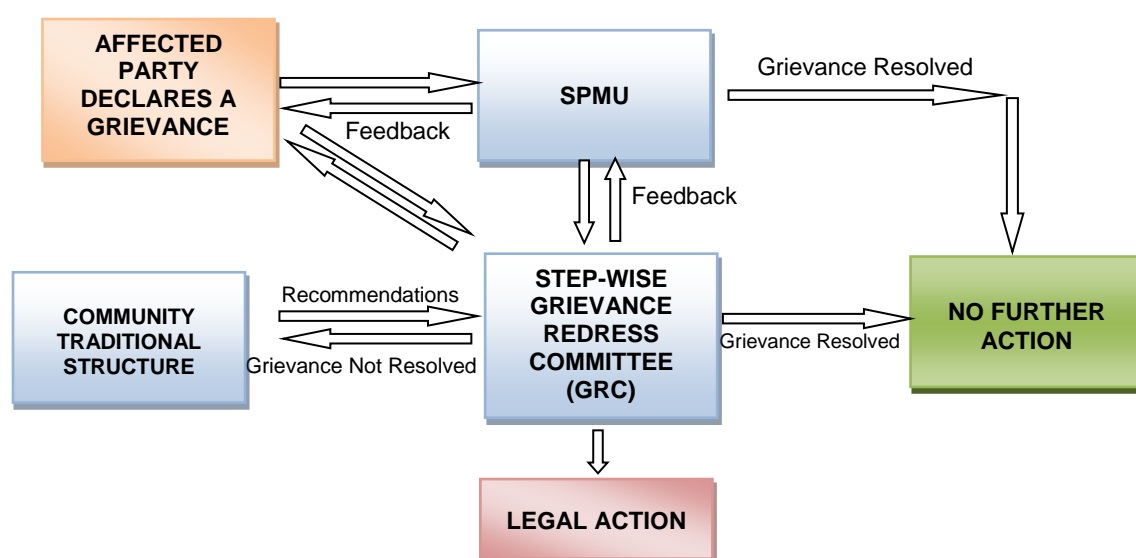
exposure to risks and also provide the platform for the optimization of environmental and social benefits of the project. The grievance procedures consist of the steps that ensure proper documentation of all grievances, a discussion mechanism for hearing and resolving the grievances, and provisions for appeals in the event of dissatisfaction by any affected persons.

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

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

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

Figure 6-1: Grievance Redress Procedure



6.8.1 Formation of Grievance Redress Committee (GRC)

The objective of the GRC is to respond to the complaints relating to the project in a timely and transparent manner and to provide a mechanism to mediate conflict and cut down on

lengthy litigation, which often delays projects. It will also provide people who might have objections or concerns about their assistance a public forum to raise their objections and through conflict resolution, address these issues adequately. The committee will provide ample opportunity to redress complaints informally, in addition to the existing formal administrative and legal procedures.

The major grievances that might require mitigation include:

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

The NEWMAP SPMU shall establish necessary levels of Grievance Redress Committees (GRC) overseen by NEWMAP for Tudun Wada/Mabera project to address complaints from this ESMP implementation. Each GRC shall provide specific necessary support and resolution of the potential PAP related grievances in accordance with provisions of this ESMP. The Committees will be coordinated as provided for at each level with the compositions of each GRC level comprising of the following:

FIRST LEVEL: COMMUNITY GRIEVANCE REDRESS COMMITTEE (COM-GRC)

The first stage of the GRC in the grievance process shall be the community-based GRC (Community GRC) which shall be coordinated by the Focal NGO (FNGO) and shall be made up of the following:

- 1 Representative from each of the Community Associations
- 1 Representative from the traditional ruler of the Community
- 1 Representative of the Local Government Area
- 1 Representative of Ministry of Lands, Survey and Physical Planning.
- 1 Representative of the Project Affected Persons (PAPs)
- Environmental Safeguards Officer (ESO) in SPMU as the Secretary
- 1 Representative from the Focal NGO as coordinator

This committee shall be the place of first recourse for anyone who has a grievance matter related to the site. The timeline for addressing/resolving the issues raised by a complainant by this GRC shall be at most 15 days from the last day allowable for grievance and complaints submission following the end of ESMP disclosure.

SECOND LEVEL: PMU GRIEVANCE REDRESS COMMITTEE (PMU-GRC)

Where the Com-GRC is unable to resolve the matter, the Complainant may seek redress from the Project Management Unit – Grievance Redress Committee (PMU-GRC). This Committee shall be coordinated by the Project Coordinator of the SPMU and made up of the following:

- 1 Representative from the Ministry of Environment
- 1 Representative from the Ministry of Lands and Survey
- 1 Representatives of the Project Affected Persons (PAPs)
- 1 Representative from the Focal NGO
- Environmental Safeguards Officer in SPMU as the Secretary
- Project Accountant in the SPMU
- Project Coordinator of the SPMU as the Coordinator

This committee shall be the second place of recourse for anyone who has a grievance matter related to the site. The timeline for addressing/resolution of the issues raised by a complainant by this PMU-GRC shall be at most 15 days from the last day allowable for grievance and complaints submission following the inability of the Com-GRC to resolve the matter.

THIRD LEVEL: NEWMAP STEERING/TECHNICAL COMMITTEE (STATE-GRC)

Where the PMU-GRC is unable to resolve the matter at this level, the Complainant may seek redress from the NEWMAP Steering and Technical Committee GRC (STATE-GRC). This Committee will be coordinated by the Chairman of the Steering Committee, who is the Honourable Commissioner of the Ministry of Environment. The composition of this Committee shall be as follows:

- The Federal Environmental Safeguards Specialist
- Representative of the Umbrella NGO
- Environmental Safeguards Officers from 2 neighboring NEWMAP states who have experience in handling grievance matters
- Project Coordinator of the SPMU as the Secretary

The timeline for addressing/resolving issues raised by a complainant by this STATE-GRC shall be at most 15 days from the last day allowable for grievance and complaints submission following the inability of the PMU- GRC to resolve the matter.

FOURTH LEVEL: THE COURTS

Where the Complainant is not satisfied with the decisions of the STATE-GRC, he/she may seek redress in the law Courts.

All grievances will first of all be addressed at the First Level. It will only move on to Second Level if the first level agreement was not accepted by the party involved and then to third and forth under similar situations. If negotiated settlement of grievances cannot be achieved through the normal procedural steps outlined in the grievance mechanism, the complainant has the right to approach the courts. The GRM procedure will be included in the community engagement plan to ensure that all PAPs know and understand the process and are able to access it whenever they feel the need. The effectiveness of the GRM will be one of the crucial monitoring indicators.

6.8.2 Training of the Grievance Redress Committees

The various Grievance Redress Committees shall be provided with training to enable them adequately perform their responsibilities. The training shall be organized by the SPMU who shall provide logistics such as writing materials, per diem, transportation, training venue and time.

The details of the training including time and date shall be adequately communicated to all members for their attendance. At the end of the training, members of the intervention community shall be adequately sensitized on the procedure for submission of complaints and grievances.

Table 6-5 E&S Impact Mitigation and Monitoring Plan for Tudun Wada/Mabera Stormwater Drainage Project

E&S Impact Category	Source of Impact	Objective	Impact Mitigation			Performance & Impact Monitoring			
			Proposed Mitigation Measures	Responsible to Implement	Mitigation Cost (N)	Monitoring Indicator	Monitoring Frequency	Responsible to Monitor	Monitoring Cost (N)
PRE-CONSTRUCTION PHASE									
Safeguard Instrument (ESMP)		Ensure that identified E&S impacts are addressed and mitigation measures are executed properly	Environmental and social management measures as spelled out in this document (details are as enumerated below)	SMEEnv & SPMU	To be included in the overall project construction cost	Approval of ESMP Report by FMEnv & WB; Commencement of construction activities; Availability of completed & approved plans	Monitoring parameters as indicated in this ESMP	FPMU & WB	N/A
Impacts on Community and PAP Management (Loss of physical assets; Loss of means of livelihood; Displacement of persons (temporary))	All those impact sources that are indicated in Table 6.1, Item 1, Column 1	To restore persons affected by the project to a condition equivalent to or better than the pre-project situation	A stand-alone Resettlement Action Plan (RAP) is being prepared as a stand-alone document; All those impact mitigation measures that are indicated in Table 6.1, Item 1, Column 2	SMEEnv & SPMU	To be included in the total RAP cost	<ul style="list-style-type: none"> No. of public complaints recorded; Level of awareness and understanding of community members; No of community members that attend trainings; Level of satisfaction among PAPs; No of women gainfully employed by project; No of other businesses induced by project Questionnaires, direct observations and interviews. 	Weekly Continuous Quarterly Continuous Quarterly Quarterly; Six months intervals	SPMU-SLO ; Focal NGO SMEEnv.; SMLS.; Community Leaders; Site Committee	Included in total cost provided in the RAP 350,000.00
Community Cultural Heritage	All those impact sources that are indicated in Table 6.1, Item 2, Column 1	Ensure that community's historical, archeological, and cultural treasures are not destroyed during project execution	All those impact mitigation measures that are indicated in Table 6.1, Item 2; Column 2 Develop and	SMEEnv & SPMU Contractor	To be included in the overall project construction cost	<ul style="list-style-type: none"> Protection of all identified treasure finds 	Continuously	Focal NGO; SPMU; SMEEnv; Community Leaders; Site Committee	250,000.00

E&S Impact Category	Source of Impact	Objective	Impact Mitigation			Performance & Impact Monitoring			
			Proposed Mitigation Measures	Responsible to Implement	Mitigation Cost (N)	Monitoring Indicator	Monitoring Frequency	Responsible to Monitor	Monitoring Cost (N)
			submit for SPMU approval a Cultural Heritage Management Plan; Possibility of chance archeological findings						
Public/Stakeholders Participation	All those impact sources that are indicated in Table 6.1, Item 3, Column 1	Ensure effective community and stakeholder involvement in the project decision process	Develop and submit for SPMU approval a Stakeholders Engagement Plan; All those impact mitigation measures that are indicated in Table 6.1, Item 3, Column 2	Contractor Contractor	To be included in the overall project construction cost	• No of active participants from the community and other stakeholders	Continuously	Focal NGO; SPMU; SMOEnv; Community Leaders; Site Committee	300,000.00
Vegetation and Biomass Removal Management	All those impact sources that are indicated in Table 6.1, Item 4, Column 1	Prevent damage to critical ecosystems and habitats and destruction of flora and fauna	Develop and submit for SPMU approval a Vegetation and Biomass Removal Management Plan; All those impact	Contractor Contractor	To be included in the overall project construction cost	Areas of stressed vegetation; Size of cleared vegetation areas	Monthly Monthly	SPMU-ESO; NRO; Focal NGO; SMOW; SMOEnv; SMOH; Community Leaders; Site Committee	450,000.00

E&S Impact Category	Source of Impact	Objective	Impact Mitigation			Performance & Impact Monitoring			
			Proposed Mitigation Measures	Responsible to Implement	Mitigation Cost (N)	Monitoring Indicator	Monitoring Frequency	Responsible to Monitor	Monitoring Cost (N)
			mitigation measures that are indicated in Table 6.1, Item 4, Column 2						
CONSTRUCTION PHASE									
Dust and Air Quality Management	All those impact sources that are indicated in Table 6.1, Item 5, Column 1	To minimize emission of hydrocarbons and generation of dust at the work site and access roads	Develop and submit for SPMU approval an Air Quality Management Plan; All those impact mitigation measures that are indicated in Table 6.1, Item 5, Column 2	Contractor Contractor	To be included in the overall project construction cost	<ul style="list-style-type: none"> No. of public complaints; Level of particulates Level of air pollutants Vegetation surfaces free of dusts Ambient air monitoring using standard methods 	Daily Continuous as necessary Continuous as necessary Two month intervals or as required Two month intervals or as required	SPMU-ESO; Focal NGO SMOH.; Community Leaders; Site Committee	550,000.00
Water Resources, Erosion & Sedimentation Control Management	All those impact sources that are indicated in Table 6.1, Item 6, Column 1	Ensure that project area is adequately protected from development of erosion and sedimentation hazards	Develop and submit for SPMU approval a Water Management Plan and an Erosion and Sedimentation Management Plan; All those impact mitigation measures that are indicated in Table 6.1, Item 6, Column 2	Contractor Contractor	To be included in the overall project construction cost	<ul style="list-style-type: none"> No of complaints from community members; Absence of sediment build up; Absence of flooding in construction areas; No of spills & repairs made; Use of standard monitoring methods 	Daily Daily Daily Three month intervals	SPMU-ESO; Focal NGO; SMOW; Community Leaders; Site Committee;	450,000.00

E&S Impact Category	Source of Impact	Objective	Impact Mitigation			Performance & Impact Monitoring			
			Proposed Mitigation Measures	Responsible to Implement	Mitigation Cost (N)	Monitoring Indicator	Monitoring Frequency	Responsible to Monitor	Monitoring Cost (N)
Noise and Vibration Exposure Management	All those impact sources that are indicated in Table 6.1, Item 7, Column 1	Ensure adequate protection of the workforce and community members from effects of noise and vibrations	<ul style="list-style-type: none"> All those impact mitigation measures that are indicated in Table 6.1, Item 7, Column 2 	Contractor – Site Engineer	To be included in the overall project construction cost	<ul style="list-style-type: none"> No of complaints from community members; Absence of structural failures; Absence of debris accumulation; No of debris removals & repairs made; Sensor measurements around workplace 	Daily Daily Daily Daily	SPMU-ESO; Local NGO; SMOW; SMOH; Community Leaders; Site Committee	500,000.00
Occupational & Public Health and Safety Management	All those impact sources that are indicated in Table 6.1, Item 8, Column 1	Ensure that identified occupational & public health, safety and security impacts are addressed and mitigation measures are executed properly	<p>Develop and submit for SPMU approval an Occupational and Public Health, Safety and Security Management Plan;</p> <p>All those impact mitigation measures that are indicated in Table 6.1, Item 8, Column 2</p>	Contractor Contractor	To be included in the overall project construction cost	<ul style="list-style-type: none"> No. of sanitary facilities provided at start of project; Adherence to stipulated speed limit Record of incidents; Use of PPEs by workers; Records of appropriate workers' training; Record of reinstatement plan for burrow pits; Record of health and safety meetings Record of first aid exercises Hazards assessment 	At start of project; Twice weekly; Weekly; Daily; Monthly; At beginning of project Weekly; Monthly At start of project	SPMU-ESO; Focal NGO; SMOH; Community Leaders; Site Committee;	600,000.00
HIV/AIDS and STIs Management	All those impact sources that are indicated in Table 6.1, Item 9, Column 1	Ensure effective HIV/AIDS and STI awareness among community members	<ul style="list-style-type: none"> All those impact mitigation measures that are indicated in Table 6.1, Item 9, Column 2 	SPMU Safeguard Officers; MOH; NGO; Contractor-Health &	To be included in the overall project construction cost	<ul style="list-style-type: none"> No. of HIV/AIDS workshops held; Level of awareness of workers & others; Records of peer educators' training; Records of condoms distributed 	Quarterly Continuous Bi-monthly Monthly	Focal NGO; SPMU-ESO; SMEnv; SMOH; Community Leaders; Site Committee;	500,000.00

E&S Impact Category	Source of Impact	Objective	Impact Mitigation			Performance & Impact Monitoring			
			Proposed Mitigation Measures	Responsible to Implement	Mitigation Cost (N)	Monitoring Indicator	Monitoring Frequency	Responsible to Monitor	Monitoring Cost (N)
				Safety Personnel					
Construction Operations & Slope Stabilization	All those impact sources that are indicated in Table 6.1, Item 10, Column 1	To ensure that construction activities are carried out without risks to health and safety of the workforce and the community	Develop and submit for SPMU approval an Emergency Response and Incident Plan; All those impact mitigation measures that are indicated in Table 6.1, Item 10, Column 2	Contractor Contractor	To be included in the overall project construction cost	<ul style="list-style-type: none"> No of workshops for Gender Based Violence and Child Labour held; No. of accidents/incidents; No. of visible warning signs; Level of public awareness; Record of safety meetings held; 	Daily; Daily; Continuous; Continuous Weekly.	SPMU-ESO; PE, Focal NGO; SMOW; SMEnv; Community Leaders; Site Committee	350,000.00
Traffic and Transportation Hazards	All those impact sources that are indicated in Table 6.1, Item 11, Column 1	To ensure that traffic within the project area is managed so as to assure the workplace and community are without risks to health and safety	Develop and submit for SPMU approval a Traffic and Vehicle Management Plan; All those impact mitigation measures that are indicated in Table 6.1, Item 11, Column 2	Contractor Contractor	To be included in the overall project construction cost	<ul style="list-style-type: none"> Effective traffic flow with vehicular & worker safety; Appropriate positioning of road signs, reflectors, speed ramps, control limits, traffic wardens; Records of accidents and near misses 	Daily; Daily; Daily.	SPMU-ESO; Focal NGO; SMOW; SMEnv; Community Leaders; Site Committee	350,000.00
Waste Management (Solid and Liquid Wastes)	All those impact sources that are indicated in Table 6.1, Item 12, Column 1	To protect the community and the workforce from health hazards of indiscriminate waste disposal by	Develop and submit for SPMU approval a Waste Management Plan; All those impact	Contractor Contractor	To be included in the overall project construction cost	<ul style="list-style-type: none"> Waste segregation and littering; Emptying of bins at waste dump sites; Waste composting; Indiscriminate defecation; Toilets 	Daily; Weekly; Weekly; Daily; At end of project	SPMU-ESO; Focal NGO; SMOW; SMEnv; Community Leaders; Site Committee	400,000.00

E&S Impact Category	Source of Impact	Objective	Impact Mitigation			Performance & Impact Monitoring			
			Proposed Mitigation Measures	Responsible to Implement	Mitigation Cost (N)	Monitoring Indicator	Monitoring Frequency	Responsible to Monitor	Monitoring Cost (N)
		proper collection and disposal of liquid and solid wastes generated on-site during the project.	mitigation measures that are indicated in Table 6.1, Item 12, Column 2,			decommissioning			
OPERATION AND MAINTENANCE (POST CONSTRUCTION) PHASE									
Land Use Restriction	All those impact sources that are indicated in Table 6.1, Item 13, Column 1	To ensure that required project areas under restricted use remains as designated	All those impact mitigation measures that are indicated in Table 6.1, Item 13, Column 2	SPMU; SMEnv; Community Leaders; Site Committee		Sustained treated flood and erosion healing process	Routine monitoring of project corridor (6mos – 12mos)	SPMU-ESO; SMEnv; Focal NGO; Community Leaders; Site Committee	500,000.00
Closure of Temporary Office, Staging Areas and Decommissioning of Project	All those impact sources that are indicated in Table 6.1, Item 14, Column 1	Ensure that agreements with the community and landowners on post construction hand-over are kept.	• All those impact mitigation measures that are indicated in Table 6.1, Item 14, Column 2	Contractor	To be included in the overall project construction cost	Agreements entered with community and landowners for use of land; Terms of Agreement fulfilled with community and landowners; Handover of office site as agreed	Prior to start of project; At completion of project	SPMU-ESO; Focal NGO; Community Leaders; Site Committee	450,000.00
System Control Failures Management	All those impact sources that are indicated in Table 6.1, Item 15, Column 1	Ensure sustainable maintenance of erosion prevention and control structures	All those impact mitigation measures that are indicated in Table 6.1, Item 15, Column 2	SPMU; Community Leaders; Site Committee		Sustained treated flood and erosion healing process	Routine monitoring of project corridor (6mos – 12mos)	Community Leaders; Site Committee CBOs/CDOs	350,000.00

A summary of the projected ESMP monitoring costs through the preconstruction, construction and post-construction phases of the project are presented in Table 6.6.

Table 6.6: Summary of Monitoring Cost by Project Site and Activity Area

Project Site	Catchment Area (km ²)	Drainage Length (m)	Associated Monitoring Costs (₦)		
			Pre-Construction	Construction	Post Construction
Tudun Wada/Mabera Stormwater Drainage Rehabilitation	94.462	10.228	1,350,000.00	3,700,000.00	1,300,000.00
TOTAL			1,350,000.00	3,700,000.00	1,300,000.00

6.9 ESMP Management Costs

A summary of the projected ESMP management costs through the preconstruction, construction and post-construction phases of the project are presented in Table 6.7.

Table 6.7: ESMP Management Costs

Institutional Category	Roles & Responsibilities	Associated Management Costs (₦)		
		Pre-Construction	Construction	Post Construction
Sokoto State Ministry of Environment (SMEEnv)	• Overall oversight, assessment and monitoring of specific and general project implementation ;	N/A	600,000.00	800,000.00
SPMU (Safeguard Officers, Project Engineer)	• Oversight of all specific activities associated with the ESMP implementation	1,000,000.00	1,600,000.00	1,600,000.00
FPMU	• Project assessment and monitoring of this ESMP implementation and the construction activities.	300,000.00	300,000.00	200,000.00
World Bank	• Overall assessment and monitoring of specific and general project implementation;	N/A	N/A	N/A
State Ministry of Works	• Provide necessary preconstruction and construction support to the SPMU	N/A	N/A	N/A
State Ministry of Lands & Survey (SMLS)	• Provide necessary support to the SPMU on matters of land acquisition, compensation and other resettlement issues	250,000.00	N/A	N/A
Other MDAs	• Intervene in areas under their jurisdiction as and when project demands	N/A	N/A	N/A
Contractor (Site Engineers/ Supervisors)	• Provide oversight function during decommissioning to ensure adherence to good practice and the ESMP	N/A	N/A	N/A
Site Committee	• Monitor and ensure compliance with ESMP, BEME and implementation quality	200,000.00	300,000.00	600,000.00
Local government	• Provide support in monitoring project execution within their domains to ensure compliance with this ESMP and other relevant requirements	N/A	N/A	N/A
Local Community	• Support and promote environmental awareness	200,000.00	300,000.00	400,000.00
CDOs/CBOs	• Ensure community participation by mobilizing, sensitizing community members;	N/A	N/A	N/A

Institutional Category	Roles & Responsibilities	Associated Management Costs (₦)		
		Pre-Construction	Construction	Post Construction
NGOs	<ul style="list-style-type: none"> Assist to ensure effective response actions, to evolve and devise sustainable environmental strategies and rehabilitation techniques, organize, coordinate and ensure safe use of volunteers in a response action, & provide wide support in management planning, institutional/governance issues and other livelihood related matter, awareness campaigns 	N/A	N/A	N/A
General Public	<ul style="list-style-type: none"> Identify issues that could derail the project Support project impacts and mitigation measures as well as awareness campaigns 	N/A	N/A	N/A
TOTALS		₦1,950,000.00	₦3,100,000.00	₦2,600,000.00

6.10 Budget to Implement ESMP

Cost projections for implementation of the various measures, monitoring plan and capacity building are given in Table 6.8. The projected implementation budget will enable the ESMP to be an integral part of financing for the rehabilitation/maintenance works in the project.

