

CHAPTER ONE

INTRODUCTION

1.1 Background

Appraisal of the environmental situation in Nigeria indicates that the problem of flooding and gully erosion is multi-scaled and multi-faceted. Indeed, the problem permeates political delineations and aggregations such as wards, communities, local governments, cities, states and the federal level. The extent of the danger and threat posed by the resultant land degradation which in some cases has led to loss of lives, led the federal government of Nigeria to seek support from international development partners to halt the problem.

The support was sought through an eight-year project titled. “The Nigeria Erosion and Watershed Management Project” (NEWMAP), financed by the World Bank, Global Environment Facility, the Special Climate Change Fund and the Government of Nigeria. The project, which initially targeted seven states viz Anambra, Abia, Cross River, Edo, Enugu, Ebonyi and Imo was recently scaled up to twenty-three states. The last added states were Delta, Oyo, Sokoto, Gombe, Plateau, Kogi, Kano Akwa Ibom, Borno, Nassarawa, Katsina and Kano. As one of the beneficiaries, Nasarawa State is intervening in prioritized flood and gully erosion sites covering four locations in the State, which calls for an Environmental and Social Management Plan (ESMP) to assess the potential environmental and social impacts of the proposed intervention projects by NEWMAP.

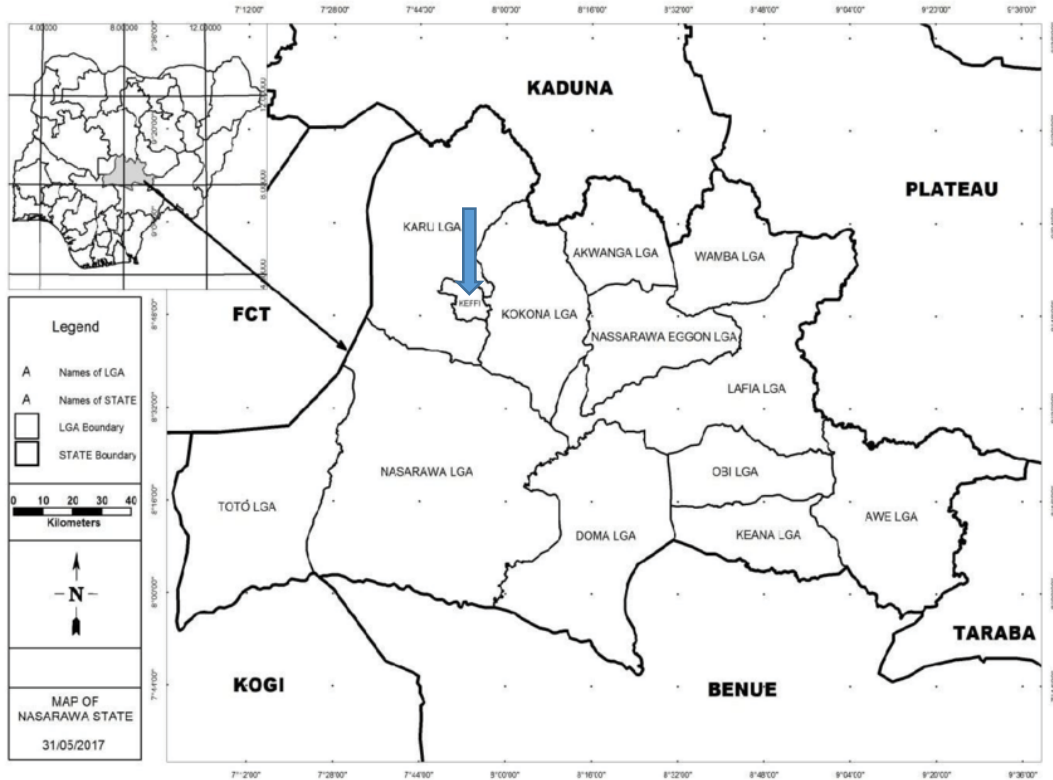
Environmental and Social Management plan (ESMP) means a detailed plan prepared by an organization indicating mitigating measures and monitoring action to be undertaken so as to ensure effective implementation of the environmental and social requirements of a proposed project in order not to have adverse effects on the environment and humans. ESMP also indicate actions for the maintenance of an environmental/occupational health and safety/community management system according to ISO4001/OHSAS 18001. The safeguard requirements of World Bank make ESMP mandatory for all projects being partly or fully sponsored/funded by the bank.