An indicative budget of **₦17,692,500.00** (Seventeen Million Six Hundred and Ninety Two Thousand Five Hundred Naira) only, is shown for the implementation of the ESMP for the intervention project bearing in mind the elements that make up the implementation process. The budget covers:

1. Routine E & S duties of the SPMU;
2. Capacity Building for the SPMU and other stakeholders;
3. Engagement of Environmental and Social Specialists
4. Environmental and Social Due Diligence investigations and/or Audits;
5. Monitoring and evaluation activities of the SPMU and other regulatory Agencies.

Table 6.8: Breakdown of Cost Estimates

S/No	ITEM	RESPONSIBILITY	COST BREAKDOWN IN (N)			COST ESTIMATE IN NAIRA (N)	COST ESTIMATE IN (US\$)
			Pre-Construction Phase	Construction Phase	Post-Construction Phase		
1	MITIGATION	SPMU/ Contractor	(To be built into Contractor costs)				
2	MANAGEMENT	SPMU/ SMeEnv	1,950,000.00	3,100,000.00	2,600,000.00	N7,650,000.00	
3	MONITORING	SPMU/ FPMU/ FMeEnv/ SMeEnv/ Environmental Consultants/ NGOs	1,350,000.00	3,700,000.00	1,300,000.00	N6,350,000.00	
4	CAPACITY BUILDING & TRAININGS	SPMU/ MOH/ Consultants/ Contractor	1,000,000.00	1,100,000.00	750,000.00	N2,850,000.00	

S/No	ITEM	RESPONSIBILITY	COST BREAKDOWN IN (N)			COST ESTIMATE IN NAIRA (N)	COST ESTIMATE IN (US\$)
			Pre-Construction Phase	Construction Phase	Post-Construction Phase		
			Sub-total			N16,850,000.00	
5			CONTINGENCY (5%)			N842,500.00	
			GRAND TOTAL			N17,692,500.00	

6.11 ESMP Implementation Schedule

The implementation and management of the ESMP schedule is designed to facilitate any necessary resettlement issues associated with the RAP. The ESMP activities also need to be implemented within an agreed timeframe and budget. Appropriate timing should be adhered to in order to avoid project delays especially if the situation arises where site clearing is to begin before the resettlement end date.

Execution of the ESMP activities is recommended in accordance with the schedule shown in Table 6.9. The period of the first week will be used to develop and set up all structures necessary to support all aspects of the programmes.

Table 6.9: Proposed ESMP Implementation Schedule

DESCRIPTION OF ACTIVITY	DURATION IN MONTHS																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Disclosure of ESMP Report	←→																								
Formation of Project Grievance Redress Committee (GRC)	←→																								
Review and Approval of Contractor's ESMP and Health, & Safety Plan		←→																							
Hold Stakeholders Meetings and Consultations	←→																								
Execute Capacity Building Programmes		←→																							
Implementation of Mitigation Measures		←→																							
Supervision of ESMP Implementation	←→																								
Monitoring & Reporting on ESMP Implementation	←→																								
Conduct ESMP Implementation Audit																							←→		
Programme Administration	←→																								

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The proposed remediation/rehabilitation of Tudun Wada/Mabera stormwater drainage project is considered to be in line with the development and socio-economic needs of Sokoto State as a whole. The project will greatly ease the perennial devastating floods and soil erosion within the project communities and facilitate redevelopment of the agriculturally degraded lands and once again allow unimpeded use of agricultural lands. Indeed, the project have many positive socio-economic impacts both locally and regionally.

In view of positive and negative impacts identified, as well as public consultations conducted in the project areas, it is unlikely that the proposed project will have overall significant adverse social and environmental impacts. Most adverse impacts will be temporary in nature during the construction phase and can be managed to acceptable levels. Implementation of the recommended mitigation measures for the project will ensure that the overall benefits of the project will greatly outweigh the few adverse impacts.

The main social issues for the project will revolve around the temporary displacement and relocation of people within the project areas and the permanent acquisition of setback lands for the construction and rehabilitation of the major drainage corridors as well as the access roadways. Sokoto State will compensate the PAPs with respect to the adverse impacts associated with temporary displacement and disturbance, loss of economic trees and crops and loss of lands.

There is a pressing need to construct and rehabilitate the Tudun Wada/Mabera stormwater drainage corridors and install effective flood control/management systems to reduce the incidence of flooding and erosion during periods of heavy rainfall. The quality of life of residents in Tudun Wada/Mabera communities is significantly and negatively impacted by the frequent incidence of flooding and erosion phenomenon, long-term pools of standing water which encourages the spread of waterborne disease and incidence of malaria.

The public consultations indicate a widespread support for the Tudun Wada/Mabera project as people desperately look forward to a relief from the emotional trauma arising from devastating impacts of the floods as well as the need to improve their quality of life. The most commonly expressed comment in meetings was that the key to success of the system would be the need to implement an effective maintenance programme to ensure that (a) the Tudun Wada/Mabera drainage systems is effectively functional, and (b) the structural integrity of the Tudun Wada/Mabera systems as well as the proper functioning of the drains/culverts is maintained.

It is concluded that the Tudun Wada/Mabera Project is, in essence, a mitigation measure that is gravely needed to improve the conditions of communities endangered and blighted by the hazards of floods and erosion, and living helplessly in the face of perennial threats to lives and severe losses of properties, ancestral and agricultural lands.

7.2 Recommendations

The current lack of a formal solid waste management system is very apparent as waste and litter are indiscriminately abandoned throughout Tudun Wada/Mabera

project communities. People use a variety of containers for waste disposal (e.g. plastic bags, tins and baskets). However, these are make-shift solutions to a serious waste problem. No collection system means waste is left to rot throughout the project areas. The abandoned food waste attracts scavengers such as rats and cats. Once containers are opened by scavengers, waste is scattered widely by wind and animals. The ultimate litter and waste trap tends to be streams and water bodies which net result is a spiral of contamination of water and on-going environmental degradation that promotes the spread of disease.

There is widespread public support for implementing an effective waste collection and disposal system. Many schemes have been instigated in the past but have failed due to a lack of resources including infrastructure. The most commonly made comment, during the public consultation process, was that a community awareness programme will be key to the success of the waste collection and disposal system. It is therefore imperative that waste collection and disposal system that works on a regular basis is required so that the current problem of waste accumulation in water courses can be eliminated. It is therefore strongly recommended that the volumes of wastes that currently collect in stormwater drains should not be allowed to continue as they inhibit the effective flow through water courses thereby reducing the overall capacity of the drainage systems.

CHAPTER 8: DECOMMISSIONING/ABANDONEMENT

This section provides additional specific guidance on prevention and control of community health and safety impacts that may occur during project development and at the end of the project life-cycle. Many of the provisions here are adopted from the General EHS Guidelines of the World Bank.

Noise and Vibration

During decommissioning activities, noise and vibration may be caused by the earth moving and excavation equipment, the transportation of equipment, materials and people. It is recommended that noise reduction and control strategies be considered in areas close to community areas. These strategies include:

- Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance;
- Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines; and,
- Avoiding or minimizing project transportation through community areas.

Soil Erosion

Soil erosion may be caused by exposure of soil surfaces to rain and wind during site clearing, earth moving, and excavation activities. The mobilization and transport of soil particles may, in turn, result in sedimentation of surface drainage networks, which may result in impacts to the quality of natural water systems and ultimately the biological systems that use these waters. Recommended soil erosion and water system management approaches include reducing or preventing erosion by:

- Scheduling to avoid heavy rainfall periods (i.e., during the dry season) to the extent practical
- Contouring and minimizing length and steepness of slopes
- Mulching to stabilize exposed areas
- Re-vegetating areas promptly
- Designing channels and ditches for post-construction flows;
- Lining steep channel and slopes (e.g. use jute matting).

Air Quality

Decommissioning activities may generate emission of fugitive dust caused by a combination of on-site excavation and movement of earth materials, contact of construction machinery with bare soil, and exposure of bare soil and soil piles to wind. A secondary source of emissions may include exhaust from diesel engines of earth moving equipment, as well as from open burning of solid waste on-site. Techniques to consider for the reduction and control of air emissions from construction and decommissioning sites include:

- Minimizing dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression, bag house, or cyclone);
- Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content;
- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements;

- Selectively removing potential hazardous air pollutants, such as asbestos, from existing infrastructure prior to demolition;
- Managing emissions from mobile sources;
- Avoiding open burning of solids.

Solid Waste

Non-hazardous solid waste generated at construction and decommissioning sites includes excess fill materials from grading and excavation activities, scrap wood and metals, and small concrete spills. Other non-hazardous solid wastes include office, kitchen, and dormitory wastes when these types of operations are part of construction project activities. Hazardous solid waste includes contaminated soils, which could potentially be encountered on-site due to previous land use activities, or small amounts of machinery maintenance materials, such as oily rags, used oil filters, and used oil, as well as spill cleanup materials from oil and fuel spills. Techniques for preventing and controlling nonhazardous and hazardous construction site solid waste include those already discussed in Section 1.6 of the EHS guidelines.

Hazardous Materials

Decommissioning activities may pose the potential for release of petroleum based products, such as lubricants, hydraulic fluids, or fuels during their storage, transfer, or use in equipment. These materials may also be encountered during decommissioning activities in building components or industrial process equipment. Techniques for prevention, minimization, and control of these impacts include:

- Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids;
- Using impervious surfaces for refueling areas and other fluid transfer areas;
- Training workers on the correct transfer and handling of fuels and chemicals and the response to spills;
- Providing portable spill containment and cleanup equipment on site and training in the equipment deployment;
- Assessing the contents of hazardous materials and petroleum-based products in building systems (e.g. PCB containing electrical equipment, asbestos-containing building materials) and process equipment and removing them prior to initiation of decommissioning activities.

Wastewater Discharges

Decommissioning activities may include the generation of sanitary wastewater discharges in varying quantities depending on the number of workers involved. Adequate portable or permanent sanitation facilities serving all workers should be provided at all construction sites. Sanitary wastewater in construction and other sites should be managed as prescribed in Section 1.3 of the EHS guidelines.

Contaminated Land

Land contamination may be encountered in sites under construction or decommissioning due to known or unknown historical releases of hazardous materials or oil, or due to the presence of abandoned infrastructure formerly used to store or handle these materials, including underground storage tanks. Actions necessary to manage the risk from contaminated land will depend on factors such as the level and location of contamination, the type and risks of the contaminated media, and the intended land use. However, a basic management strategy should

include:

- Managing contaminated media with the objective of protecting the safety and health of occupants of the site, the surrounding community, and the environment post construction or post decommissioning;
- Understanding the historical use of the land with regard to the potential presence of hazardous materials or oil prior to initiation of construction or decommissioning activities;
- Preparing plans and procedures to respond to the discovery of contaminated media to minimize or reduce the risk to health, safety, and the environment consistent with the approach for Contaminated Land in Section 1.6
- Preparation of a management plan to manage obsolete, abandoned, hazardous materials or oil consistent with the approach to hazardous waste management described in Section 1.6 of the EHS guidelines.

Slips and Falls

Slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, loose construction materials, liquid spills, and uncontrolled use of electrical cords and ropes on the ground, are also among the most frequent cause of lost time accidents at construction and decommissioning sites. Recommended methods for the prevention of slips and falls from, or on, the same elevation include:

- Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths;
- Cleaning up excessive waste debris and liquid spills regularly;
- Locating electrical cords and ropes in common areas and marked corridors;
- Use of slip retardant footwear.

Struck By Objects

Construction and demolition activities may pose significant hazards related to the potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools which can result in injury to the head, eyes, and extremities. Techniques for the prevention and control of these hazards include:

- Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels;
- Conducting sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable;
- Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap;
- Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged;
- Evacuating work areas during blasting operations, and using blast mats or other means of deflection to minimize fly rock or ejection of demolition debris if work is conducted in proximity to people or structures;
- Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes

Moving Machinery

Vehicle traffic and use of lifting equipment in the movement of machinery and materials on a construction site may pose temporary hazards, such as physical

contact, spills, dust, emissions, and noise. Heavy equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle. Center-articulated vehicles create a significant impact or crush hazard zone on the outboard side of a turn while moving. Techniques for the prevention and control of these impacts include:

- Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic;
- Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas, and training of workers to verify eye contact with equipment operators before approaching the operating vehicle;
- Ensuring moving equipment is outfitted with audible back-up alarms;
- Using inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

Dust

- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements;
- PPE, such as dusk masks, should be used where dust levels are excessive

Other Site Hazards

Construction and decommissioning sites may pose a risk of exposure to dust, chemicals, hazardous or flammable materials, and wastes in a combination of liquid, solid, or gaseous forms, which should be prevented through the implementation of project specific plans and other applicable management practices, including:

- Use of specially trained personnel to identify and remove waste materials from tanks, vessels, processing equipment or contaminated land as a first step in decommissioning activities to allow for safe excavation, construction, dismantling or demolition;
- Use of specially trained personnel to identify and selectively remove potentially hazardous materials in building elements prior to dismantling or demolition including, for example, insulation or structural elements containing asbestos and Polychlorinated Biphenyls (PCBs), electrical components containing mercury;
- Use of waste-specific PPE based on the results of an occupational health and safety assessment, including respirators, clothing/protective suits, gloves and eye protection.

General Site Hazards

Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning. Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are vacant or under construction, or excavations and structures which may pose falling and entrapment hazards. Risk management strategies may include:

- Restricting access to the site, through a combination of institutional and administrative controls, with a focus on high risk structures or areas

depending on site-specific situations, including fencing, signage, and communication of risks to the local community;

- Removing hazardous conditions on construction sites that cannot be controlled affectively with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials

Traffic Safety

Construction activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers and local communities. The incidence of road accidents involving project vehicles during construction should be minimized through a combination of education and awareness-raising, and the adoption of procedures prescribed for Traffic Safety.

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ANNEXURES

ANNEXURE I: List of Contacted Stakeholders

**LIST OF STAKEHOLDERS FOR ESMP PROJECT
UNDER SOKOTO STATE NEWMAP**

FEDERAL GOVERNMENT:

Federal Ministry of Environment, Abuja

National Environmental Standards and Regulations Enforcement Agency (NESREA)

STATE GOVERNMENT

THE TRADITIONAL RULERS

COMMUNITY PERSONS:

NATIONAL ASSEMBLY MEMBERS, ABUJA

Distinguished Senators

Federal House of Representatives

SOKOTO STATE HOUSE OF ASSEMBLY

LOCAL GOVERNMENT AREAS:

NON-GOVERNMENTAL ORGANIZATIONS:

FAITH BASED ORGANISATIONS (FBO)

HIGHER LEARNING INSTITUTIONS:

ONE PASSPORT-SIZE
PHOTO OF
RESPONDENT
REQUIRED

QUESTIONNAIRE NUMBER	
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**SOKOTO STATE NIGERIA EROSION & WATERSHED MANAGEMENT
PROGRAMME (SKS-NEWMAP)
TUDUN WADA/MABERA STORMWATER DRAINAGE INTERVENTION PROJECT
[Construction and Rehabilitation of Stormwater Drainage Systems]**

NAME OF COMMUNITY: _____

DATA COLLECTION CONSENT & SURVEY FORM

CONSENT:

We are conducting/preparing an Environmental and Social Management Plan (ESMP) for the above stormwater drainage project under the Sokoto State Nigeria Erosion and Watershed Management Programme (NEWMAP). The data collected will help to assess the environmental and social impacts that may occur as a result of these drainage rehabilitation and redevelopment project. To enable us achieve this objective, this socioeconomic survey and your voluntary consent for the survey are required.

Respondent Name: _____ **Signature:** _____

Gender		Phone Number(s)					
Your Village/ Community		No of years lived in area?:		Do you desire to see this project happen?			
				YES	NO		
No. of Persons in Your Household:	MALE		FEMALE		Highest Education	NS/F/S/UG/G/PG	
What is your age range?		0-21 yrs	22-45 yrs	46-60 yrs	61-70 yrs	Above 70 yrs	
Are you married?	YES	NO	Your Occupation				
Household Age Distribution		0-21 yrs	22-45 yrs	46-60 yrs	61-70 yrs	Above 70 yrs	
Household Educational Distribution	No School (NS)	FSLC (F)	SSCE (S)	Undergrad (UG)	Graduate (G)	Post Grad (PG)	
Household Marital Status:	Child	Single	Married	Widowed	Separated	Divorced	
Household Occupational Distribution:	Student	Farmers	Daily Labor	Civil Servant	Trader/ Business	Industrial Worker	Unemployed
Monthly Household Income:	Below N21,000	N21,000- 30,000	N31,000- 45,000	N46,000- 60,000	N60,000-120,000	Above N120,000	
How will this project affect you, your household or your community?		Improve Movement	Increase Land Value	Improve Trading	Improve Communication	Others	
What was the frequent illness(es) in your family in the past one year?							
Where does your family seek medical treatment from?			Hospital	Pharmacy/ Chemist	Native Drugs	Self-Medication	
How far is this facility from your place?			Walking Distance	Upto 2.0km	Over 2.0km	Outside Community	

INTERVIEWER: (Full Names)		PHONE NO.			
SIGNATURE		DATE:	D:	M:	2018

Household Composition and Personal Information

Household Members	Surname	Other Names	Relationship With H.H	Gender	Age	Disability	Educational Level	Occupation
Head of Household								
Spouse								
Member 1								
Member 2								
Member 3								
Member 4								
Member 5								
Member 6								
Member 7								

Disability = Blind-1; Crippled-2; Mentally Disabled-3; Physically Challenged-4, Other-5
Relationship = Self -1; Wife-2; Son/Daughter-3, Nephew/Niece-4, Son-in-law/Daughter-in-law-5, Grand Child-6, Parent-7, House Help-8, Others-9
Marital Status = Single-1, Married-2, Widow-3, Widower-4, Divorcee-5, Separated-6, Single Parent-7.
Literacy Level = Illiterate-1, Primary School-2, Secondary School-3, Undergraduate-4, Graduate-5, Post Graduate-6, Others-7.
Occupation = Crop Farming-1, Animal Husbandry-2, Service Provider-3, Civil Servant-4, Craftsmanship/Artisanship-5, Trade/Business-6, Industrial Worker-7, Daily Wage Labour-8, Other-9.

WHAT IS LIKELY TO BE AFFECTED BY THE PROJECT?

Structure-1; Land-2; Structure and Land-3; Cash Crop-4; Others-5
(specify).....
Years of Occupation of Affected Property (if applicable):.....Years

STATUS OF PROPERTY USER: A) Title holder; B) Tenant; C) Non-Title Holder; D) Govt; E) Squatter

Affected Structure Details:

Type of Use	Monthly Rent	Utility Connections	Distance to Drainage Edge (m)	No of Rooms	Floor Level	Total Area (m2)	Type of Construction		
							Roof	Wall	Floor

Type of Use = Residence-1; Commercial-2; Residential-cum-Commercial-3; Animal Shed/Poultry-4; Other (specify)-5.....
Type of Construction: Wall = Mud-1, Thatched-2, Brick-3, Plank-4, Zinc-5; **Roof** = Zinc/Asbestos-1; RCC-2; Thatched-3; Tiles-4
Floor = Cement-1; Mud-2; Tiles-3; **Floor Level** = Bungalow-1, Storey Building-2; **Utility Connection** = Electricity-1; Water-2; Phone-3

AFFECTED LAND DETAILS

SIZE OF AFFECTED LAND.....
TYPE OF LAND..... (Agriculture-1; Residential-2; Commercial-3; Barren-4; Grazing Land-5)
If Agriculture, is land Wet-1; Dry-2; Other-3
Crops grown on land?
Immovable assets likely to be affected: Trees.....; Orange.....; Mango.....; Apple.....; Others.....
In your view, what is the yearly monetary benefit you gain from the land? .N.....

ANNEXURE III: Summary of Applicable World Bank Safeguard Policies

The World Bank safeguard policies are designed to help ensure that projects proposed for Bank financing are environmentally and socially sustainable, and thus improve decision-making. The Bank has ten safeguards policies as listed below:

- OP 4.01 Environmental Assessment;
- OP 4.04 Natural Habitats;
- OP 4.09 Pest Management;
- OP 4.11 Physical Cultural Heritage;
- OP 4.12 Involuntary Resettlement;
- OP 4.10 Indigenous People;
- OP 4.36 Forests;
- OP 4.37 Safety of Dams;
- OP 7.50 Projects on International Waterways;
- OP 7.60 Projects in Disputed Areas

The environmental and social safeguard policies of World Bank triggered and applicable in this LID subproject include OP 4.01 and OP 4.12. These policies are summarized as follows:

Environmental Assessment (EA) (OP 4.01):

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

Physical Cultural Resources (OP 4.11):

The Bank seeks to assist countries to manage their physical cultural resources and avoid or mitigate adverse impact of development projects on these resources. Although this policy is not triggered for this subproject, there are possibilities for the existence of and other cultural relics within the project area. The requirements for chance finds of such relics shall apply during the construction works.

Involuntary Resettlement (OP 4.12):

Key objectives of the World Bank's policy on involuntary land acquisition are to avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs; assist displaced persons in improving their former living standards, income earning capacity and production level, or at least in restoring them; encourage community participation in planning and implementing resettlement; and provide assistance to affected people regardless of the legality of land tenure. The policy covers not only physical relocation, but any loss of land or other assets resulting in relocation, or loss of shelter; loss of assets or access to assets; loss of income sources or means of livelihood whether or not the affected people must move to LIDther location. When the policy is triggered, a Resettlement Action Plan (RAP), must be prepared. An abbreviated plan may be developed when less than 200 people are affected by the project. In situations, where all the precise impacts cannot be assessed during project preparation, provisions are made for preparing a

Resettlement Policy Framework (RPF). The RAP/RPF must ensure that all Bank's policy provisions detailed in OP 4.12 are addressed particularly the payment of compensation for affected assets at their replacement cost.

Disclosure Policy (OP 17.50).

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

ANNEXURE IV: General Environmental Management Conditions For Construction Contracts/Civil Works.

Contract Specifications for Contractor

1.0 General

- a. All Environmental and Social (E&S) safeguards associated with the contract shall be complied with by the contractor. The Contractor shall also update himself about such issue in the ESMP, and prepare his work strategy and plan to fully take into account relevant provisions of the ESMP.
- b. The Contractor shall develop a plan of work indicating all Environmental and Social safeguards at the various stages and indicate the period within which site will be maintained to it's original state after completion of works to ensure that significant E&S safeguards have been addressed appropriately.
- c. The Contractor shall adhere to the proposed plan implementation schedule and the monitoring plan to ensure effective feedback of monitoring information to the SPMU Project Engineer (PE).
- d. The Contractor shall implement all measures to avoid undesirable adverse environmental and social impacts wherever possible, restore site offices to acceptable standards, and abide by all environmental performance requirements specified in the ESMP

2.0 Dust Mitigation Measures

- a. The contractor shall minimize the effect of dust on the surrounding environment resulting from site clearing, vibrating equipment and temporary access roads.
- b. During the rehabilitation project, the contractor shall carry out proper and efficient measures, such as water dousing, whenever necessary to reduce the dust nuisance, and to prevent dust originating from the operations.

3.0 Noise Due to Construction Activities

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

4.0 Waste Management

- a) Construction waste shall not be left in stockpiles along the road, but removed and disposed of/or reused where needed.
- b) All waste shall be segregated into organic waste and plastic and glass. The organic waste will be composted near the site office to enrich the soil while plastics and glass will be taken to the district dump sites
- c) All sanitary facilities (e.g. garbage collection and disposal, drinking water facilities, etc.) shall be provided by the contractor in site offices or project sites.

5.0 Water Resource Management

- a) No construction water containing spoils or site effluent, especially cement, oil and fuel, shall be allowed to flow into natural water drainage courses.
- b) The contractor shall take all possible steps to prevent pollution of streams and other water supplies.
- c) Entry of runoff water to the site shall be restricted by constructing diversion channels or culverts to reduce the potential of soil erosion and water pollution.
- d) Waste water from washing out of equipment shall not be discharged into water courses.

6.0 Material Excavation and Deposit

Vegetation clearing shall be restricted to the area required for safe operation of the rehabilitation work. Vegetation clearing shall not be done more than two weeks in advance of rehabilitation.

7.0 Contractor's Environment and Social Management Plan (ESMP)

- a) Within 6 weeks of signing the Contract, the Contractor shall prepare a work plan to ensure the adequate management of E&S aspects of the works, including implementation of the requirements of these general conditions and any specific requirements of an E&S safeguards for the works. The Contractor's work plan will serve two main purposes:
 - i. For the Contractor's internal purposes, to ensure that all measures are in place for adequate E&S management, and as an operational manual for his staff.
 - ii. For the Client, supported where necessary by appointed Consultants, to ensure that the Contractor is fully prepared for the adequate management of all E&S safeguards issues.
- b) The Contractor's E&S document shall provide at least:
 - A description of procedures and methods for complying with these general environmental and social conditions, and any specific conditions specified in the ESMP;
 - A description of specific mitigation measures that will be implemented in order to minimize adverse impacts;
 - A description of all planned monitoring activities and the reporting thereof; and
 - The internal organizational, management and reporting mechanisms put in place.

8.0 Health and Safety

- a) 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 HIV/AIDS.
- b) Adequate road signs to warn pedestrians and motorists of rehabilitation

activities, diversions, etc. shall be provided at appropriate points.

9.0 Reporting

The Contractor shall prepare monthly progress reports to the SPMU on E&S monitoring with these general conditions and the project E&S safeguards. It is expected that the Contractor's reports will include information on:

- E&S management actions/measures taken, including approvals sought from SMENV, PE and FME
- Problems encountered in relation to E&S 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 E&S aspects; and
- Observations, concerns raised and/or decisions taken with regard to E&S management during site meetings.

10.0 Cost of Compliance

It is expected that compliance with these conditions is already part of standard of good workmanship and state-of-the-art as generally required under this Contract. The item "Compliance with Environmental and Social 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 E&S impact.

ANNEXURE V: Minutes & Photos of Meetings with Tudun Wada/Mabera Project Communities

Minutes of Consultant Meeting with Mabera District Head

SENSITIZATION MEETING HELD WITH THE MABERA DISTRICT HEAD AT THE PALACE OF THE DISTRICT HEAD (MAGAJIN MABERA, ALHAJI MAGAJI BELLO UMAR) ON SUNDAY NOVEMBER 24, 2019

ITEMS	DESCRIPTION
1. Project	SOKOTO NEWMAP; ESMP/RAP
2. Name of Community:	Mabera , Sokoto South
3. Date:	November 24, 2019
4. Language of Communication:	Hausa and English
5. Introduction:	<ul style="list-style-type: none"> • The meeting was a courtesy call to the district head of Mabera, Alhaji Magaji Bello Umar at his palace. • The meeting started with an opening prayers by Abdullahi Dikku at about 10.17am, followed by an introductory speech by the Project Coordinator (PC) represented by the Social Livelihood Officer (SLO) Mallam Mansir Yahaya. He informed the district head of the presence of the OTG enviroengineering consultant and the SPMU. Narrating that the reasons for the courtesy call by the SPMU and OTG Team was to commence the ESMP/RAP for drainage rehabilitation. • Mallam Mansir Yahaya, informed the district head Alhaji Magaji Bello Umar and other village heads present that the project is not a political project rather, a project aimed at overall development of the communities. Therefore, he urged the district head to give his cooperation towards the project. After observing protocols, thanked the district head for the great opportunity to meet with him. After which he introduced the visiting teams
6. Remarks of the Principal Consultant:	<ul style="list-style-type: none"> • Dr Odili Ojukwu the chief consultant of OTG who spoke in English language and had his notes interpreted in the local dialect (Hausa) by Dr Abdulrahman an OTG Consultant, expressed his thanks to the district head for the privilege to meet with him, he spoke on behalf of the team stating that he is on ground with his team of professionals to carry out an Environmental and Social Management Plan (ESMP) and Resettlement Action Plan (RAP) for drainage Rehabilitation project under the Sokoto NEWMAP • He explained that the ESMP consultancy is mainly concerned with taking baseline survey (site characterization), documenting persons and elements of the physical and social environment that would be affected by the proposed water conservation project in Mabera; and recommend appropriate mitigation to the World Bank through the SPMU for necessary action While RAP ensure that valuable assets, structures, farmlands, economic trees and other things likely to be affected by the project will be quantified and valued for adequate compensation • He pointed out that the essence for the meeting was to ensure that the community leadership is aware of the project, to communicate the extent of work to be done as well as noting what is expected from the community. Adding that the ESMP and RAP is necessary in other to ascertain and ensure that the community members are better off after the project as well as to ensure that adequate compensations are done to person who would be affected by the project in line with the world bank policy. • The assignment has to be completed before the commencement of civil engineering works at the drainage rehabilitation site. • He went further to note that it is important the community sees the project as their own by being part of the project and also protect it for their continuous benefit. • The chief consultant solicited for mass mobilization of community members

	<p>for a community consultation and Focal Group Discussions (FGD) for both the Men, Women and Youth groups scheduled for 25th Nov, 2019. This is a sensitization meeting with the community members to ensure that the people are aware of the project as well as to note what is expected of them.</p> <ul style="list-style-type: none"> • He further noted that enumerators would be available to capture the socioeconomics of members of the community using questionnaires and as such members who have their valuable assets, structures, farmland and economic trees and whose livelihoods are likely to be affected were advised to come with photocopy of their valid ID card as well as passport for the enumeration which will begin on the 26th Nov, 2019 and end on the 27th Nov, 2019 time is from 9am to 3pm respectively while verification will be done on the 28th Nov, 2019. • The principal Consultant reiterated that the project is for the people and therefore must take full ownership of the project. Adding no one would be left out and no stone must be left unturned as cutting of corners would not be entertained. • Be that as it may, Dr, Odili stated that any site or land taken for the project is permanently taken and duly compensated. The owner does not have the right to the land anymore after the project. • More so, the principal consultant informed the district head that there would be a walk through the project site for characterization immediately after the meeting. He called on the SPMU Engineer, Mallam Kabiru Yabo who describe the project site as having 4 main drains with 13 connecting drains. • Dr Odili thanked the district head and all the village heads present for their time and solicited their blessings and full support in getting the work done.
<p>7. Questions/ Concerns from Leadership</p>	<ul style="list-style-type: none"> • In response to the remark above, the leadership expressed their concern and raised 3 questions: • Alhaji Sani Galadima asked that what happens to an individual who has more than one building, would only one passport and I.D cover for all or does he need to bring representatives to stand in for the rest of the buildings? • Bello Magaji, Marafan Mabera expressed his dismay over the short notice of the meeting and asked that, in an event an individual loses all his land to the project, would the world bank resettle that individual to another area instead of just paying compensation to the affected individual? • The Magajin Mabera asked that, what happens to land and buildings who are collectively owned e.g Mosque and burial ground, how would they be captured? More so what happens to people who are far away and owns property along the drains.
<p>8. Response to the Question and Concern:</p>	<ul style="list-style-type: none"> • In response to Alhaji Sani Galadima's Question, one passport photograph and an I.D card in just one documentation would cover for all the asset likely to be affected owned by the individual, however, that individual is expected to identify all the assets owned during documentation which are likely to be affected by the project • In response to Bello Magaji, Marafan Mabera, apologies was made for the short notice in meeting and that was due to the urgency of the project and the consultant wouldn't want to be responsible for the delay of the project as the 2 reports ESMP and RAP must be submitted before the actual construction begins. However, it is unlikely that all land would be taken for the project but in an event of that special consideration would be given. • In response to the Magajin Mabera, there should be a representative who would cover for the mosque or burial ground. More so those who are away and are aware of the project can make a formal delegation for capturing but in an event where they are not aware, and not captured, can resort to the grievance redress committee based in the community to the SPMU who will treat the case in line with World Bank policy.
<p>9. Remark of the Traditional Ruler:</p>	<ul style="list-style-type: none"> • The district head, Magajin Mabera, Alhaji Magaji Bello Umar, appreciated the OTG and team as well as the Kano Newmap for their effort towards the drainage rehabilitation in Mabera district state that the project is a welcome development to the district. • He called on all village heads to ensure maximum mobilization of their

	<p>community members for the support of the project.</p> <ul style="list-style-type: none"> • He concluded by assuring the OTG consultant of his maximum support and cooperation of the communities towards the success of the project.
10. Attendees:	<ul style="list-style-type: none"> • The delegation was composed of experts and staff from OTG led by Dr. Odili Ojukwu, representatives of the SPMU led by the PC who is represented by the SLO Mallam Mansir Yahaya. • A total of 123 persons attended the meeting composed of 15 females 108 males
11. Closing:	<ul style="list-style-type: none"> • The meeting ended at about 12:22pm with a closing prayers by Mallam Bello.

Attendees to the Consultant Meeting with Mabera District Head

NIGERIA EROSION AND WATERSHED MANAGEMENT PROJECT (NEWMAP)
TUNUN WABA MABERA DRAINAGE RENOVATION PROJECT
CONSULTANT CONSULTATIVE MEETING WITH TRADITIONAL LEADERSHIP

NOVEMBER 24, 2019

ATTENDANCE SHEET

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
1	Ah. Umar Bello Magaji	M	Village head	09065968467	
2	Mst. Amin Sankin Jaus	M	Sarkin Yamma	08146075585	
3	Abdullahi Yusuf Dikko	M	Mabera	09032354509	
4	Umaro Amadi	M	Dallatu	070605759	
5	Abdullahi Magaji	M	Chairman mabera	08063809060	
6	Umaru Sili	M	Sarkin Dadin	08068322523	
7	Umar Bala	M	Burna Iddi	08069790618	
8	Aliyu Chairman	M	Chairman	09036050814	
9	Sani Mst. Amin	M	Mst. Amin	07069148580	
10	Ah. Umar Chairman	M	Chairman	08034374086	
11	Ah. Bello Dan Ali	M	Sarkin Dadin	0706278849	
12	Mst. Yakubu Jaus	M	Mst. Amin	08038319027	
13	Ah. Bello Dan Ali	M	Mst. Amin	08032893257	
14	Sarkin Dadin	M	Mst. Amin		

M-1

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
15	Ibrahim Bello	M	Mabera	08067061934	
16	Sarkin Dadin Abdullahi	M	Mabera	08162622639	
17	Abas Idris	M	Mabera	07069292272	
18	Ibrahim Hassan	M	Mabera	09062366802	
19	Abdullahi Sulaiman	M	Mabera	08062947639	
20	BASHAR DODO IYA	M	MABERA	07066186471	
21	Umaro Amin	M	MABERA	07066724000	
22	KALAL Umar	M	Mabera	08038537574	
23	Ibrahim Abdullahi	M	Mabera	08066712880	
24	HASHIMU MALLI	M	Mabera	08062131907	
25	Abubakar Magaji	M	Mabera	07032979378	
26	Abaji Umar Attahiru	M	Mabera	0803913216	
27	DAUDA MUSA	M	MABERA	08037689731	
28	Taura Bawa	M	M	08069679226	
29	MABERA SHEPHERD	M	MABERA	08069560458	
30	BILYAMINU BELLO SAHABI	M	MABERA	07066667769	
31	MAMMUDA HUSSEIN IYA	M	MABERA	08165781311	
32	MUKA RPA FARUK M BALLE	M	MABERA	07033386680	

M-2

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
33	Muhammad Ubaidema	Male	Ubaidema Rungu	07061283200	BUOT
34	Ahmad Subaion Shahu	✓	Shahid Al Bahala	08057524799	Asfandi
35	Akmulaplis Baraden	✓	Baraden Mabeve	08060061442	Asfandi
36	Ah. Alkham Al Bahali	✓	Al Bahali Mabeve	08035626220	Al Bahali
37	Alubakar Saadu	✓	Dangaladun Mabeve	08054176174	Alubakar
38	MUSA ALI ABDULLAH	✓		08061120113	Alubakar
39	Soradu Al Mustapha	✓		07064367932	Alubakar
40	Umaru Galaga	✓	Mabeve Magaji	08164249118	Umaru
41	MUSTAPHA SHUMBU	✓	MABERA TUDI	09109412558	Umaru
42	Bashar Ahmed	✓	mabeve Dusti	08063429927	Bashar
43	Ibrahim D. Mohd	✓	Mabeve Dusti	08066633317	Ibrahim
44	Kabir Al Muel Bashir	✓	Mabeve Dusti	08068452632	Kabir
45	Ibrahim Ulanoma	✓	Mabeve Dusti	08030569129	Ibrahim
46	Alwaisu M. Saadu	✓	Mabeve Dusti	08069727898	Alwaisu
47	Fortuku Umaru	✓	Mabeve Dusti	07033164604	Fortuku
48	Habib Alubakar Mabeve	✓	Mabeve Dusti	08069452441	Habib
49	AHMED JELANI	✓	MABERA JELANI	08184341200	AHMED
50	M. S. FAKA	✓	MABERA	0806901741	M. S. FAKA

M-5

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
51	Yabi Magaji	F	mabeve	08060298717	Yabi
52	Ziqinab Abdullahi	F	mabeve	08038096657	Ziqinab
53	Hajara Al Bahali	F	mabeve	08065317338	Hajara
54	Inno Garba	F	mabeve	0706079485	INNO
55	Aisha Ibrahim	F	mabeve	08136465331	Aisha
56	Shafaqatu Asdulhadi	F	mabeve	08146644931	Shafaqatu
57	Habiba Umar	F	mabeve	07060741244	Habiba
58	Maimuna Umaru	F	mabeve	07031228299	Maimuna
59	Nasiru Asdulhadi	M	mabeve	08107413289	Nasiru
60	Idris Abdurrahman	M	mabeve	07037813119	Idris
61	SALI AMINU	M	MABERA		SALI
62	AMADU HAZI	M	MABERA	08023885264	AMADU
63	Sulaman Asdulhadi	M	mabeve	08169370189	Sulaman
64	Nasiru Umaman	M	mabeve	08022750107	Nasiru
65	Bala Shahu	M	mabeve	070380482487	Bala
66	Muhammad Ali	M	Mabeve Al Bahali	08065043023	Muhammad
67	Abubakar Tambani	M	mabeve	08069383929	Abubakar
68	Abubakar Muhid	M	mabeve	09067205686	Abubakar

M-6

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
69	SAMBO ALIYU	male	mabera	07069771991	
70	Bukhari Ahmad	m	mabera	07034297123	
71	Umar Salam Bini	m	mabera	08029679745	
72	MILIALA SHAMBU	m	MABERA FADL	08061262344	
73	Muhammad Jamil Abdullahi	Male	Mabera Behind GGC	07038023043	
74	Abdulrahman Bello	m	mabera gudampiri	07064559150	
75	Engi Bashani Sacha	m	Mabera	08030683598	
76	N. B. LIBANDASAKI	M	MABERA GIAN JANI	07039758828	
77	Haji Bala Kuru	m	mabera	05067085089	
78	Ackaji Bello Bolanda	m	mabera		
79	Nasiru Ambar	m	mabera	0502447036	
80	Ikram Gaido Jelani	m	mabera Jelani	08036134581	
81	Mamvu Hassan	m	Mabera	08068127102	
82	Muhammad Gamba	m	Mabera	07056808842	
83	Aliyu Aliyu Haibo	M	Mabera area	08063108842	
84	-/OS OF MO SA	M	MA BE RA		
85	Ahaji muazu	m	mabera	08126298530	
86	Ahaji Boudado	m	mabera	08062398876	

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
87	Ahaji Ibn mabera	m	mabera	08149426859	
88	Ali Bashir Yusuf	m	mabera	07037729707	
89	Baalsmasi Isah	m	mabera jeni	07033433493	
90	Zattam Ngamed	m	mabera	No	
91	Harahin Anni Abba	M	MABERA AREA	08036283313	
92	Muhamd mansur Hassan	m	mabera	05069127102	
93	MURTA SAMI	M	MABERA	08038992191	
94	Abulmuhammad mabera	m	mabera	08164266458	
95	Suleman muhammad	m	mabera tunga	08161722072	
100	Haji ENUR Musa Hassan	M	GIAN DAKALA	08069317538	
101	ABUBAKAR BALA SOKO	M	GIAN DAKALA	0906665052	
102	Shah Muhammad Amin	m	Mabera	08067409931	
103	Amina muhammad	F	mabera	08164472539	
104	LUBA AMUSTAPHA	F	MABERA	0803819730	
105	HADIJA ALIYU	F	MABERA	08168274441	
106	AISHA ISAH	F	MABERA	08107633724	
107	Iyan mat dan. Shaah	F	mabera	08161153564	
108	Umar muhammad	m	mabera	08029679745	

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
109	Horahim Sorati mboro	M	MABERA 1cdh	0903079007	Horahim
110	STIFHA AHMAD MURTAHA	M	MABERA IDDI	08038302102	MABERA
111	Mustaha Umar	M	MABERA 100:	08035773616	Mustaha
112	Abubakar Nagwaga	M	SOK, NEWMAP	09090571931	Abubakar
113	Osvelin ThankGod C.	M	OTG, Sub-Gadabu	07039661173	Osvelin
114	STAN DYO M.	F	✓	08065733134	STAN DYO
115	Aminu A. Alugu	M	SOK, NEWMAP	08025185445	Aminu
116	Mukid Surajo Alugu	M	SOK, NEWMAP	08069190293	Mukid
117	Dr. Abdul Umar	M	OTG	08032806603	Dr. Umar
118	Fadatu Bello	M	OTG	08024571022	Fadatu
119	OLUSANYA STEPHEN	M	OTG	07032713959	Stephen
120	Dr. Odele Quirou	M	OTG	08033380090	Dr. Odele
121	Oba Adizee	F	OTG	08067302207	Oba Adizee
122	Chupau Victor A.	M	OTG	08063076644	Chupau
123	Fedrigoni Stanley	M	OTG	08063262537	Fedrigoni
124					