To this end, this report resents the Environmental and Social Management Plan (ESMP) of the gully sites located in Keffi communities of Nasarawa State. This is to be carried out under the Nigeria Erosion and Watershed Management Project (NEWMAP). The assessments consist of a documented set of mitigation, monitoring, and institutional actions to be taken before, during and after implementation of the project. The goal of this assessment is to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. It also includes the measures needed to implement these actions and address the adequacy of the monitoring and institutional arrangements for the upper and lower watersheds in the proposed intervention sites.

1.2 Description of the Proposed Intervention

The proposed solution focuses on the major gullies and the gully fingers and addresses the risk of these gullies and fingers re-forming in the future. It comprises the installation of adequately sized trapezoidal concrete canals on the gully site with energy dissipater structures at the points of discharge into the receptor river Antau. The proposed trapezoidal concrete canals will be designed for 1:50 year recurrence interval floods.

The design considered it important to ensure that surface runoff enters the canals freely and is not allowed to run alongside the canals, as this could cause undermining or floatation of the canals. The canals will terminate at energy dissipaters designed to form hydraulic jumps. Map 1.1 shows the map of Nasarawa state indicating locations (arrowed) of the proposed intervention Project Sites.



Map1.1: Location of the intervention project in Keffi Nasarawa state arrowed

1.3 **Rationale for NEWMAP Intervention**

The problem at the Keffi gully sites relate to the formation of gullies alongside the corridors identified in this report. The project brief identified 4 major gullies and 4 gully fingers that require attention. The environmental and socio-economic implications of the gully erosion on the communities in the project area is numerous. Farmlands are regularly destroyed and farm produce worth thousands of naira are often damaged. Access roads are also cut off at the peak of the rainy season. Residences are swept away; reptiles occasionally became a menace. If the gully erosion problem is properly appraised and appropriate control structures are introduced, the yearly colossal losses will be mitigated, life and properties will also be safeguarded. Again, the need for the proposed project at the various sites cannot be over-emphasized. Thus, different aspects of the socioeconomic lives of the area will be restored and enhanced if the proposed project is professionally implemented. Access to community facilities and infrastructures will be enhanced while the entire ecological landscapes will be restored and redesigned in such a way that the sustainability of the environment will be guaranteed. Also, the anthropogenic activities of the area will be properly re-organized and rebound.

1.4 **Rationale for ESMP**

The major developmental objective of the ESMP is to facilitate an effective decision-making process and to ensure that, during project implementation, the activities are environmentally-friendly. Thus, the objective of the ESMP is also to ensure that civil and rehabilitation works are environmentally sound, community consultation and participation, social wellbeing is enhanced in ways that are generally acceptable and sustainable. Specifically, the ESMP seeks to provide a clear process, including the action plans to integrate environmental and social considerations into the Keffi NEWMAP gully intervention projects.

The specific objectives of the ESMP are to:

- Ensure the project is carried out in accordance with contemporary sustainable development tenets;

- Provide a structure/strategy for the integration of social and environmental consideration at all stages of the project planning, design, execution and operation of various sub-projects.
- Ensure an overall positive social and environmental impacts of sub-projects and avoid/minimize, and manage any potential adverse impacts;
- Establish clear procedures and methodologies for incorporating environmental management requirements including stakeholder engagement in the implementation of the project and all sub-project;
- Provide guidelines to roles and responsibilities, and outline the reporting procedures for managing and monitoring environmental and social concerns of the proposed projects;
- Determine the training, capacity building and technical assistance needed to successfully implement the provisions of the ESMP;
- Ensure compliance with regulatory and policy requirement (local and international) that are applicable to the programme and sub projects;
- Assess the potential environmental and social impacts of the sub-projects (rehabilitation, extensions of or new constructions, livelihood adaptation, etc.), whether they are positive or negative, and propose measures and plans to reduce or mitigate adverse environmental impacts and enhance the positive impacts of the project;
- Identify the potential environmental policies, legal and institutional framework pertaining to the project;
- Identify the modalities for estimating and budgeting the costs for the implementation of the environmental Management Plan for the projects and
- Ascertain the agencies responsible for the implementation of the project's Environmental Management Plans and the project Monitoring & Evaluation (M&E).