Photos of Meeting with Tudun Wada/Mabera District Heads





Minutes of Meetings with Tudun Wada/Mabera Communities

MINUTES OF CONSULTATION MEETING WITH MABERA COMMUNITY HELD ON MONDAY 25, 2019

ITEMS	DESCRIPTION
1. Project:	Sokoto State NEWMAP: ESMP/RAP
2. Name of Community:	Mabera, Sokoto South
3. Date:	Nov 25, 2019
4. Language of Communication:	Hausa and English
5. Protocols and Introductions:	<ul style="list-style-type: none"> The meeting with Mabera community members started at about 10:58am at the open space in front of the district head palace. The meeting was attended by a large delegation of the SPMU led by the Project Coordinator who was represented by the Social Livelihood Officer– Mallam Mansir yahaya. The consultant firm, OTG Enviroengineering Ltd was led by the principal consultant – Dr. Odili Ojukwu. The attendees were welcomed by the district head of Mabera, Alhaji Magaji Bello Umar, Magajin Mabera and the village heads present.
6. Remarks of the SPMU:	<ul style="list-style-type: none"> The representative of the project coordinator (PC) Mallam Mansir yahaya spoke on behalf of the SPMU. He appreciated the leaders and the community members for the privilege of having a meeting with them, stating that Mabera is one of the few communities in the state where water drainage rehabilitation project under NEWMAP is approved. He continued by noting that before the actual construction begins, Environmental and Social Management plan (ESMP), and Resettlement Action Plan (RAP) of the project site needs to be carried out. Based on the above, the consultant for the ESMP/RAP, the OTG Enviro-engineering is on ground, thus, the community needs to be aware and that's the reason for the consultation. Hence, the SPMU is expecting the support and cooperation of the community towards the success of the project. He further stated that there is a site committee constituted to oversee the project and that the project should not be politicized as community interest supersedes personal interest. After his remark, he introduced the principal consultant of the OTG Dr. Odili Ojukwu represented by Dr Abdulrahman a consultant of the OTG team.
7. Remarks of the Principal Consultant:	<ul style="list-style-type: none"> Dr. Abdulrahman, who spoke in the local dialect (Hausa) after appreciating the community members and their leaders, introduced the team of specialists and other support staff from OTG. He informed the community that the team is on ground for the environmental and social management plans (ESMPs) and Resettlement Action Plan (RAP) for drainage rehabilitation project under the Sokoto NEWMAP, with funding assistance from the World Bank and it is important that the community members are aware of it. Dr Abdulrahman explained that ESMP consultancy is aimed at finding out and documenting the impacts of the proposed civil engineering works on the elements of the bio-physical and socio-economic environment of the community as well as the project corridors, and to recommend appropriate remediation in

	<p>line with the World Bank social safeguard policies whereas RAP ensures that valuable assets, structures, farmlands, economic trees and other things likely to be affected by the project is quantified and valued for adequate compensation in line with world bank policy.</p> <ul style="list-style-type: none"> • He noted that a baseline survey and site characterization would be carried out, this will involve biodiversity characterization, taking of samples of Air, water, soil, sound to determine its quality before and after the project. This is to ensure that the environment is not destroyed by the project, rather world bank demands that the environment must be better than it used to after the project. • He emphasized that the community must see the project as their own and must take full ownership. Therefore it is their right to ask questions at each stage they deem fit to ask. More so, they need to be aware of whatever that is going on with respect to the project. Therefore their maximum support and cooperation is highly needed. • He went further to state that the community may experience a temporary discomfort during the engineering construction of the water conservation structure. This is because there will be inflow of heavy machines and vibrations from this machine may be discomforting, it could result to air pollution, noise pollution as well as compartment of soil path which could be farmlands. The principal consultant solicited for their patience, stating that the discomfort would be for a short while. He also advised parents to safeguard their wards especially the girl child to avoid molestation or sexual abuse. However, he also said that the project may also give community members opportunity to market their goods especially local edibles. • The community members were further informed by Dr Abdulrahman that a two-day documentation on their socioeconomics by a team of enumerators would commence on Tuesday 26th Nov to Wednesday 27th Nov by 9am-3pm. While verification would be done on Thursday 28th Nov. The documentation will involve both residents, non-residents and every other person along the catchment and those who may be affected by the remedial measures. Just one representative which may be the head or breadwinner from each household is required. • Dr Abdulrahman noted that with respect to RAP a 3meter set back would be taken and those whose structure falls within 3meters would be affected by the project. • He also informed that immediately after the community meeting, A focus group discussion for men, women and youths in the community would be held to ascertain their specific perspectives and perceptions about the project. • He thanked the community for their time and requested that questions be asked
8. Questions/Concerns of the	<ul style="list-style-type: none"> • Reacting to the remarks above, the community members asked

Community:	<p>two questions:</p> <ul style="list-style-type: none"> • Ibrahim Suleiman asked that how do we intend to take the 3m set back considering the facts that the roads are very narrow not more than 4m? • Bala Muhammed Mabera asked that what happens to an individual who has more than one building, would only one passport and I.D cover for all or does he need to bring representatives to stand in for the rest of the buildings?
9. Responses to the Questions and Concern:	<ul style="list-style-type: none"> • In response to Ibrahim Suleiman's question, Dr. Abdulrahman stated that 7m would be given for a standard road and that the 3m set back would be taken from the edge of the 7.5m road cut and structures within the 3m setback would be affected by the project. • In response to Alhaji Sani Galadima's Question, one passport photograph and an I.D card in just one documentation would cover for all the asset likely to be affected owned by the individual, however, that individual is expected to identify all the assets owned during documentation which are likely to be affected by the project • In response to Bala Mohammed Mabera's Question, one passport photograph and an I.D card in just one documentation would cover for all the asset likely to be affected owned by the individual, however, that individual is expected to identify all the assets owned during documentation which are likely to be affected by the project
10. Community Perceptions about the Project:	<ul style="list-style-type: none"> • The project intervention is a welcome development. Speaking on behalf of the community, the district head Magajin Mabera thanked the delegations for their remarks and explanations and promised the support and cooperation of the community to the project.
11. Closing:	<ul style="list-style-type: none"> • The meeting closed by 11:52am.
12. Attendees:	<ul style="list-style-type: none"> • The meeting was attended by 144 persons composed of 18 females and 126 males.

Attendees to the Meetings with Tudun Wada/Mabera Communities

NIGERIA EROSION AND WATERSHED MANAGEMENT PROJECT (NEWMAP)
 TUDUN WADA MABERA DRAINAGE REHABILITATION PROJECT
 CONSULTANT CONSULTATIVE MEETING WITH COMMUNITY MABERA

NOVEMBER 25th, 2019

ATTENDANCE SHEET

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
1	BALA MOTTAMMA	M	MABERA	08168661849	[Signature]
2	AMINU IBRAHIM	M	MABERA	08035845490	[Signature]
3	Muhammad Samsu Malik	M	Mabera	08065889802	[Signature]
4	Muhammad Samsu Aminu	M	Mabera	08032874440	[Signature]
5	ABUBAKAR SAMSU MULLAMMA	M	MABERA	08069678260	[Signature]
6	MAMU BIRAWA	M	MABERA	07032440211	[Signature]
7	MALAMI S/AMINA	M	MABERA S/GIDA	08146075585	MALAMI
8	RABIU ABDULAU	M	MABERA	08021362485	RABIU
9	ABUBAKAR SAMSU MULLAMMA	M	MABERA	08034176174	[Signature]
10	ABUBAKAR MUHAMMAD	M	MABERA	08067205686	[Signature]
11	MUSA RUSO	M	MABERA	0804889947	[Signature]
12	UMAR SANI	M	MABERA	08062299197	[Signature]
13	SAUDA MUSA	M	Mabera (ungwarungu)	08089689991	[Signature]
14	SAADE MAMMAN	M	Mabera (bunabun)	07032617980	[Signature]

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
15	MUHAMMAD MALAM	male	mabera area	08105177507	[Signature]
16	FATMA BIRAWA	M	MABERA area	08069679226	[Signature]
17	MUHAMMAD YAKUBA BAWA	M	Mabera area	07069620110	[Signature]
18	IBRAHIM ABULLAH	M	mabera area	09033858077	[Signature]
19	SAMAILA ABUBAKAR	M	Mabera area	0706951626	[Signature]
20	ABBA IMRAN	male	mabera area	08134811797	[Signature]
21	NASIRU MACKINTI	M	" "	08035535414	[Signature]
22	ALIYU YUSUF A	M	" "	08036512106	[Signature]
23	HARUN SALAMA	F	" "	" "	[Signature]
24	IBRAHIM SALAMA	M	" "	07031046595	[Signature]
25	Shehu ATISU	M	" "	07036615591	[Signature]
26	IBRAHIM MALIQ SANI	M	Mabera area	09066525415	[Signature]
27	BUYAMINU BELLO SAMSU	M	" "	07066677769	[Signature]
28	NURA ABULLAH	M	MABERA AREA	07062258733	[Signature]
29	ALIYU MALAM	M	MABERA	07036349990	[Signature]
30	MURTAZA IBRAHIM	M	MABERA	08080794450	[Signature]
31	Shehu Mohammed	M	" "	08032937511	[Signature]
32	ALI UMARU BIYAYA	M	" "	08034374466	[Signature]

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
33	Alh. Umar Bello	Male	Magaji Mabera	0806968467	[Signature]
34	Hon Bello Magaji	"	Mabera Mabera	073579102	[Signature]
35	Abdullah Magaji	Male	Chimema Mabera	08063809010	[Signature]
36	Almurtasha Bello	"	Boraden Mabera	08060061442	[Signature]
37	BRATHIN SULIMAN	"	MABERA MAGAJI	07034941823	[Signature]
38	S.P. Jibson Asumu	male	MABERA A.S.C.	07059035340	[Signature]
39	Kabiru S. GAZI	"	"	08032347667	[Signature]
40	Umar Sid. Sraf	"	"	05064222523	[Signature]
41	Abdullahi mohammed mabera	"	"	08069273113	[Signature]
42	Alhaji Sani Galadima	"	Gidan Zobebe	08036043210	[Signature]
43	BELLO Namajumi	"	mabera lodi	0813715442	[Signature]
44	Amman Isah	"	mabera lodi	08037154460	[Signature]
45	AMINA GALADIMA	"	mabera lodi	07043824525	[Signature]
46	Alhaji Bello Dan Kulu	"	Mabera magaji	08032893257	[Signature]
47	Hassan SHEHU	"	mabera lodi	07038879999	[Signature]
48	Ahyu Chairman	"	mabera lodi	08036050814	[Signature]
49	Hon FARUKI MUSTAPHA	"	MABERA lodi	08035973616	[Signature]
50	SANUSI GARBA MABERA	"	MABERA TSOHON GUA	08109083437	[Signature]

3

C-7109

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
51	ANAS IDRIS	M	Mabera	07069192271	[Signature]
52	LAWALI CUMAR	M	mabera	0807853487	[Signature]
53	AMADI DANI GANI	m	mabera	0803	[Signature]
54	Abubakar ALI SADA	✓	mabera	08069727893	[Signature]
55	DANMAMA Isah	✓	mabera magaji	08039486225	[Signature]
56	Abdullahi Samaki	✓	mabera lodi	09030179067	[Signature]
57	Bello Sani Mintala	✓	Mabera lodi	08173533830	[Signature]
58	ZARA W TRANT	✓	mabera magaji	08065903910	[Signature]
59	Zainab Abdulkahim magaji	f	mabera magaji	08038096657	[Signature]
60	Mariam Abubakar	f	mabera magaji	07035051532	[Signature]
61	Bello Alubakar S	M	mabera magaji	09036797733	[Signature]
62	Jabir Kabiru	m	mabera magaji	07066526790	[Signature]
63	Tabi magaji	F	mabera magaji	08060298777	[Signature]
64	Aisha Ali Sikanu	F	mabera magaji		[Signature]
65	Hafsa Ali Sikanu	F	mabera magaji		[Signature]
66	Zuhara beke	F	mabera magaji		[Signature]
67	Saadatu ma'id	F	mabera magaji	08167385817	[Signature]
68	Halima magaji	F	mabera magaji	07037556464	[Signature]

4

C-7109

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
69	Sirajo Hamza Abdullahi	m	MABERA 1001	080 37099593	[Signature]
70	Abdullatti Umaru	m	Mabera 1001	080 32947521	[Signature]
71	Aminu Lasani	m	Mabera Gidanbala	08062373575	[Signature]
72	Israhim Bello	m	Mabera		
73	Saniusi Amuru	m	Mabera Sabogida	080 33257541	[Signature]
74	Nasiru Abdullahi	m	Mabera 1001	080 22750107	[Signature]
75	Halimatu ABUBALEER	F	Mabera 1001	09096775233	[Signature]
76	Al-Haji Bello Abubakar	M	mabera G. Jirni	080676713534	[Signature]
77	Abdullahi Shahu	m	mabera 1001	090 34979553	[Signature]
78	MUSTAPHA SHUMTZE	M	MABERA AREA	08109412557	[Signature]
79	Babangida Abubakar	m	MABERA AREA	08061836012	[Signature]
80	BADAMASI MUSA	m	MABERA AREA	07065638265	[Signature]
81	SANI BANI	m	MABERA AREA	07061794273	[Signature]
82	Bashir Abdullahi	m	Mabera	08069978229	[Signature]
83	SANI BALA	m	Mabera	08061181860	[Signature]
84	Babangida MUSA	m	mabera	808161594510	[Signature]
85	Bello UMAR	m	MABERA	0706580490	[Signature]
86	Bello Gabbe	m	mabera	08035420440	[Signature]

5

C-71-5

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
87	STANLEY UMAR S	m	MABERA	08035474409	[Signature]
88	KABIRU GARA	M	MABERA	08032455907	[Signature]
89	Aminu Ahmad	m	Mabera	07066130003	[Signature]
90	SALISU MUHAMMAD TARI	m	MABERA	09032606193	[Signature]
91	SADIU ABDULLAH	M	MAB	07036812812	[Signature]
92	SANIUSI Bello	M	MABERA	09030145339	[Signature]
93	Shehu SAIDU	M	MABERA	08069706004	[Signature]
94	HOSSAMRABIU	M	MABERA	08033375407	[Signature]
95	Jani KAYUNO	M	MABERA	07039782476	[Signature]
96	Abubakar Motud Sabo	M	Mabera over	08024672585	[Signature]
97	Bello M. ALI	m	Mabera	08030402823	[Signature]
98	Alh. Nasiru Umar	m	Mabera	080 65 159707	[Signature]
99	Ahmad Ismail	M	Mabera	08036166491	[Signature]
100	Suleman Muhammad	m	mabera	08161722077	[Signature]
101	Bello S/rafi	m	" "	07061909579	[Signature]
102	Bashir N. Sani	m	" "	07039806057	[Signature]
103	Mantani Ibrahim	m	mabera	09056643503	[Signature]
104	Harun Bello	m	" "	09036167986	[Signature]

6

C-71-6

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
105	IRUHAM BALA	male		08031331527	<i>[Signature]</i>
106	Amadu HANI	male		08023895264	<i>[Signature]</i>
107	Abubakar Aminu	male		08030509465	<i>[Signature]</i>
108	Abraham Abandona	✓		08080569189	<i>[Signature]</i>
109	Maman Danje	✓		080373394489	<i>[Signature]</i>
110	Balthazar Sa'idu	✓		07066525359	<i>[Signature]</i>
111	Smalls Salihu	✓		08065812225	<i>[Signature]</i>
112	Musa Maishau	✓		08085626220	<i>[Signature]</i>
113	Isah Azizles	✓		07032502424	<i>[Signature]</i>
114	IRATHIN A. TURUR	✓		08036384922	<i>[Signature]</i>
115	Muhammad Sami Abdullahi	✓		07038003043	<i>[Signature]</i>
116	Hon. Umar Faruk G.	✓		080-35962625	<i>[Signature]</i>
117	Abd Bello Aliyu	✓		080-32284417	<i>[Signature]</i>
118	Abd Bello D/Abu	✓		070-69278849	<i>[Signature]</i>
119	Nasiru Abubakar	✓		070-11070280	<i>[Signature]</i>
120	Kasiru Umar D/gali	✓		080-37251341	<i>[Signature]</i>
121	Sani Garba		Mabera (Mabera) Idai	07035950115	<i>[Signature]</i>
122	Yehud Abubakar		Mabera (Mabera) Idai	08169676011	<i>[Signature]</i>

7

C-10-7

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
123	HABIBA Umar	F	MABERA AREA	07060741244	<i>[Signature]</i>
124	Ino Garba	F	MABERA AREA	0816664296	<i>[Signature]</i>
125	Shafa. Ali Abdullahi	F	MABERA AREA	08146644931	<i>[Signature]</i>
126	Hauwili Kabiru	F	MABERA AREA	08068982043	<i>[Signature]</i>
127	Hauwili Garba	F	MABERA AREA		<i>[Signature]</i>
128	ATSHU Haruna	F	MABERA AREA	08136465331	<i>[Signature]</i>
129	Kasiru Garba	M	MABERA IDAI	08082455407	<i>[Signature]</i>
130	Abiyi yardu	F	Idai MABERA		<i>[Signature]</i>
131	Nasiru Abdullahi	M	MABERA IDAI		<i>[Signature]</i>
132	Abu BARI	M	MABERA IDAI	08132858447	<i>[Signature]</i>
133	Bello Jari's	M	MABERA IDAI	09060416767	<i>[Signature]</i>
134	Bello Jari's	M	MABERA IDAI	08101111840	<i>[Signature]</i>
135	PHARM UMAR ATIMAHU SORO	M	MABERA IDAI	080-34113216	<i>[Signature]</i>
136	Abdullahi Garba	M	MABERA NAGAMU	08064874486	<i>[Signature]</i>
137	Mustapha Aliyu	M	MABERA NAGAMU	0803449910	<i>[Signature]</i>
138	Umaru Amadu	M	MABERA NAGAMU	07060575937	<i>[Signature]</i>
139	SAIDU Abdullahi	M	MABERA	0810622839	<i>[Signature]</i>
140	Musa Sa'ali	M	MABERA	08038792177	<i>[Signature]</i>

8

C-10-8

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
141	Deon Agazi - M	F	DTG	05065733154	[Signature]
142	Uma Kagor Chirak	F	DTG Consultant	08037789595	[Signature]
143	Dr. Abdul Umer	M	DTG Consultant	080325806602	[Signature]
144	Devlina Thakkar C	M	DTG Consultant	07039661173	[Signature]

**COMMUNITY SENSITIZATION MEETING HELD AT KURFI DISTRICT
ON TUESDAY 26, 2019**

ITEMS	DESCRIPTION
1. Project:	Sokoto State NEWMAP: ESMP/RAP
2. Name of Community:	Kurfi, Sokoto South
3. Date:	November 26, 2019
4. Language of Communication:	Hausa and English
5. Protocols and Introductions:	<ul style="list-style-type: none"> • The sensitization activities started with a courtesy call on the traditional ruler, the district head of Kurfi, Alhaji Magajin Aliyu Kurfi at the village square. The team was welcomed by the district head who promised all necessary support from the community. • The meeting with Kurfi community members started at about 8:23am at the village square, attended by delegations of the SPMU led by the Social Livelihood Officer (SLO) – Mallam Mansir Yahaya. The consultant firm, OTG Enviroengineering Ltd was led by the principal consultant – Dr. Odili Ojukwu. • The attendees were welcomed by the district head Alhaji Magajin Aliyu Kurfi and the village heads present.
6. Remarks of the SPMU:	<ul style="list-style-type: none"> • The Social Livelihood Officer (SLO) – Mallam Mansir Yahaya spoke on behalf of the SPMU. • He appreciated the leaders and the community members for honouring the meeting despite the short notice, • He continued by noting that the project to embark upon is drainage rehabilitation from Mabera to Kurfi stating that its a NEWMAP project with assistance from world bank. • The SLO pointed out that before the actual construction begins, Environmental and Social Management plan (ESMP), and Resettlement Action Plan (RAP) of the project site needs to be carried out. Based on the above, the consultant for the ESMP and RAP, the OTG Enviroengineering is on ground, thus, the community needs to be aware and that's the reason for the consultation. Therefore, the SPMU is expecting the support and cooperation of the community towards the success of the project. • Mallam Mansir after his remark introduced the principal consultant of the OTG Dr. Odili Ojukwu.
7. Remarks of the Principal Consultant:	<ul style="list-style-type: none"> • Dr. Odili Ojukwu, the principal consultant at OTG after appreciating the community members and their leaders, called on Dr. Abdulrahaman to address the community in their local language (Hausa). • Dr. Abdulrahaman who spoke in the local language informed the community that the team is on ground for the environmental and social management plans (ESMP) as well as Resettlement action plan (RAP) for drainage rehabilitation project under the Sokoto NEWMAP, with funding assistance from the World Bank. • He explained that ESMP is aimed at finding out and documenting the impacts of the proposed civil engineering works on the elements of the bio-physical and socio-economic environment of the community as well as the project corridors, and to recommend appropriate remediation whereas the resettlement action plan deals with the quantification and valuation of assets which could be structures, farmlands, crops, economic tree that are likely to be affected by the project for adequate compensation in line with the World Bank social safeguard policies. • He noted that a baseline survey and site characterization would be

	<p>carried out, this will involve biodiversity characterization, taking of samples of Air, water, soil, sound to determine its quality before and after the project. This is to ensure that the environment is not destroyed by the project, rather world bank demands that the environment must be better than it used to after the project.</p> <ul style="list-style-type: none"> • Therefore he solicited for their maximum support and cooperation. • The community members were further informed that a two-day documentation on their socioeconomics by a team of enumerators would commence on same day by 9am-3pm and elapse on the next day same time. The documentation will involve both residents, non-residents and every other person along the catchment and those who may be affected by the remedial measures. Just one representative which may be the head or breadwinner from each household is required to come along with a passport photograph and a copy of valid I.D card. • He thanked the community for their time and requested that questions be asked
8. Questions/Concerns of the Community:	<ul style="list-style-type: none"> • Reacting to the remarks above, the community members asked two questions: • Muktar Magaji asked that; what setback is taken to determine structures that would be affected. • Magaji Aliyu asked; would a new drainage channel be created or is the project maintaining the existing drainage channel?
9. Responses to the Questions and Concern:	<ul style="list-style-type: none"> • In response to Muktar Magaji's question, 3m setback would be taken from the drains. Structures within the 3m radius would be affected by the project. • In response to Magaji Aliyu's question, the natural flow would be maintained and drains rehabilitated.
10. Community Perceptions about the Project:	<ul style="list-style-type: none"> • The project intervention is a welcome development. Speaking on behalf of the community, the district head (Kurfi) thanked the delegations for their remarks and explanations and promised the support and cooperation of the community to the project.
11. Vote of Thanks/Closing:	<ul style="list-style-type: none"> • A formal vote of thanks was moved by the district head of kurfi Alhaji Magaji Aliyu Kurfi and assured of the support of the community members towards the success of the project. The meeting closed by 8:49am with a prayer by Liman Yahaya.
12. Attendees:	<ul style="list-style-type: none"> • The meeting was attended by 36 persons all male.

SENSITIZATIONS MEETING WITH THE TRADITIONAL RULER, THE DISTRICT HEAD OF NAKASARI, ALHAJI SANI UMAR JABBI FULANI. SARKI YAKIN GAGI HELD AT HIS HOUSE ON TUESDAY NOVEMBER 26TH, 2019

ITEMS	DESCRIPTION
1. Project	Sokoto NEWMAP; ESMP and RAP
2. Name of Community:	Nakasari, Sokoto South
3. Date:	November 26, 2019
5. Language of Communication:	Hausa and English
6. Introduction:	<ul style="list-style-type: none"> • The meeting was a courtesy call to the district head of Nakasari, Alhaji Sani Umar Jabbi Fulani. Sarki Yakin Gagi • The meeting started at about 9.20am with a welcome note from the District Head and an apology for not being able to mobilize the village heads owing to his tight schedules. However, he assured the visiting team of adequate mobilization of both the village heads as well as the community members for subsequent activities..
7. Remarks of the Principal Consultant:	<ul style="list-style-type: none"> • The chief consultant OTG, Dr. Odili Ojukwu, after appreciating the district head for the great privilege, spoke on behalf of the team stating that he is on ground with his team of professionals to carry out Environmental and Social Management Plan (ESMP) and Resettlement Action Plan for drainage rehabilitation project under the Sokoto NEWMAP. • He further noted that the courtesy call his important because the said drainage cuts across Nakasari from Mabera down to Kurfi. • Dr Abdulrahman who spoke on behalf of the OTG team explained that the ESMP consultancy is mainly concerned with taking baseline survey (site characterization), documenting persons and elements of the physical and social environment that would be affected by the proposed drainage rehabilitation project in Nakasari; and recommend appropriate mitigation to the World Bank through the SPMU for necessary action. • He also added that RAP entails quantification and valuation of assets likely to be affected for adequate compensation in line with world bank policy • The district head was further informed that a two-day documentation on their socioeconomics of those along the corridors of the project would commence on same day by 9am-3pm and elapse on the next day same time by a team of enumerators. The documentation will involve both residents, non-residents and every other person along the catchment and those who may be affected by the remedial measures. Just one representative which may be the head or breadwinner from each household is required to come along with a passport photograph and a copy of valid I.D card. • Dr Abdulrahman noted that this assignment has to be completed before the commencement of civil engineering works at the drainage corners. He therefore solicited the blessings and full support of the District head for the smooth success of the exercise.
8. Response of the Traditional Ruler:	<ul style="list-style-type: none"> • The district head, Alhaji Sani Umar Jabbi Fulani. Sarki Yakin Gagi, expressed his joy and appreciated the visiting teams, stating that the project is a welcome development to the community. • He assured of immediate mobilization of his village heads as well as the community members for the exercise and support for the success of the project. • He concluded by assuring the OTG consultant of his full blessings and maximum support in whatever capacity needed and utmost cooperation of the communities.
9. Attendees:	<ul style="list-style-type: none"> • The delegation was composed of experts and staff from OTG led by Dr. Odili Ojukwu, representatives of the SPMU led by the Social Livelihood officer Mallam Mansir Yahaya.
10. Closing:	<ul style="list-style-type: none"> • The meeting ended at about 10:00am.

REPORT OF YOUTH FOCUS GROUP DISCUSSIONS (FGD)

ITEMS	DESCRIPTION
1. Project:	Sokoto NEWMAP: ESMP /RAP
3. Community:	Mabera, Sokoto South
4. Date:	November 25, 2019.
5. Language of Communication:	English and Hausa
6. Introductions:	<ul style="list-style-type: none"> • The meeting started with an opening prayer by Umar Usman at about 11:53am. The venue was the open space in front of the district head palace, Magajin Mabera. The meeting was a follow-up to the general community sensitization exercise held same day.
7. Remarks of the Consultant:	<ul style="list-style-type: none"> • The consultant firm-OTG Enviroengineering Ltd, was represented by Mr. Oduehie, ThankGod - the social development expert. • Mr ThankGod who spoke on-behalf of the OTG team explained to the youths that the team is here to carry out environmental and social management plans (ESMPs) and Resettlement Action Plan (RAP) for drainage rehabilitation project under the Sokoto NEWMAP, with funding assistance from the World Bank and it is important that the youths are aware of it. • He explained to the youths that the proposed rehabilitation on the drainage corridor is likely to have adverse impacts on the elements of the physical environment and socio-economic lives of the community. There is therefore the need to recommend appropriate mitigation and compensatory measures to deal with these impacts; and this is the main purpose of the ESMP and RAP. • Since Youths are the active workforce of any society. Therefore, Youth-specific perspectives to the study and their perception about the project are considered important to avoid restiveness. Hence the need for the meeting. • He mentioned the following likely adverse impacts to be experienced temporary during the engineering construction such as; Dusts; Lost of topsoil and vegetation; Noise; Soil/ground water contamination; Traffic disruptions; and creation/limiting of operational routes; Disruptions to livelihood as well as Sexual risks. • He urges the youths to be patient and avoid every form of violence but give their support to the success of the project. • Mr. ThankGod reminded the youths of the socioeconomic survey which will take place on Tuesday 26th and Wednesday 27th, November. Be that as it may, each member along the corridor of the project was advised to come with photocopy of ID card and a passport photograph for the documentation. He went further to also note that the verification exercise would commence on Thursday 28th Nov, 2019 and everyone who has made a claim along the corridor should be fully on ground for verification
8. Remarks of the Youths:	<ul style="list-style-type: none"> • The remarks of the attendees are summarized below: <ul style="list-style-type: none"> - Mustapha Buda the youth leader appreciated the NEWMAP and the OTG team noting that the project was long awaited and also a welcome development to the entire community of Mabera. - He pledged the cooperation of the youths and assured the OTG Environengineering Consultant as well as the NEWMAP of their full support for the success of the project.
9. Perceptions of the Project and Questions:	<ul style="list-style-type: none"> • The youths were well pleased with the prospect of the intending project. They also expressed readiness to give support in getting the project done as most of them have accepted the project to be their own. They posed two questions: <ul style="list-style-type: none"> - Will there be compensation for destroyed livelihoods? - What are the requirements for the socioeconomic survey as well as

	verification?
10. Response of the Consultant:	<ul style="list-style-type: none"> • In his reply, he noted that, in line with world bank policy, there would be adequate compensation for those whose lives, assets and livelihoods would be affected by the project; provided they were documented and verified. • A passport size photograph and a photocopy of valid ID card are the requirements for the socioeconomic documentation.
11. Attendees:	<ul style="list-style-type: none"> • The meeting was attended by 34 Youths.
12. Closing:	<ul style="list-style-type: none"> • The meeting ended at about 12:30pm.

Attendees to the FGD Meetings with Tudun Wada/Mabera Community (Men)

NIGERIA EROSION AND WATERSHED MANAGEMENT PROJECT (NEWMAP)
TUDUN WADA MABERA DRAINAGE REHABILITATION PROJECT
FOCAL GROUP DISCUSSION - MEN
COMMUNITY: Mabera Men Group
NOVEMBER 25th 2019

ATTENDANCE SHEET

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
1	Alhaji Aliyu	male	Sigil Sani	0706876605	[Signature]
2	Imam Ahmadu	MALE	MABERA IDI	080-3412216	[Signature]
3	Alh. Isah	MALE	MABERA (ID)	080-3562620	[Signature]
4	Bilo ABUBAS	MALE	MABERA (ID)	07032617930	[Signature]
5	Aliyu Yusuf Garaji	male	Mabera Ididi	0803650106	[Signature]
6	Isah ARZIL-S	"	Gidan Jani	07-032502474	[Signature]
7	Haji Maikwazi Nuhu	"	"	07038875678	[Signature]
8	Amadu dangane	m	mabera fulani	"	[Signature]
9	Saidu Abdullahi	m	mabera Jelani	08162622639	[Signature]
10	Shehu Ahmya	m	mabera Ididi	09036615554	[Signature]
11	Umaru Amadu	m	mabera Genere	07060575934	[Signature]
12	Bello Aliyu	hr	mabera S/fulani	08032254417	[Signature]
13	Abubakar Saidu	hr	mabera	08034176172	[Signature]
14	Dawood Isah	m	mabera	08039486225	[Signature]
15	Dr. Abdul. Umer	MA	mabera/OTI	08032380665	[Signature]
16	Umaru Umaru Chisala	F	OTI Consultant	08033339595	[Signature]
17	Chelie Thankad C.	M	OTI Consultant	0703661173	[Signature]

Attendees to the FGD Meetings with Tudun Wada/Mabera Community (Women)

NIGERIA EROSION AND WATERSHED MANAGEMENT PROJECT (NEWMAP)
TUDUN WADA MABERA DRAINAGE REHABILITATION PROJECT
 FOCAL GROUP DISCUSSION - WOMEN
 COMMUNITY: MABERA
 NOVEMBER 25, 2019

ATTENDANCE SHEET

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
1	Mrs D Hauwatu	f	Mabera		
2	IND GARRA	f	✓		
3	Hauwatu SARA	f	✓		
4	Aista Isfahim	f	✓		
5	ZARA-U KARLO	f	✓	08065963910	Z
6	Zainab Abdulshimami	f	mabera	08038096657	Z
7	Mariam Abubakar	f	mabera	09035051572	M
8	Umaru Chinedo	f	OTG Consultant	08037739595	U
9	Mrs Dguz. M.	f	✓	080687733134	M
10	Oba Adede	f	OTG Consultant	08067808207	Oba
11	YABI MAGAJI	f	Mabera	08060298717	Yabi
12	KASJA RABIU	f	Mabera	08102663772	K
13	RABU ABUBAKAR	f	✓	08065370645	RABU
14	MUJANATU ABDULLAH	f	mabera	08060928888	M
15	Maryam Kello	f	mabera	081665655277	M
16	UMMU SAMI'LA	f	mabera	08166859475	U
17	Bulkayya Aminu	f	mabera	09065984459	B

①

WADU FGD MABERA

	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
18	Zinatu Balisu	f	Mabera	09063677320	Z
19	Sadiya Bello	f	mabera	08136405048	Sadiya
20	Aisha Bello Suliman	f	Mabera	08147294611	A
21	Zalifatu Bello Suliman	f	Mabera	08163451845	Z
22	Ahmadu Bello Suliman	f	Mabera	08164445472	Ahmadu
23	Hadiza Ishaga	f	mabera	08141956019	H
24	Hadiza Bello	f	mabera	08139497421	H
25	Ummu Aliyu	f	mabera	08136679603	U
26	Rautatu Muhammad	f	Mabera	07066407090	R
27	Zulfatu Bello Athaji	f	Mabera	09060015105	Z
28	Ramatu Suliman	f	mabera	07061590560	R
29	Rabiba Ibrahim	f	mabera	08060625162	R
30	Luba Ismail	f	mabera	09037142856	L
31	Aisha Abubakar	f	mabera	07032262872	A
32	Ramatu Ishaka	f	mabera	07038495934	R
33	Sumanya Umar	f	mabera	09060450896	S
34	Shafa Nurhata	f	mabera	07035916855	S
35	Aisha Abubakar	f	mabera	09034867000	A

②

Women Fed MABERA

	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
36	Shatu muhammadu	f	mabera	0816020644	(Signature)
37	Safya Abubakar	f	mabera	08140469292	(Signature)
38	A'SMA'U Abubakar	f	mabera	08060298919	(Signature)
39	habiba samalla	f	mabera	08162911862	(Signature)
40	Gulu Awuy	f	mabera	07063419459	(Signature)
41	Jimani Aminu	f	mabera	08065604387	(Signature)
42	Hadiza Umar	f	mabera	09038996716	(Signature)
43	hawatu Abubakar	f	mabera	09013982085	(Signature)
44	Jamila Wadada	f	mabera	08036954259	(Signature)
45	Fatima Sa'adu	f	mabera	08134265428	(Signature)
46	Uansa Abubakar	f	mabera	08064315905	(Signature)
47	hajarun Aminu	f	mabera	08067096926	(Signature)
48	Afiya muhammad	f	mabera	09030913898	(Signature)
49	Aisya nura	f	mabera	07063404442	(Signature)
50	ARATU ABUBAKAR GADU	F	MABERA	08133887198	(Signature)
51	maria Bala	f	mabera	08163088304	(Signature)
52	Zainab mu'azu	f	mabera	08169356904	(Signature)
53	TATIANA A. SA'ADU	f	mabera	07061129461	(Signature)

(3)

Attendees to the FGD Meetings with Tudun Wada/Mabera Community (Youths)

NIGERIA EROSION AND WATERSHED MANAGEMENT PROJECT (NEWMAP)
 TUDUN WADA MABERA DRAINAGE REHABILITATION PROJECT /
 FOCAL GROUP DISCUSSION - YOUTH
 COMMUNITY: MABERA MABERA
 NOVEMBER 25th 2019

ATTENDANCE SHEET

S/No	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
1	KARIMU GARBA	M	Mabera Idj	08032455707	[Signature]
2	MUSTAFA Muhamad	m	mabera sabagida	08094748131	[Signature]
3	Sanusi Aminu	m	mabera sabagida	08033251541	[Signature]
4	Muhammad Yaqub Bala	m	Mabera Idj	07069620110	[Signature]
5	Saratu Almustapha	m	mabera Idj	07004367932	[Signature]
6	Bello Yusuf	M	Mabera Idj	08101111340	[Signature]
7	Lamin, Umar	m	mabera	08038539517	[Signature]
8	Abubakar	m	da mabera mabera	09122387747	[Signature]
9	Shehu Umar S	m	MABERA	08035424409	[Signature]
10	Abubakar Abdullahi (M)	m	Kulund Mabera	08069779145	[Signature]
11	Samsila Abubakar	m	mabera majeri	07060951626	[Signature]
12	Jibril Abubakar	m	Mabera Gudangari	08169676011	[Signature]
13	Bashar Bawa	m	MABERA	09032282761	[Signature]
14	Ibrahim Bello	m	MABERA M.S.G.T.I.	09006167786	[Signature]
15	Bashar Muhammad	m	MABERA Sallon Sika	09077915977	[Signature]
16	Halwai Abdulkadir	M	MABERA Gillaudili	08064909110	[Signature]
17	MUHAMMAD SALISU	M	MABERA	09032606173	[Signature]

①

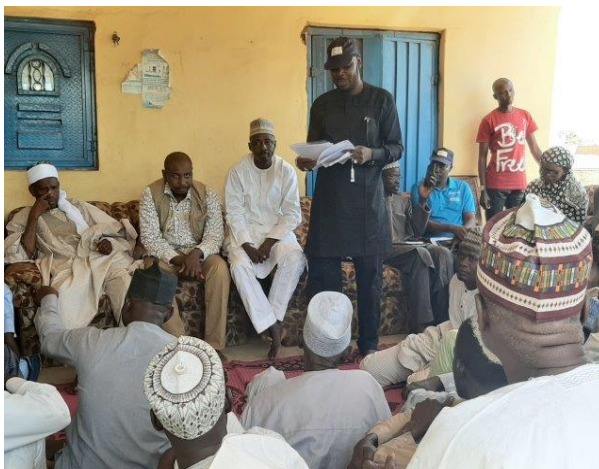
YOUTH FGD MABERA

	NAME	GENDER	COMMUNITY/VILLAGE/ ORGANIZATION	PHONE NUMBER	SIGNATURE
18	MUKA ABULLAHI	M		07060258933	[Signature]
19	Abdullahi Gussau	m	MABERA	08035185359	[Signature]
20	MURAZU Malami	m	MABERA ADEI	08105177507	[Signature]
21	Abubakar Sa'adu	m	MABERA	08038555487	[Signature]
22	Mustapha Umar	M	MABERA Idj	01033386680	[Signature]
23	Abdulhadi Sulaman	M	MABERA Idj	08062947659	[Signature]
24	Muhammed Aminu	m	MABERA MABERANGI	08037219970	[Signature]
25	ANAS Jones	m	MABERA	07067152277	[Signature]
26	Ibrahim Mu'ad Sani	m	" "	07065257115	[Signature]
27	Samsila Abubakar	m	MABERA	07060951626	[Signature]
28	Abdullahi A. Muhammad	m	Idj	08066433317	[Signature]
29	Keddi-Rakana Beto	M	MABERA Gamin	0706255750	[Signature]
30	Chikhe ThankGod C	M	Consultant	07039661173	[Signature]
31	Umarqar Chimala	F	OTG Consultant	08037739595	[Signature]
32	Abdullahi Dattamari	N	MABERA	08137792377	[Signature]
33	YAHAYA IBRIM	N	MABERA	08102967371	[Signature]
34	ISAH	N	MABERA	07061582967	[Signature]

②

Photos of Meetings with Tudun Wada/Mabera Communities

MABERA COMMUNITY MEETING



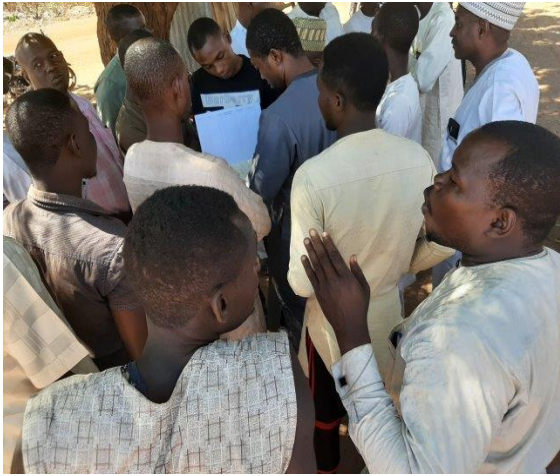
MABERA COMMUNITY FGD MEETING - MEN



MABERA COMMUNITY FGD MEETING - WOMEN



MABERA COMMUNITY FGD MEETING - YOUTHS

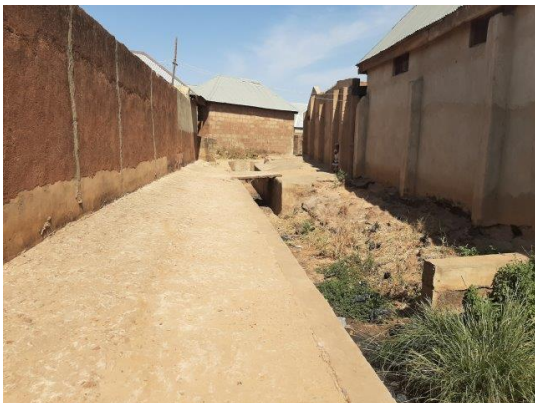
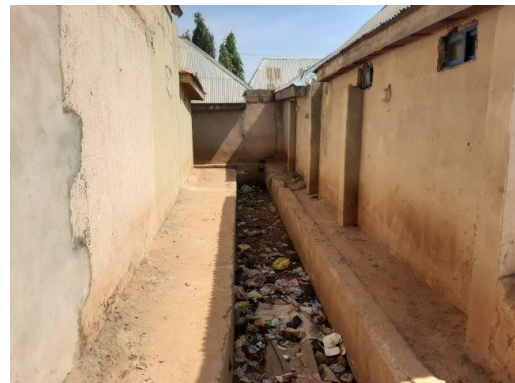


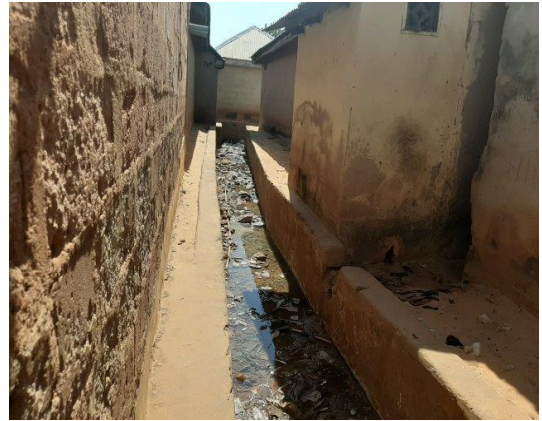
Photos of Tudun Wada/Mabera Project Site Areas











ANNEXURE VI: Mapping of Sampling Locations & Coordinates Across the Mabera Site

SAMPLING LOCATIONS AND COORDINATES				
SAMPLE MEDIA	SAMPLE MODE	SAMPLE LOCATION	CODE	COORDINATES
TUDUN WADA/MABERA SITE				
SOIL SAMPLE	TARGETED	TAFARKI ROAD	TWM/SS/01	N 13°01.987' E 5°15.760'
	RANDOM	RIJIYAR YARTUTU	TWM/SS/02	N 13°01.891' E 5°15.269'
	TARGETED	KANTIN SANI - IDDI ROAD (MASSALACIN BIN ABBAS MOSQUE)	TWM/SS/03	N 13°02.066' E 5°15.545'
	TARGETED	TRADE FAIR COMPLEX	TWM/SS/04	N 13°00.859' E 5°15.440'
GROUND WATER SAMPLE	TARGETED	TAFARKI ROAD	TWM/GWS/01	N 13°01.987' E 5°15.760'
	TARGETED	RIJIYAR YARTUTU	TWM/GWS/02	N 13°01.891' E 5°15.269'
	TARGETED	KANTIN SANI - IDDI ROAD (MASSALACIN BIN ABBAS MOSQUE)	TWM/GWS/03	N 13°02.066' E 5°15.545'
	TARGETED	TRADE FAIR COMPLEX	TWM/GWS/04	N 13°00.859' E 5°15.440'
AIR QUALITY	RANDOM	TAFARKI ROAD	TWM/AS/01	N 13°01.987' E 5°15.760'
	TARGETED	RIJIYAR YARTUTU	TWM/AS/02	N 13°01.891' E 5°15.269'
	TARGETED	KANTIN SANI - IDDI ROAD (MASSALACIN BIN ABBAS MOSQUE)	TWM/AS/03	N 13°02.066' E 5°15.545'
	RANDOM	TRADE FAIR COMPLEX	TWM/AS/04	N 13°00.859' E 5°15.440'
TURETA SITE				
SOIL SAMPLE	RANDOM	WOMEN CENTRE	TUR/SS/01	N 12°39.959' E 5°33.523'
	RANDOM	BEGINNING OF EARTH DAM	TUR/SS/02	N 12°40.019' E 5°33.230'
	TARGETED	POND AREA	TUR/SS/03	N 12°39.799' E 5°33.721'
	TARGETED	SHIYAR RUNJI (END POINT)	TUR/SS/04	N 12°29.937' E 5°33.601'
SURFACE WATER SAMPLE	RANDOM	BEGINNING OF EARTH DAM	TUR/SWS/01	N 12°40.019' E 5°33.230'
	RANDOM	POND AREA	TUR/SWS/02	N 12°39.799' E 5°33.721'
GROUND WATER SAMPLE	TARGETED	WOMEN CENTRE	TUR/GWS/01	N 12°39.959' E 5°33.523'
	TARGETED	SHIYAR RUNJI (END POINT)	TUR/GWS/02	N 12°29.937' E 5°33.601'
AIR QUALITY	TARGETED	WOMEN CENTRE	TUR/AS/01	N 12°39.959' E 5°33.523'
	RANDOM	BEGINNING OF EARTH DAM	TUR/AS/02	N 12°40.019' E 5°33.230'
	TARGETED	POND AREA	TUR/AS/03	N 12°39.799' E 5°33.721'
	RANDOM	SHIYAR RUNJI (END POINT)	TUR/AS/04	N 12°29.937' E 5°33.601'
RAFINDUMA SITE				
SOIL SAMPLE	RANDOM	MARKET	RFD/SS/01	N 13°51.890' E 5°33.438'
	TARGETED	GIDAN SALAWU	RFD/SS/02	N 13°52.497' E 5°32.678'
	TARGETED	GIDAN ALMA	RFD/SS/03	N 13°52.125' E 5°33.195'
	TARGETED	GIDAN MAGAJI	RFD/SS/04	N 13°51.683' E 5°32.695'
GROUND WATER SAMPLE	TARGETED	MARKET	RFD/GWS/01	N 13°51.890' E 5°33.438'
	TARGETED	GIDAN SALAWU	RFD/GWS/02	N 13°52.497' E 5°32.678'
	TARGETED	GIDAN ALMA	RFD/GWS/03	N 13°52.125' E 5°33.195'
	TARGETED	GIDAN MAGAJI	RFD/GWS/04	N 13°51.683' E 5°32.695'
AIR QUALITY	TARGETED	MARKET	RFD/AS/01	N 13°51.890' E 5°33.438'
	TARGETED	GIDAN SALAWU	RFD/AS/02	N 13°52.497' E 5°32.678'

SAMPLING LOCATIONS AND COORDINATES				
	RANDOM	GIDAN ALMA	RFD/AS/03	N 13°52.125' E 5°33.195'
	TARGETED	GIDAN MAGAJI	RFD/AS/04	N 13°51.683' E 5°32.695'
YABULUTU SITE				
SOIL SAMPLE	RANDOM	WITHIN YAR'BULUTU COMMUNITY	YAB/SS/01	N 13°36.587' E 6°14.465'
	TARGETED	YAR'BULUTU WELL	YAB/SS/02	N 13°36.577' E 6°14.547'
	TARGETED	ZALLA BANGO	YAB/SS/03	N 13°36.620' E 6°13.343'
	TARGETED	GAJID	YAB/SS/04	N 13°36.237' E 6°10.298'
SURFACE WATER SAMPLE	TARGETED	WITHIN YAR'BULUTU COMMUNITY	YAB/SWS/01	N 13°36.587' E 6°14.465'
	RANDOM	GAJID	YAB/SWS/02	N 13°36.237' E 6°10.298'
GROUND WATER SAMPLE	TARGETED	YAR'BULUTU WELL	YAB/GWS/01	N 13°36.577' E 6°14.547'
	TARGETED	ZALLA BANGO	YAB/GWS/02	N 13°36.620' E 6°13.343'
AIR QUALITY	TARGETED	WITHIN YAR'BULUTU COMMUNITY	YAB/AS/01	N 13°36.587' E 6°14.465'
	TARGETED	YAR'BULUTU WELL	YAB/AS/02	N 13°36.577' E 6°14.547'
	RANDOM	ZALLA BANGO	YAB/AS/03	N 13°36.620' E 6°13.343'
	RANDOM	GAJID	YAB/AS/04	N 13°36.237' E 6°10.298'

ANNEXURE VII: Study Sampling Methods and Locations

Representative soil samples for laboratory analysis were both randomly and targetedly collected from areas that show adverse environmental conditions within the Tudun Wada/Mabera sites. Total of five soil samples were collected from the Tudun Wada/Mabera drainage corridors. Each near surface soil sample (0 - 6 inches depth) was collected using the Dutch hand auger and put in a properly labeled self-sealing plastic bag for shipment to the MGG Resources laboratory at Nsukka for chemical analysis. The matrix of soil sampling locations and coordinates across the Tudun Wada/Mabera sites are included in Annex X.

Soil parameters indicate the state of soil ecosystem characteristics, which especially reflect productive, buffering, filtering and other soil functions. The structure of soil profile (the soil class), soil type, soil depth, the chemical content and quality of humus substances, accessible nutrient supply, soil reaction, the content of foreign substances in soil, and soil edaphon is of highest importance. Soil quality is significantly affected by physical, chemical, biological and biochemical properties sensitive to changes in the environment and land management. With regard to physical properties, there are bulk density, porosity, water retention capacity, soil temperature, etc. In the group of chemical characteristics, total carbon and nitrogen content, soil reaction and content of available nutrients are observed.

Evaluation of biological parameters focuses on microbial biomass and its activity, soil respiration, potentially mineralised nitrogen, the activity of soil enzymes, etc. Soil enzymatic activity can be used as a microbial indicator of soil quality, since the activity of soil enzymes is closely related to essential soil characteristics. It indicates changes sooner than other soil characteristics and can be an integrating soil-biological index reflecting soil use. Selected enzymatic activities can be suitable indicators for long-term soil monitoring and quality assessment of soils.

A decrease in soil quality results from the load of risk substances such as heavy metals in the soil. Heavy metals as a large group of pollutants are a serious problem in all components of the environment, including soil. A great number of these metals have considerable toxic effects and their highest allowable concentrations are defined for the soil system, similarly to those for air and water. However, it has been extremely difficult to define limit concentrations of heavy metals for soil, since, in contrast to air and water, soil is an extremely heterogeneous system and mobility of inorganic contaminants, closely related to the intake by plants, depends on several soil factors. The approaches towards the determination of metal concentration limits in soil vary significantly in individual countries. In some countries, the definition of limits for heavy metals concentrations is based on soil use (these are defined as so-called trigger and action values), or, possibly, on eco-toxicological data in so-called standard soil and limit values for the total and dissolvable concentration of heavy metals in soil (Barančíková, 1998; Makovniková et al., 2006).

Soil may be considered a passive acceptor of heavy metals that becomes the source of polluting other components of the environment and the food chain. The analytical results of the baseline soil quality indicators within and around the project corridor show concentrations below the regulatory threshold limits as summarized in the Table 3.4. These results do not show concentrations that will pose any potential health risks to residents and project construction workers during the construction phase of the project. The complete analytical results are included in Annex XIV - XVII.

Air pollution is a major environmental risk to health. By reducing air pollution levels, people can reduce the burden of disease from stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases, including asthma. The lower the levels of air pollution, the better the cardiovascular and respiratory health of the population will be, both long- and short-term. The WHO Air Quality Guidelines (Global Update 2005) provide an assessment of

health effects of air pollution and thresholds for health-harmful pollution levels. The Guidelines apply worldwide and are based on expert evaluation of current scientific evidence.

ANNEXURE VIII: Baseline Noise Readings and Sampling Locations

Tudun Wada/Mabera Project Site Noise Readings

S/N	NOISE READING LOCATIONS	MINIMUM (dB)	MAXIMUM (dB)	COORDINATES
1.	TAFARKI ROAD	50.1	77.0	N13 ⁰ 01.987'; E5 ⁰ 15.760'
2.	RIJIYAR YARTUTU	48.5	70.8	N13 ⁰ 01.891'; E5 ⁰ 15.269'
3.	KANTIN SANI - IDDI ROAD (MASSALACIN BIN ABBAS MOSQUE)	59.1	73.4	N13 ⁰ 02.066'; E5 ⁰ 15.545'
4.	TRADE FAIR COMPLEX	63.7	75.2	N13 ⁰ 00.859'; E5 ⁰ 15.440'

Tudun Wada/Mabera Project Particulate Matter Readings

S/N	PM READING LOCATIONS	PM 2.5	PM 10
1.	TAFARKI ROAD	26.6	45.3
2.	RIJIYAR YARTUTU	11.5	15.8
3.	KANTIN SANI - IDDI ROAD (MASSALACIN BIN ABBAS MOSQUE)	10.8	13.4
4.	TRADE FAIR COMPLEX	4.3	5.8

ANNEXURE IX: Complete Plant Listing from Vegetative Study

Major Cultivated/Agronomic Species Found in Tudun Wada/Mabera Project Site

S/N	Species	Family	Life Form	Common Name	Local names	Distribution
1	<i>Arachis hypogaea</i>	Fabaceae	Herb	Groundnut	Gyada	Common
2	<i>Sesamum indicum</i>	Pedaliaceae	Herb	Benniseed	Ridi	Common
3	<i>Anacardium occidentale</i>	Anacardiaceae	Tree	Cashew	Yazawa	Rare
4	<i>Citrus sinensis</i>	Rutaceae	Tree	Orange	Lemo	Rare
5	<i>Pennisetum glaucum</i>	Poaceae	Herb	Millet	Gero	Common
6	<i>Gossypium hirsutum</i>	Malvaceae	Herb	cotton	Auduga	Rare
7	<i>Musa paradisiaca</i>	Musaceae	Herb	Plantain	Ayaba	Rare
8	<i>Terminalia catapa</i>	Combretaceae	Tree	Umbrella Tree	Bawshi	Rare
9	<i>Terminalia spp</i>	Combretaceae	Tree	Cameroon Tree	Bawshi	Rare
10.	<i>Eucalyptus camandilensis</i>	Myrtaceae	Tree	River red gom	Turare	Rare
11.	<i>Oryza sativa</i>	Gramineae	Herb	Rice	Shinkafa	Common
12	<i>Allium cepa</i>	Amaryllidaceae	Herb	Onion	Albasa	Common
13	<i>Allium sativum</i>	Amaryllidaceae	Herb	Garlic	Tafarnuwa	Common
14	<i>Capsicum annum</i>	Solanaceae	Herb	Pepper	Tatase/shambo	Common
15	<i>Ipomoea batatas</i>	Convolvulaceae	Herb	Sweet potato	Dankali	Common
16	<i>Zea mays</i>	Poaceae	Herb	Maize	Masara	Common
17	<i>Manihot esculenta</i>	Eupobiaceae	Herb	Cassava	Rogo	Common
18	<i>Saccharum officinarum</i>	Poaceae	Herb	Sugarcane	Rake	Common
19	<i>Sorghum bicolor</i>	Poaceae	Herb	Guinea corn	Dawa	Common
20	<i>Zingiber officinale</i>	Zingiberaceae	Herb	Ginger	Citta	Common
21	<i>Solanum melongena</i>	Solanaceae	Herb	Egg plant	Yalo	Rare
22	<i>Vigna unguiculata</i>	Fabaceae	Herb	Cowpea	Wake	Common
23	<i>Mangifera indica</i>	Anacardiaceae	Tree	Mango	Mangwàrò	Common

Source: Sokoto NEWMAP ESMP Field Survey, December 2019.

Animal and Livestock Species at Tudun Wada/Mabera Showing Their Common/Local Names

S/N	Species	Common/Local Name	IUCN Threat Status
1	<i>Numidia meleagris</i>	Helmeted guinea fowl / zabo	Not listed
2	<i>Falco tinnunculus</i>	Common kestrel / ataltabara	Not listed
3	<i>Sitophilus oryzae</i>	Rice weevil / Dale	Not listed
4	<i>Dendroaspis polylepis</i>	Black mamba / bakin maciji	Not listed
5	<i>Vespula germanica</i>	Wasps	Not listed
6	<i>Opodiphthera eucalypti</i>	Moths	Not listed
7	<i>Danaus spp</i>	Butterfly /malam buduifafi	Not listed
8	<i>Eleutherodactylus marnockii</i>	Cliff frog/Kwado	Not listed
9	<i>Agama agama</i>	Common lizard / kadangare	Not listed
10	<i>Chamaeleo dilepis</i>	Flap-necked Chameleon / kuiba	Not listed
11	<i>Tilapia nilotica</i>	Catfish/gargaza	Not listed
12	<i>Gymnacus niloticus</i>	Frankfish / yauri	Not listed
13	<i>Rattus norvegicue</i>	Rat / bera	Not listed
14	<i>Camelus dromedanus</i>	Camel / rakumi	Not listed
15	<i>Meleagris spp</i>	Turkey/talotalo	Not listed
16	<i>Gallus gallus</i>	Chicken/kaza	Not listed
17	<i>Equus africanus</i>	Donkey/jaki	Not listed
18	<i>Ovis aries</i>	Sheep / Tumaki	Not listed
19	<i>Capra aegagru</i>	Goat //Hawaki	Not listed
20	<i>Bos taurus</i>	Cattle / Shanu	Not listed

Source: Sokoto NEWMAP ESMP Field Survey, December 2019.



*Public Analysis, Industrial/Environmental Consultants,
Water Treatment Specialist*

RC: 768166, FMENV ACCREDITATION NO. 002637, NESREA ACCREDITATION NO 423

21 University Road, Nsukka, Enugu State.

11th December, 2019.

Dear Sir,

**TWM (WATER (WS), SOIL (SS) AND AIR (AS)) SAMPLES ANALYSES
RESULT**

Please find attached the result of the analyses of the samples brought to our laboratory on the 29th November, 2019.

Thanks for your patronage.

Yours faithfully,

Dr. Mrs. Alum O. L

TWM /GWS/1/ N 13⁰.01.987' E 5⁰.15.760' E 299 m

S/N	PARAMETERS TESTED	UNITS	Average Value/Results	NESREA/ FMENV LIMITS	WHO	METHOD	REMARK
1	Temperature	⁰ C	32.2	40	32-34	In-situ	Satisfactory
2	pH	-	7.70	6.5 - 8.0	6.5-8.5	In-situ	Satisfactory
3	Taste	-	Has taste	NS	Nil	Organoleptic	Unsatisfactory
4	Appearance	-	Turbid	NS	Nil	Organoleptic	Unsatisfactory
5	Odour	-	Has odour	NS	Nil	Organoleptic	Unsatisfactory
6	Total Dissolved Solids	mg/L	690.00	2100	500	ASTM, 2005.	Unsatisfactory
7	Conductivity	µS/Cm	1340	1000 µS/Cm	1500	In-situ	Unsatisfactory
8	Total hardness	mg/L	508.00	NS	120-180	ASTM, 2005.	Unsatisfactory
9	Chloride	mg/L	147.68	NS	250	ASTM, 2005.	Satisfactory
10	Fluoride	mg/L	0.21	NS	2.0	ASTM, 2005.	Satisfactory
11	Sodium	mg/L	7.86	10	20	ASTM, 2005.	Satisfactory
12	Potassium	mg/L	12.61	NS	NS	ASTM, 2005.	Satisfactory
13	Sulphate	mg/L	4.04	250	250	ASTM, 2005.	Satisfactory
14	Sulphide	mg/L	0.47	NS	0.2	ASTM, 2005.	Unsatisfactory
15	Ammonia	mg/L	0.22	NS	1.5	ASTM, 2005.	Satisfactory
16	Nitrate	mg/L	0.43	50	10	ASTM, 2005.	Satisfactory
17	Phosphate	mg/L	0.01	5	5	ASTM, 2005.	Satisfactory
18	DO	mg/L	4.00	6	6	ASTM, 2005.	Unsatisfactory
19	BOD	mg/L	14.40	6	6	ASTM, 2005.	Unsatisfactory
20	COD	mg/L	48.00	30	NS	ASTM, 2005.	Unsatisfactory
21	Chromium	mg/L	Bdl	0.1	0.03	AAS	Satisfactory
22	Copper	mg/L	0.03	3	2	AAS	Satisfactory
23	Iron	mg/L	0.86	1	0.3	AAS	Unsatisfactory
24	Zinc	mg/L	0.03	< 1	0.01	AAS	Unsatisfactory
25	Lead	mg/L	Bdl	0.1	0.01	AAS	Satisfactory
26	Nickel	mg/L	Bdl	0.1	0.2	AAS	Satisfactory
27	Manganese	mg/L	Bdl	0.01	0.02	AAS	Satisfactory
28	Silver (Ag ⁺)	mg/L	Bdl	< 1	0.10	AAS	Satisfactory
29	Calcium	mg/L	76.80	NS	NS	ASTM, 2005.	Satisfactory
30	Magnesium	mg/L	92.20	NS	NS	ASTM, 2005.	Satisfactory
31	Total Alkalinity	mg/L	34.00	NS	NS	ASTM, 2005.	Satisfactory
32	Hydroxide	mg/L	Nil	NS	NS	ASTM, 2005.	Satisfactory
33	Bicarbonate	mg/L	32.00	NS	NS	ASTM, 2005.	Satisfactory
	Microbial Analysis						
34	<i>E.coli</i>	cfu/ml	3.0 x 10 ⁰	0	0	ASTM, 2005.	Unsatisfactory
35	Total coliform	cfu/ml	6.0 x10 ¹	0	0	ASTM, 2005.	Unsatisfactory
36	Total viable counts	cfu/ml	7.0 x10 ²	NS	NS	ASTM, 2005.	Unsatisfactory

µS/Cm = MicroSiemens per centimeter

Bdl = Below detectable level

mg/L = milligram per litre

cfu = Coliform forming units.

TWM /GWS/2/ N 13^o.01.891' E 5^o.15.269' E 301 m

S/N	PARAMETERS TESTED	UNITS	Average Value/Results	NESREA/ENV LIMITS	WHO LIMITS	METHOD	REMARK
1	Temperature	^o C	33.8	40	32-34	In-situ	Satisfactory
2	pH	-	8.0	6.5 - 8.0	6.5-8.5	In-situ	Satisfactory
3	Taste	-	Has taste	NS	Nil	Organoleptic	Unsatisfactory
4	Appearance	-	Turbid	NS	Nil	Organoleptic	Unsatisfactory
5	Odour	-	Has odour	NS	Nil	Organoleptic	Unsatisfactory
6	Total Dissolved Solids	mg/L	564.00	2100	500	ASTM, 2005.	Unsatisfactory
7	Conductivity	µS/Cm	1088.00	1000 µS/Cm	1500	In-situ	Unsatisfactory
8	Total hardness	mg/L	184.00	NS	120-180	ASTM, 2005.	Unsatisfactory
9	Chloride	mg/L	52.54	NS	250	ASTM, 2005.	Satisfactory
10	Fluoride	mg/L	0.23	NS	2.0	ASTM, 2005.	Satisfactory
11	Sodium	mg/L	6.48	10	20	ASTM, 2005.	Satisfactory
12	Potassium	mg/L	12.61	NS	NS	ASTM, 2005.	Satisfactory
13	Sulphate	mg/L	0.01	250	250	ASTM, 2005.	Satisfactory
14	Sulphide	mg/L	0.19	NS	0.2	ASTM, 2005.	Satisfactory
15	Ammonia	mg/L	0.25	NS	1.5	ASTM, 2005.	Satisfactory
16	Nitrate	mg/L	0.09	50	10	ASTM, 2005.	Satisfactory
17	Phosphate	mg/L	0.01	5	5	ASTM, 2005.	Satisfactory
18	DO	mg/L	4.24	6	6	ASTM, 2005.	Unsatisfactory
19	BOD	mg/L	32.00	6	6	ASTM, 2005.	Unsatisfactory
20	COD	mg/L	106.40	30	NS	ASTM, 2005.	Unsatisfactory
21	Chromium	mg/L	Bdl	0.1	0.03	AAS	Satisfactory
22	Copper	mg/L	0.06	3	2	AAS	Satisfactory
23	Iron	mg/L	Bdl	1	0.3	AAS	Satisfactory
24	Zinc	mg/L	0.61	< 1	0.01	AAS	Unsatisfactory
25	Lead	mg/L	0.03	0.1	0.01	AAS	Unsatisfactory
26	Nickel	mg/L	0.20	0.1	0.2	AAS	Unsatisfactory
27	Manganese	mg/L	Bdl	0.01	0.02	AAS	Satisfactory
28	Silver (Ag ⁺)	mg/L	Bdl	< 1	0.10	AAS	Satisfactory
29	Calcium	mg/L	40.00	NS	NS	ASTM, 2005.	Satisfactory
30	Magnesium	mg/L	144.00	NS	NS	ASTM, 2005.	Satisfactory
31	Total Alkalinity	mg/L	62.00	NS	NS	ASTM, 2005.	Satisfactory
32	Hydroxide	mg/L	Nil	NS	NS	ASTM, 2005.	Satisfactory
33	Bicarbonate	mg/L	58.00	NS	NS	ASTM, 2005.	Satisfactory
	Microbial Analysis						
34	<i>E.coli</i>	cfu/ml	1.0 x10 ⁰	0	0	ASTM, 2005.	Unsatisfactory
35	Total coliform	cfu/ml	1.0 x10 ²	0	0	ASTM, 2005.	Unsatisfactory
36	Total viable counts	cfu/ml	5.0 x 10 ³	NS	NS	ASTM, 2005.	Unsatisfactory

TWM /GWS/3/ N 13⁰.02.066' E 5⁰.15.545' E 300 m

S/N	PARAMETERS TESTED	UNITS	Average Value/Results	NESREA/ FMENV LIMITS	WHO LIMITS	METHOD	REMARK
1	Temperature	⁰ C	34.8	40	32-34	In-situ	Satisfactory
2	pH	-	8.60	6.5 - 8.0	6.5-8.5	In-situ	Unsatisfactory
3	Taste	-	Has taste	NS	Nil	Organoleptic	Unsatisfactory
4	Appearance	-	Turbid	NS	Nil	Organoleptic	Unsatisfactory
5	Odour	-	Has odour	NS	Nil	Organoleptic	Unsatisfactory
6	Total Dissolved Solids	mg/L	415.00	2100	500	ASTM, 2005.	Satisfactory
7	Conductivity	μS/Cm	830.00	1000 μS/Cm	1500	In-situ	Satisfactory
8	Total hardness	mg/L	276.00	NS	120-180	ASTM, 2005.	Unsatisfactory
9	Chloride	mg/L	66.74	NS	250	ASTM, 2005.	Satisfactory
10	Fluoride	mg/L	0.25	NS	2.0	ASTM, 2005.	Satisfactory
11	Sodium	mg/L	7.19	10	20	ASTM, 2005.	Satisfactory
12	Potassium	mg/L	4.49	NS	NS	ASTM, 2005.	Satisfactory
13	Sulphate	mg/L	8.09	250	250	ASTM, 2005.	Satisfactory
14	Sulphide	mg/L	0.11	NS	0.2	ASTM, 2005.	Satisfactory
15	Ammonia	mg/L	0.06	NS	1.5	ASTM, 2005.	Satisfactory
16	Nitrate	mg/L	0.12	50	10	ASTM, 2005.	Satisfactory
17	Phosphate	mg/L	0.04	5	5	ASTM, 2005.	Satisfactory
18	DO	mg/L	4.00	6	6	ASTM, 2005.	Unsatisfactory
19	BOD	mg/L	17.60	6	6	ASTM, 2005.	Unsatisfactory
20	COD	mg/L	58.40	30	NS	ASTM, 2005.	Unsatisfactory
21	Chromium	mg/L	0.06	0.1	0.03	AAS	Unsatisfactory
22	Copper	mg/L	Bdl	3	2	AAS	Satisfactory
23	Iron	mg/L	1.35	1	0.3	AAS	Unsatisfactory
24	Zinc	mg/L	0.03	< 1	0.01	AAS	Unsatisfactory
25	Lead	mg/L	Bdl	0.1	0.01	AAS	Satisfactory
26	Nickel	mg/L	0.31	0.1	0.2	AAS	Unsatisfactory
27	Manganese	mg/L	0.13	0.01	0.02	AAS	Unsatisfactory
28	Silver (Ag ⁺)	mg/L	0.03	< 1	0.10	AAS	Satisfactory
29	Calcium	mg/L	28.8	NS	NS	ASTM, 2005.	Satisfactory
30	Magnesium	mg/L	247.20	NS	NS	ASTM, 2005.	Satisfactory
31	Total Alkalinity	mg/L	108.00	NS	NS	ASTM, 2005.	Satisfactory
32	Hydroxide	mg/L	Nil	NS	NS	ASTM, 2005.	Satisfactory
33	Bicarbonate	mg/L	86.00	NS	NS	ASTM, 2005.	Satisfactory
	Microbial Analysis						
35	<i>E.coli</i>	cfu/ml	1.0x 10 ⁰	0	0	ASTM, 2005.	Unsatisfactory
36	Total coliform	cfu/ml	2.0 x 10 ¹	0	0	ASTM, 2005.	Unsatisfactory
37	Total viable counts	cfu/ml	2.0 x 10 ⁶	NS	NS	ASTM, 2005.	Unsatisfactory

TWM /GWS/4/ N 13⁰.00.859' E 5⁰.15.440' E 292 m

S/N	PARAMETERS TESTED	UNITS	Average Value/Results	NESREA/FME NV LIMITS	WHO LIMITS	METHOD	REMARK
1	Temperature	⁰ C	28.8	40	32-34	In-situ	Unsatisfactory
2	pH	-	7.20	6.5 - 8.0	6.5-8.5	In-situ	Satisfactory
3	Taste	-	Has taste	NS	Nil	Organoleptic	Unsatisfactory
4	Appearance	-	Turbid	NS	Nil	Organoleptic	Unsatisfactory
5	Odour	-	Has odour	NS	Nil	Organoleptic	Unsatisfactory
6	Total Dissolved Solids	mg/L	207.00	2100	500	ASTM, 2005.	Satisfactory
7	Conductivity	μS/Cm	414.00	1000 μS/Cm	1500	In-situ	Satisfactory
8	Total hardness	mg/L	24.00	NS	120-180	ASTM, 2005.	Satisfactory
9	Chloride	mg/L	56.80	NS	250	ASTM, 2005.	Satisfactory
10	Fluoride	mg/L	0.24	NS	2.0	ASTM, 2005.	Satisfactory
11	Sodium	mg/L	7.19	10	20	ASTM, 2005.	Satisfactory
12	Potassium	mg/L	2.55	NS	NS	ASTM, 2005.	Satisfactory
13	Sulphate	mg/L	43.73	250	250	ASTM, 2005.	Satisfactory
14	Sulphide	mg/L	0.15	NS	0.2	ASTM, 2005.	Satisfactory
15	Ammonia	mg/L	0.27	NS	1.5	ASTM, 2005.	Satisfactory
16	Nitrate	mg/L	0.07	50	10	ASTM, 2005.	Satisfactory
17	Phosphate	mg/L	0.01	5	5	ASTM, 2005.	Satisfactory
18	DO	mg/L	5.20	6	6	ASTM, 2005.	Unsatisfactory
19	BOD	mg/L	24.00	6	6	ASTM, 2005.	Unsatisfactory
20	COD	mg/L	80.00	30	NS	ASTM, 2005.	Unsatisfactory
21	Chromium	mg/L	0.12	0.1	0.03	AAS	Unsatisfactory
22	Copper	mg/L	0.09	3	2	AAS	Satisfactory
23	Iron	mg/L	0.24	1	0.3	AAS	Satisfactory
24	Zinc	mg/L	0.17	< 1	0.01	AAS	Unsatisfactory
25	Lead	mg/L	0.25	0.1	0.01	AAS	Satisfactory
26	Nickel	mg/L	Bdl	0.1	0.2	AAS	Satisfactory
27	Manganese	mg/L	Bdl	0.01	0.02	AAS	Satisfactory
28	Silver (Ag ⁺)	mg/L	Bdl	< 1	0.10	AAS	Satisfactory
29	Calcium	mg/L	24.00	NS	NS	ASTM, 2005.	Satisfactory
30	Magnesium	mg/L	124.00	NS	NS	ASTM, 2005.	Satisfactory
31	Total Alkalinity	mg/L	76.00	NS	NS	ASTM, 2005.	Satisfactory
32	Hydroxide	mg/L	Nil	NS	NS	ASTM, 2005.	Satisfactory
33	Bicarbonate	mg/L	68.00	NS	NS	ASTM, 2005.	Satisfactory
	Microbial Analysis						
35	<i>E.coli</i>	cfu/ml	3.0 x 10 ⁰	0	0	ASTM, 2005.	Unsatisfactory
36	Total Coliform	cfu/ml	4.0 x 10 ¹	0	0	ASTM, 2005.	Unsatisfactory
37	Total viable counts	cfu/ml	3.0 x 10 ³	NS	NS	ASTM, 2005.	Unsatisfactory

TWM /SS/1/ N 13⁰.01.987' E 5⁰.15.760' E 299 m

S/N	Parameters	Units	Sample Results	FMENV/ NESREA	METHOD	REMARKS
1	pH (KCl)	-	9.6	-	pH meter	Satisfactory
2	pH (10% solution @ 25°C)	-	10.4	6.5-9.0	pH meter	Unsatisfactory
3	Nitrate	mg/kg	3.00	-	ASTM, 2005.	Satisfactory
4	Moisture	%	8.23	-	ASTM, 2005.	Satisfactory
5	Electrical conductivity	µS/Cm	5.00	-	Conductivity meter	Satisfactory
6	Soil colour	-	Whitish	-	Visual Inspection	Satisfactory
7	Potassium (K ⁺)	mg/kg	0.04	-	ASTM, 2005.	Satisfactory
8	Magnesium (Mg ²⁺)	mg/kg	2.80	-	ASTM, 2005.	Satisfactory
9	Calcium (Ca ²⁺)	mg/kg	5.20	-	ASTM, 2005.	Satisfactory
10	Sodium (Na ⁺)	mg/kg	0.02	-	ASTM, 2005.	Satisfactory
11	Available Phosphorus	mg/kg	1.87	5	ASTM, 2005.	Satisfactory
12	Organic Matter	%	0.20	-	ASTM, 2005.	Satisfactory
13	Nitrogen	%	0.05	-	ASTM, 2005.	Satisfactory
14	Organic Carbon	%	0.12	-	ASTM, 2005.	Satisfactory
15	Iron (Fe ²⁺)	mg/kg	0.98	0.03	AAS	Unsatisfactory
16	Lead (Pb ²⁺)	mg/kg	1.00	164	AAS	Satisfactory
17	Copper (Cu ²⁺)	mg/kg	Bdl	100	AAS	Satisfactory
18	Zinc (Zn ²⁺)	mg/kg	0.37	-	AAS	Satisfactory
19	Grain Size Distribution (Coarse Sand)	%	51.00	-	ASTM, 2005.	Satisfactory
20	Grain Size Distribution (Clay)	%	7.00	-	ASTM, 2005.	Satisfactory
21	Grain Size Distribution (Silt)	%	1.00	-	ASTM, 2005.	Satisfactory
22	Grain Size Distribution (Fine Sand)	%	40.00	-	ASTM, 2005.	Satisfactory
23	Textural Class	-	Sandy	-	Visual Inspection	Satisfactory

TWM /SS/2/ N 13⁰.01.891' E 5⁰.15.269' E 301 m

S/N	Parameters	Units	Sample Results	FMENV/ NESREA	METHOD	REMARKS
1	pH (KCl)	-	8.8	-	pH meter	Satisfactory
2	pH (10% solution @ 25°C)	-	9.5	6.5-9.0	pH meter	Unsatisfactory
3	Nitrate	mg/kg	0.96	-	ASTM, 2005.	Satisfactory
4	Moisture	%	33.87	-	ASTM, 2005.	Satisfactory
5	Electrical conductivity	µS/Cm	5.00	-	Conductivity meter	Satisfactory
6	Soil colour	-	Whitish	-	Visual Inspection	Satisfactory
7	Potassium (K ⁺)	mg/kg	0.13	-	ASTM, 2005.	Satisfactory
8	Magnesium (Mg ²⁺)	mg/kg	3.60	-	ASTM, 2005.	Satisfactory
9	Calcium (Ca ²⁺)	mg/kg	12.40	-	ASTM, 2005.	Satisfactory
10	Sodium (Na ⁺)	mg/kg	0.07	-	ASTM, 2005.	Satisfactory
11	Available Phosphorus	mg/kg	20.52	5	ASTM, 2005.	Unsatisfactory
12	Organic Matter	%	3.27	-	ASTM, 2005.	Satisfactory
13	Nitrogen	%	0.17	-	ASTM, 2005.	Satisfactory
14	Organic Carbon	%	1.99	-	ASTM, 2005.	Satisfactory
15	Iron (Fe ²⁺)	mg/kg	1.22	0.03	AAS	Unsatisfactory
16	Lead (Pb ²⁺)	mg/kg	0.25	164	AAS	Satisfactory
17	Copper (Cu ²⁺)	mg/kg	0.13	100	AAS	Satisfactory
18	Zinc (Zn ²⁺)	mg/kg	0.61	-	AAS	Satisfactory
19	Grain Size Distribution (Coarse Sand)	%	39.00	-	ASTM, 2005.	Satisfactory
20	Grain Size Distribution (Clay)	%	9.00	-	ASTM, 2005.	Satisfactory
21	Grain Size Distribution (Silt)	%	5.00	-	ASTM, 2005.	Satisfactory

22	Grain Size Distribution (Fine Sand)	%	47.00	-	ASTM, 2005.	Satisfactory
23	Textural Class	-	Sandy	-	Visual Inspection	Satisfactory

TWM /SS/3/ N 13⁰.02.066' E 5⁰.15.545' E 300 m

S/N	Parameters	Units	Sample Results	FMENV/ NESREA	METHOD	REMARKS
1	pH (KCl)	-	9.8	-	pH meter	Satisfactory
2	pH (10% solution @ 25°C)	-	10.6	6.5-9.0	pH meter	Unsatisfactory
3	Nitrate	mg/kg	4.20	-	ASTM, 2005.	Satisfactory
4	Moisture	%	23.15	-	ASTM, 2005.	Satisfactory
5	Electrical conductivity	µS/Cm	9.00	-	Conductivity meter	Satisfactory
6	Soil colour	-	Darkish	-	Visual Inspection	Satisfactory
7	Potassium (K ⁺)	mg/kg	0.03	-	ASTM, 2005.	Satisfactory
8	Magnesium (Mg ²⁺)	mg/kg	3.00	-	ASTM, 2005.	Satisfactory
9	Calcium (Ca ²⁺)	mg/kg	10.40	-	ASTM, 2005.	Satisfactory
10	Sodium (Na ⁺)	mg/kg	0.01	-	ASTM, 2005.	Satisfactory
11	Available Phosphorus	mg/kg	18.65	5	ASTM, 2005.	Unsatisfactory
12	Organic Matter	%	0.54	-	ASTM, 2005.	Satisfactory
13	Nitrogen	%	0.07	-	ASTM, 2005.	Satisfactory
14	Organic Carbon	%	0.31	-	ASTM, 2005.	Satisfactory
15	Iron (Fe ²⁺)	mg/kg	3.55	0.03	AAS	Unsatisfactory
16	Lead (Pb ²⁺)	mg/kg	0.50	164	AAS	Satisfactory
17	Copper (Cu ²⁺)	mg/kg	Bdl	100	AAS	Satisfactory
18	Zinc (Zn ²⁺)	mg/kg	0.47	-	AAS	Satisfactory
19	Grain Size Distribution (Coarse Sand)	%	42.00	-	ASTM, 2005.	Satisfactory
20	Grain Size Distribution (Clay)	%	7.00	-	ASTM, 2005.	Satisfactory
21	Grain Size Distribution (Silt)	%	3.00	-	ASTM, 2005.	Satisfactory
22	Grain Size Distribution (Fine Sand)	%	48.00	-	ASTM, 2005.	Satisfactory
23	Textural Class	-	Sandy	-	Visual Inspection	Satisfactory

TWM /SS/4/ N 13⁰.00.859' E 5⁰.15.440' E 292 m

S/N	Parameters	Units	Sample Results	FMENV/ NESREA	METHOD	REMARKS
1	pH (KCl)	-	9.4	-	pH meter	Satisfactory
2	pH (10% solution @ 25°C)	-	10.1	6.5-9.0	pH meter	Unsatisfactory
3	Nitrate	mg/kg	2.44	-	ASTM, 2005.	Satisfactory
4	Moisture	%	21.51	-	ASTM, 2005.	Satisfactory
5	Electrical conductivity	µS/Cm	6.00	-	Conductivity meter	Satisfactory
6	Soil colour	-	Whitish	-	Visual Inspection	Satisfactory
7	Potassium (K ⁺)	mg/kg	0.04	-	ASTM, 2005.	Satisfactory
8	Magnesium (Mg ²⁺)	mg/kg	2.60	-	ASTM, 2005.	Satisfactory
9	Calcium (Ca ²⁺)	mg/kg	6.20	-	ASTM, 2005.	Satisfactory
10	Sodium (Na ⁺)	mg/kg	0.02	-	ASTM, 2005.	Satisfactory
11	Available Phosphorus	mg/kg	2.80	5	ASTM, 2005.	Satisfactory

12	Organic Matter	%	0.40	-	ASTM, 2005.	Satisfactory
13	Nitrogen	%	0.06	-	ASTM, 2005.	Satisfactory
14	Organic Carbon	%	0.23	-	ASTM, 2005.	Satisfactory
15	Iron (Fe ²⁺)	mg/kg	0.49	0.03	AAS	Unsatisfactory
16	Lead (Pb ²⁺)	mg/kg	0.50	164	AAS	Satisfactory
17	Copper (Cu ²⁺)	mg/kg	0.03	100	AAS	Satisfactory
18	Zinc (Zn ²⁺)	mg/kg	0.17	-	AAS	Satisfactory
19	Grain Size Distribution (Coarse Sand)	%	25.00	-	ASTM, 2005.	Satisfactory
20	Grain Size Distribution (Clay)	%	7.00	-	ASTM, 2005.	Satisfactory
21	Grain Size Distribution (Silt)	%	5.00	-	ASTM, 2005.	Satisfactory
22	Grain Size Distribution (Fine Sand)	%	63.00	-	ASTM, 2005.	Satisfactory
23	Textural Class	-	Sandy	-	Visual Inspection	Satisfactory

TWM /AS/1/ N 13⁰.01.891' E 5⁰.15.269' E 301 m

BDL = Below detectable limit.

MGA = M40 Gas Analyser

Ppm = Parts per million.

S/N	Parameters	Unit	NESREA	RESULT	METHOD	REMARK
1	Hydrogen Sulphide(H ₂ S)	Ppm	5	1.00	M40 Gas Analyser (direct reading method) (MGA)	BDL
2	Carbon monoxide (CO)	Ppm	500	0.00		BDL
3	Nitric Oxide (NO)	Ppm	300	3.99		BDL
4	Nitric dioxide (NO ₂)	Ppm	300	2.42		BDL
5	Sulphur dioxide	Ppm	500	1.24		BDL
6	Hydrogen Cyanide (HCN)	Ppm	NS	3.62		BDL
7	Ammonia (NH ₃)	Ppm	NS	3.22		BDL
8	Oxygen	Ppm	NS	20.8		BDL

TWM /AS/2/ N 11.43539⁰ E 9.08157⁰ E 498 m

S/N	Parameters	Unit	NESREA	RESULT	METHOD	REMARK
1	Hydrogen Sulphide(H ₂ S)	Ppm	5	0.00	M40 Gas Analyser (direct reading method) (MGA)	BDL
2	Carbon monoxide CO)	Ppm	500	0.00		BDL
3	Nitric Oxide (NO)	Ppm	300	5.38		BDL
4	Nitric dioxide (NO ₂)	Ppm	300	1.59		BDL
5	Sulphur dioxide	Ppm	500	1.43		BDL
6	Hydrogen Cyanide (HCN)	Ppm	NS	3.66		BDL
7	Ammonia (NH ₃)	Ppm	NS	3.42		BDL
8	Oxygen	Ppm	NS	20.8		BDL

TWM /AS/3/ N 13⁰.02.066' E 5⁰.15.545' E 300 m

S/N	Parameters	Unit	NESREA	RESULT	METHOD	REMARK
1	Hydrogen Sulphide (H ₂ S)	Ppm	5	1	M40 Gas Analyser (direct reading method) (MGA)	BDL
2	Carbon monoxide (CO)	Ppm	500	2.00		BDL
3	Nitric Oxide (NO)	Ppm	300	6.36		BDL
4	Nitric dioxide (NO ₂)	Ppm	300	1.48		BDL
5	Sulphur dioxide	Ppm	500	1.25		BDL
6	Hydrogen Cyanide (HCN)	Ppm	NS	3.76		BDL
7	Ammonia (NH ₃)	Ppm	NS	3.12		BDL
8	Oxygen	Ppm	NS	20.8		BDL

TWM /AS/4/ N 13⁰.00.859' E 5⁰.15.440' E 292 m

S/N	Parameters	Unit	NESREA	RESULT	METHOD	REMARK
1	Hydrogen Sulphide (H ₂ S)	Ppm	5	2.00	M40 Gas Analyser (direct reading method) (MGA)	BDL
2	Carbon monoxide (CO)	Ppm	500	0.00		BDL
3	Nitric Oxide (NO)	Ppm	300	6.35		BDL
4	Nitric dioxide (NO ₂)	Ppm	300	1.46		BDL
5	Sulphur dioxide	Ppm	500	1.24		BDL
6	Hydrogen Cyanide (HCN)	Ppm	NS	2.71		BDL
7	Ammonia (NH ₃)	Ppm	NS	3.10		BDL
8	Oxygen	Ppm	NS	20.8		BDL

Summary of Environmental, Social, Health and Safety (ESHS) Enhancements

Standard Procurement Documents (SPDs) & Standard Bidding Documents (SBDs)

Note: The following ESHS enhancements shall be applicable for all new works contracts for which the relevant SBD/SPD listed below are used. "New contracts" in this context means contracts for which the bidding documents/request for proposal documents have not yet been issued.



Summary of Environmental, Social, Health and Safety (ESHS) Enhancements

ESHS Enhancements have been made to the following procurement documents:

Standard Procurement Documents (SPD) Works

1. Prequalification Document - Works
2. Request for Bids - After Prequalification
3. Request for Bids - Without Prequalification
4. Request for Bids - Small Works One-Envelope Bidding Process
5. Request for Bids - Small Works Two-Envelope Bidding Process
6. Request for Bids - Output and Performance-Based Road Contracts

Standard Bidding Documents (SBD) Works

7. Prequalification Document - Works
8. SBD Small Works
9. SBD Works
10. SBD Output and Performance-Based Road Contracts

Consulting Services

11. Request for Proposals (RFP) Consulting Services 2015 (for supervising engineer)
12. RFP Consulting Services 2016 (for supervising engineer)

Summary of key enhancements

The following table summarizes the key enhancements that have been reflected in the SBDs and SPDs listed above.

#	Subject	Enhancement/s
1	Declaration of contract suspension or termination	<ul style="list-style-type: none"> • Applicants/Bidders/Proposers are now required to make a declaration listing any civil works contracts that have been suspended or terminated by an employer and/or performance security called by an employer, for ESHS reason/s. This information will be used to inform enhanced due diligence.
2	Strengthened specifications/ employer's requirements	<ul style="list-style-type: none"> • The Employer is required to set out clearly the minimum expectations of ESHS performance from the outset, to ensure that all Bidders/Proposers are aware of the ESHS requirements.
3	Workers' ESHS Code of Conduct	<ul style="list-style-type: none"> • Bidders/Proposers are now required to submit, as part of their Bid/Proposal, an ESHS Code of Conduct that will apply to their employees and sub-contractors, and details of how it will be enforced. • The suitability of the Code of Conduct can be assessed and discussed as part of the Bid/Proposal evaluation and negotiations. • The successful Bidder/Proposer is required to implement the agreed Code of Conduct upon contract award.
4	Contractor's ESHS Management Strategy and Implementation Plans	<ul style="list-style-type: none"> • Bidders/Proposers are now required to submit, as part of their Bid/Proposal, ESHS Management Strategies and Implementation Plans required to manage the key ESHS risks of the project. • The suitability of these strategies and plans can be assessed as part of the Bid/Proposal evaluation, and discussed during pre-contract

#	Subject	Enhancement/s
		<p>discussions, as appropriate.</p> <ul style="list-style-type: none"> • These strategies and plans will become part of the Contractor's Environmental and Social Management Plan (C-ESMP). • Particular Conditions of Contract now include provisions relating to the (C-ESMP), e.g.: <ul style="list-style-type: none"> - a requirement that the Contractor shall not commence any Works unless the Engineer is satisfied that appropriate measures are in place to address ESHS risks and impacts; - at a minimum, the Contractor shall apply the plans and ESHS Code of Conduct, submitted as part of the Bid/Proposal, from contract award onwards.
5	ESHS Performance Security	<ul style="list-style-type: none"> • The successful Bidder/Proposer is now required to provide, in addition to the standard Performance Security, an ESHS Performance Security (the sum of the two "demand" bank guarantees, normally not to exceed 10% of the contract price). • The ESHS performance security is in the form of a "demand" bank guarantee." • The application of this provision is at the Borrower's discretion. It is recommended for contracts where there is significant ESHS risks as advised by Social/Environmental specialist/s.
6	ESHS Provisional Sum	<ul style="list-style-type: none"> • An additional provisional sum, specifically for ESHS outcomes, may be included in the Request for Bids/Proposals documents, and eventual contract. Normally, the payment for the delivery of ESHS requirements shall be a subsidiary obligation of the Contractor covered under the prices quoted for other Bill of Quantity/price items.
7	Key ESHS Personnel	<ul style="list-style-type: none"> • Bidders/Proposers are now required to demonstrate that they have suitably qualified ESHS specialists among their Key Personnel. • Key Personnel must be named in the Bid/Proposal, and in the contract. • The quality of the proposed Key Personnel (including ESHS specialists) will be assessed during the evaluation of Bids/Proposals. • The Contractor shall require the Employer's consent to substitute or replace any Key Personnel. • The Engineer may require the removal of Personnel if they undertake behaviour which breaches the ESHS Code of Conduct, e.g. spreading communicable diseases, sexual harassment, gender-based violence, illicit activity, or crime.
8	ESHS Reporting	<ul style="list-style-type: none"> • Contracts now contain specific ESHS reporting requirements. These relate to: <ul style="list-style-type: none"> - ESHS incidents requiring immediate notification - ESHS metrics in regular progress reports.
9	ESHS considerations during contract variation	<ul style="list-style-type: none"> • As part of variation procedures, the Contractor shall provide relevant ESHS information to enable the Engineer to evaluate the ESHS risks and impacts.
10	Ability to withhold interim payment	<ul style="list-style-type: none"> • Contracts now contain provisions allowing interim payments to be withheld where there is a failure to perform an ESHS obligation.
11	ESHS considerations included in civil works	<ul style="list-style-type: none"> • The standard Request for Proposals for consulting services now include ESHS considerations to apply to the supervision of civil works.

#	Subject	Enhancement/s
	Consulting Services	

ANNEXURE XII: Quick Brief on ESHS

Brief on ESHS

Code of Conduct (ESHS)

The Bidder shall submit its Code of Conduct that will apply to contractor's personnel to ensure compliance with its Environmental, Social, Health and Safety (ESHS) obligations under this contract to include the following;

- a. Community and PAPs Issues Management
- b. HIV/AIDS and Health Awareness Management
- c. Public and Occupational Health and Safety Management
- d. Sexual Harassment and Gender Based Violence
- e. Illicit Drug and Alcohol Use and Behaviours
- f. Crime and Criminal Activities
- g. Grievance Redress Mechanisms (GRM)
- h. Labour Relations, Fair Compensation and Child Labour

In addition, the Bidder shall detail how this Code of Conduct will be implemented. This will include: how it will be introduced into conditions of employment/engagement, what training will be provided, how it will be monitored and how the Contractor proposes to deal with any breaches.

The Contractor shall be required to implement the agreed Code of Conduct and which will be strictly supervised by the employer and/or its agent(s).

Management Strategies and Implementation Plans (MSIP) to manage the (ESHS) risks

The Bidder shall submit Management Strategies and Implementation Plans (MSIP) to manage the following key Environmental, Social, Health and Safety (ESHS) risks.

1. Community and PAPs Issues Management
2. Public and Occupational Health and Safety Management
3. Dust Control and Air Quality Management
4. Noise and Vibration Exposure Management
5. Waste Management and Debris from Construction Operations
6. Flora and Fauna Removal Management
7. Grievance Redress Mechanisms (GRM)

In addition to the Code of Conduct and MSIP outlined above, the contractor shall be required to address and implement the ESHS as identified in the Environmental and Social Management Plan (ESMP) and Resettlement Action Plan (RAP) provided by the SPMU.

Environmental, Social, Health and Safety (ESHS) Metrics for Progress Reports

Metrics for regular reporting:

- a. environmental incidents or non-compliances with contract requirements, including contamination, pollution or damage to ground or water supplies;
- b. health and safety incidents, accidents, injuries and all fatalities that require treatment;

- c. interactions with regulators: identify agency, dates, subjects, outcomes (report the negative if none);
- d. status of all permits and agreements:
 - i. work permits: number required, number received, actions taken for those not received;
 - ii. status of permits and consents:
 - list areas/facilities with permits required (quarries, asphalt & batch plants), dates of application, dates issued (actions to follow up if not issued), dates submitted to resident engineer (or equivalent), status of area (waiting for permits, working, abandoned without reclamation, decommissioning plan being implemented, etc.);
 - list areas with landowner agreements required (borrow and spoil areas, camp sites), dates of agreements, dates submitted to resident engineer (or equivalent);
 - identify major activities undertaken in each area this month and highlights of environmental and social protection (land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation);
 - for quarries: status of relocation and compensation (completed, or details of monthly activities and current status).
- e. health and safety supervision:
 - i. safety officer: number days worked, number of full inspections & partial inspections, reports to construction/project management;
 - ii. number of workers, work hours, metric of PPE use (percentage of workers with full personal protection equipment (PPE), partial, etc.), worker violations observed (by type of violation, PPE or otherwise), warnings given, repeat warnings given, follow-up actions taken (if any);
- f. worker accommodations:
 - iii. number of expats housed in accommodations, number of locals;
 - iv. date of last inspection, and highlights of inspection including status of accommodations' compliance with national and local law and good practice, including sanitation, space, etc.;
 - v. actions taken to recommend/require improved conditions, or to improve conditions.
- g. HIV/AIDS: provider of health services, information and/or training, location of clinic, number of non-safety disease or illness treatments and diagnoses (no names to be provided);
- h. gender (for expats and locals separately): number of female workers, percentage of workforce, gender issues raised and dealt with (cross-reference grievances or other sections as needed);
- i. training:
 - vi. number of new workers, number receiving induction training, dates of induction training;

- vii. number and dates of toolbox talks, number of workers receiving Occupational Health and Safety (OHS), environmental and social training;
- viii. number and dates of HIV/AIDS sensitization training, no. workers receiving training (this month and in the past); same questions for gender sensitization, flaglady/flagman training.
- j. environmental and social supervision:
 - ix. environmentalist: days worked, areas inspected and numbers of inspections of each (road section, work camp, accommodations, quarries, borrow areas, spoil areas, swamps, forest crossings, etc.), highlights of activities/findings (including violations of environmental and/or social best practices, actions taken), reports to environmental and/or social specialist/construction/site management;
 - x. sociologist: days worked, number of partial and full site inspections (by area: road section, work camp, accommodations, quarries, borrow areas, spoil areas, clinic, HIV/AIDS center, community centers, etc.), highlights of activities (including violations of environmental and/or social requirements observed, actions taken), reports to environmental and/or social specialist/construction/site management; and
 - xi. community liaison person(s): days worked (hours community center open), number of people met, highlights of activities (issues raised, etc.), reports to environmental and/or social specialist /construction/site management.
- k. Grievances: list this month's and unresolved past grievances by date received, complainant, how received, to whom referred to for action, resolution and date (if completed), data resolution reported to complainant, any required follow-up(Cross-reference other sections as needed):
 - xii. Worker grievances;
 - xiii. Community grievances
- l. Traffic and vehicles/equipment:
 - xiv. traffic accidents involving project vehicles & equipment: provide date, location, damage, cause, follow-up;
 - xv. accidents involving non-project vehicles or property (also reported under immediate metrics): provide date, location, damage, cause, follow-up;
 - xvi. overall condition of vehicles/equipment (subjective judgment by environmentalist); non-routine repairs and maintenance needed to improve safety and/or environmental performance (to control smoke, etc.).
- m. Environmental mitigations and issues (what has been done):
 - xvii. dust: number of working bowsers, number of waterings/day, number of complaints, warnings given by environmentalist, actions taken to resolve; highlights of quarry dust control (covers, sprays, operational status); % of rock/muram/spoil lorries with covers, actions taken for uncovered vehicles;
 - xviii. erosion control: controls implemented by location, status of water crossings, environmentalist inspections and results, actions taken to

resolve issues, emergency repairs needed to control erosion/sedimentation;

- xix. quarries, borrow areas, spoil areas, asphalt plants, batch plants: identify major activities undertaken this month at each, and highlights of environmental and social protection: land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation;
 - xx. blasting: number of blasts (and locations), status of implementation of blasting plan (including notices, evacuations, etc.), incidents of off-site damage or complaints (cross-reference other sections as needed);
 - xxi. spill cleanups, if any: material spilled, location, amount, actions taken, material disposal (report all spills that result in water or soil contamination);
 - xxii. waste management: types and quantities generated and managed, including amount taken offsite (and by whom) or reused/recycled/disposed on-site;
 - xxiii. details of tree plantings and other mitigations required undertaken this month;
 - xxiv. details of water and swamp protection mitigations required undertaken this month.
- n. compliance:
- xxv. compliance status for conditions of all relevant consents/permits, for the Work, including quarries, etc.): statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance;
 - xxvi. compliance status of ESMP/ESIP requirements: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance
 - xxvii. other unresolved issues from previous months related to environmental and social: continued violations, continued failure of equipment, continued lack of vehicle covers, spills not dealt with, continued compensation or blasting issues, etc. Cross-reference other sections as needed.

ANNEXURE XIII: Construction Daily Monitoring Checklist

The following checklists from Occupational Safety and Health Administration (OSHA) provide necessary steps to avoid hazards that cause injuries, illnesses and fatalities. OSHA states, "As always, be cautious and seek help if you are concerned about a potential hazard."

Personal Protective Equipment (PPE)

Eye and Face Protection

- Safety glasses or face shields are worn anytime work operations can cause foreign objects getting into the eye such as during welding, cutting, grinding, nailing (or when working with concrete and/or harmful chemicals or when exposed to flying particles).
- Eye and face protectors are selected based on anticipated hazards.
- Safety glasses or face shields are worn when exposed to any electrical hazards including work on energized electrical systems.

Foot Protection

- Construction workers should wear work shoes or boots with slip-resistant and puncture-resistant soles.
- Safety-toed footwear is worn to prevent crushed toes when working around heavy equipment or falling objects.

Hand Protection

- Gloves should fit snugly.
- Workers wear the right gloves for the job (for example, heavy-duty rubber gloves for concrete work, welding gloves for welding, insulated gloves and sleeves when exposed to electrical hazards).

Head Protection

- Workers shall wear hard hats where there is a potential for objects falling from above, bumps to their heads from fixed objects, or of accidental head contact with electrical hazards.
- Hard hats are routinely inspected for dents, cracks or deterioration.
- Hard hats are replaced after a heavy blow or electrical shock.
- Hard hats are maintained in good condition.

Scaffolding

- Scaffolds should be set on sound footing.
- Damaged parts that affect the strength of the scaffold are taken out of service.
- Scaffolds are not altered.
- All scaffolds should be fully planked.
- Scaffolds are not moved horizontally while workers are on them unless they are designed to be mobile and workers have been trained in the proper procedures.
- Employees are not permitted to work on scaffolds when covered with snow, ice, or other slippery materials.
- Scaffolds are not erected or moved within 10 feet of power lines.
- Employees are not permitted to work on scaffolds in bad weather or high winds unless a competent person has determined that it is safe to do so.
- Ladders, boxes, barrels, buckets or other makeshift platforms are not used to raise work height.
- Extra material is not allowed to build up on scaffold platforms.
- Scaffolds should not be loaded with more weight than they were designed to support.

Electrical Safety

- Work on new and existing energized (hot) electrical circuits is prohibited until all power is shut off and grounds are attached.
- An effective Lockout/Tagout system is in place.
- Frayed, damaged or worn electrical cords or cables are promptly replaced.
- All extension cords have grounding prongs.
- Protect flexible cords and cables from damage. Sharp corners and projections should be avoided.
- Use extension cord sets used with portable electric tools and appliances that are the three-wire type and designed for hard or extra-hard service. (Look for some of the following letters imprinted on the casing: S, ST, SO, STO.)
- All electrical tools and equipment are maintained in safe condition and checked regularly for defects and taken out of service if a defect is found.
- Do not bypass any protective system or device designed to protect employees from contact with electrical energy.
- Overhead electrical power lines are located and identified.
- Ensure that ladders, scaffolds, equipment or materials never come within 10 feet of electrical power lines.
- All electrical tools must be properly grounded unless they are of the double insulated type.
- Multiple plug adapters are prohibited.

Floor and Wall Openings

- Floor openings (12 inches or more) are guarded by a secured cover, a guardrail or equivalent on all sides (except at entrances to stairways).
- Toeboards are installed around the edges of permanent floor openings (where persons may pass below the opening).
- Elevated Surfaces
- Signs are posted, when appropriate, showing the elevated surface load capacity.
- Surfaces elevated more than 48 inches above the floor or ground have standard guardrails.
- All elevated surfaces (beneath which people or machinery could be exposed to falling objects) have standard 4-inch toeboards.
- A permanent means of entry and exit with handrails is provided to elevated storage and work surfaces.
- Material is piled, stacked or racked in a way that prevents it from tipping, falling, collapsing, rolling or spreading.

Hazard Communication

- A list of hazardous substances used in the workplace is maintained and readily available at the worksite.
- There is a written hazard communication program addressing Safety Data Sheets (SDS), labeling and employee training.
- Each container of a hazardous substance (vats, bottles, storage tanks) is labeled with product identity and a hazard warning(s) (communicating the specific health hazards and physical hazards).
- Safety Data Sheets are readily available at all times for each hazardous substance used.
- There is an effective employee training program for hazardous substances.

Crane Safety

- Cranes and derricks are restricted from operating within 10 feet of any electrical power line.
- The upper rotating structure supporting the boom and materials being handled is provided with an electrical ground while working near energized transmitter towers.

- Rated load capacities, operating speed and instructions are posted and visible to the operator.
- Cranes are equipped with a load chart.
- The operator understands and uses the load chart.
- The operator can determine the angle and length of the crane boom at all times.
- Crane machinery and other rigging equipment is inspected daily prior to use to make sure that it is in good condition.
- Accessible areas within the crane's swing radius are barricaded.
- Tag lines are used to prevent dangerous swing or spin of materials when raised or lowered by a crane or derrick.
- Illustrations of hand signals to crane and derrick operators are posted on the job site.
- The signal person uses correct signals for the crane operator to follow.
- Crane outriggers are extended when required.
- Crane platforms and walkways have antiskid surfaces.
- Broken, worn or damaged wire rope is removed from service.
- Guardrails, hand holds and steps are provided for safe and easy access to and from all areas of the crane.
- Load testing reports/certifications are available.
- Tower crane mast bolts are properly torqued to the manufacturer's specifications.
- Overload limits are tested and correctly set.
- The maximum acceptable load and the last test results are posted on the crane.
- Initial and annual inspections of all hoisting and rigging equipment are performed and reports are maintained.
- Only properly trained and qualified operators are allowed to work with hoisting and rigging equipment.

Forklifts

- Forklift truck operators are competent to operate these vehicles safely as demonstrated by their successful completion of training and evaluation.
- No employee under 18 years old is allowed to operate a forklift.
- Forklifts are inspected daily for proper condition of brakes, horns, steering, forks and tires.
- Powered industrial trucks (forklifts) meet the design and construction requirements established in American National Standards Institute (ANSI) for Powered Industrial Trucks, Part II ANSI B56.1-1969.
- Written approval from the truck manufacturer is obtained for any modification or additions which affect capacity and safe operation of the vehicle.
- Capacity, operation and maintenance instruction plates, tags or decals are changed to indicate any modifications or additions to the vehicle.
- Battery charging is conducted in areas specifically designated for that purpose.
- Material handling equipment is provided for handling batteries, including conveyors, overhead hoists or equivalent devices.
- Reinstalled batteries are properly positioned and secured in the truck.
- Smoking is prohibited in battery charging areas.
- Precautions are taken to prevent open flames, sparks or electric arcs in battery charging areas.
- Refresher training is provided and an evaluation is conducted whenever a forklift operator has been observed operating the vehicle in an unsafe manner and when an operator is assigned to drive a different type of truck.

- Load and forks are fully lowered, controls neutralized, power shut off and brakes set when a powered industrial truck is left unattended.
- There is sufficient headroom for the forklift and operator under overhead installations, lights, pipes, sprinkler systems, etc.
- Overhead guards are in place to protect the operator against falling objects.
- Trucks are operated at a safe speed.
- All loads are kept stable, safely arranged and fit within the rated capacity of the truck.
- Unsafe and defective trucks are removed from service.

Source: OSHA

ANNEXURE XIV: Discussion Of Methods/Techniques Used In Assessing Impacts

Impact Rating Methodology

The assessment of the potential impacts of the project was based on specialists’ expertise, Consultant’s professional judgment, field observations and desk-top analysis. The significance of potential impacts that may result from the proposed project was determined to assist decision making.

Generally, the envisaged areas of potential impacts which could result from the activities of the project are evaluated for impact significance based on the comparative consequential effects of the potential impact on the social and biophysical environments. The significance of an impact may be defined as a combination of the consequence of the impact occurring and the probability that it will occur. The criteria used to determine impact consequence are shown in the Table 5-1.

Table 5.1: Criteria for Determining Impact Consequence

RATING	DESCRIPTION OF RATING	SCORE
A. Extent – the area over which the impact will be experienced		
Localized	Confined to specific project activity area or part thereof	1
Entire Watershed	The entire watershed	2
Regional	Beyond the watershed	3
B. Intensity – the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions and processes are severely altered	3
C. Duration – the timeframe over which the impact will be experienced and its reversibility		
Short-term	Up to 6 months	1
Medium-term	6 months to 1 year	2
Long-term	More than 1 year	3

The numerical scores in Table 5-1 are positive or negative depending on whether the impact is adverse or beneficial. If impact is adverse, the numerical score is positive and if the impact is beneficial, the numerical score is negative. The combined score of the three criteria (extent, intensity and duration) corresponds to a Consequence Rating, as shown in Table 5-2:

Table 5-2: Method used to determine Consequence Score

Combined Score (A+B+C)	3 – 4	5	6	7	8 – 9
Consequence Rating	Very low	Low	Medium	High	Very high

The probability of the impact occurring is determined using the probability classifications presented in the Table 5-3 below:

Table 5-3: Probability Classification

Probability – the likelihood of impact occurring	
Improbable	< 40% chance of occurring
Possible	40% – 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

The overall significance of impacts was determined by considering consequence and probability using the rating system prescribed in the Table 5-4 below:

Table 5-4: Impact Significance Ratings

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	INSIGNIFICANT	INSIGNIFICANT	VERY LOW	VERY LOW
	Low	VERY LOW	VERY LOW	LOW	LOW
	Medium	LOW	LOW	MEDIUM	MEDIUM
	High	MEDIUM	MEDIUM	HIGH	HIGH
	Very High	HIGH	HIGH	VERY HIGH	VERY HIGH