1.5 **Scope of the Work**

The objective of the consulting services is to prepare an Environmental and Social Management Plan (ESMP) for the proposed Nasarawa State NEWMAP interventions at Keffi gully site.

The specific tasks are to:

- Describe the biophysical and social environment;
- Identify the potential environmental and social issues/risks associated with the interventions;
- Draw on the feasibility and engineering report and site design, appropriate baseline indicators;
- Develop a plan for mitigating environmental and social risks associated with construction and operation in the gully interventions in consultation with the relevant public and government agencies;
- Identify feasible and cost-effective measures that may reduce potentially significant adverse environmental and social impacts to acceptable levels;
- Develop a time-bound plan for mitigating the environmental and social risks associated with the specific interventions in the designated sub-watershed managements in consultation with the relevant public and government agencies;
- Identify the monitoring objectives and specify the type of monitoring, with linkages to the impacts assessed and the mitigation measures described above.
- Provide a specific description of the institutional arrangements; the agencies responsible for carrying out the mitigation and monitoring measures (e.g. for operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training) and the contractual arrangements for assuring the performance of each implementing agency;
- Define the technical assistance programs that could strengthen the environmental management capabilities in the agencies responsible for implementation;
- Provide an implementation schedule for the measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans;

- Provide the expected capital and recurrent cost estimates and sources of funds for implementing the ESMP and inform accordingly the design consultants so that these costs are duly taken into consideration in the designs.
- Register the ESMP with the environmental assessment (EA) departments at Federal and State levels; and
- Disclose the final ESMP at national, state, LGA and community levels.
- Subject the disclosed ESMP to Technical Review Exercise and other regulatory requirements that will culminate to issuance of Environmental Impact Statement (EIS) and the Certificate.

1.6 **Approach and Methodology**

This ESMP was prepared in accordance with the World Bank safeguard policies and the Nigerian environmental assessment guidelines and procedures. The ESMP preparation was guided by the ESMF, RPF, PAD and other NEWMAP documents. The methodology entailed: Literature/Desktop studies, Field studies, Public consultations and Preparation of ESMP Report.

CHAPTER TWO

INSTITUTIONAL AND LEGAL FRAMEWORK

2.1: Federal Policy, Legal, Regulatory and Administrative Frameworks

A number of national and local environmental guidelines are applicable to the operations of the NEWMAP. Brief discussions of these are provided in Table 2.1:

Table 2.1: Relevant Federal/State Policies, Legislation, Regulations and Guidelines

S/N	Policy Instrument	Year	provision
1.	National Policy on the Environment	1989 revised 2014	this describes both the conceptual and theoretical frameworks and strategies for archiving sustainable development in Nigeria
2.	National Erosion and Flood Control Policy	2005	This addresses the need to combat erosion in the country through the procedure outlined in the National Action Plan for Flood and Erosion and Technical Guidelines.
	Legal/Regulatory instrument	Year	provision
1.	Environmental Impact Assessment Act No. 86,	1992 (FMEnv) (2004 LFN)	This provides guidelines for regulating the activities of development projects for which EIA is mandatory in Nigeria. The Act also stipulates the minimum content of an EIA as well as a schedule of projects that require mandatory EIAs.
2.	The National Guidelines and Standards for Environmental Pollution Control in Nigeria	1991	These represent the basic instrument for monitoring and controlling pollution in Nigeria.
3.	National Guidelines on Environmental Management Systems	(1999)	This establishes the requirements for an Environmental Management System (EMS) in all organizations/facilities in Nigeria.
4.	National Air Quality Standard Decree No.59	1991	This defines the levels of air pollution that should not be exceeded in order to protect public health.
5.	The National Environment Standards and Regulations Enforcement Agency Act (NESREA Act)	2007	This established NESREA, the police of the environment in Nigeria and makes provision for solid waste, other environmental management issues and their administration and prescribes sanctions for offences or acts which run contrary to proper and adequate waste and other pollutant disposal procedures and practices.
6.	Land Use Act	1978 modified 1990	this is the primary legal means to acquire land in the country. The Act vests all land in the territory of each state in the federation in the governor of the State and requires that such land be held in trust and administered for the use and common benefits of all Nigerians in accordance with the provisions of

			this Act.
7.	Endangered Species Act	1985	This provides for the conservation and management of wild life in Nigeria. It also provides for the protection of some of her endangered species from extinction.
8.	FEPA/FMEnv. EIA Procedural guidelines	1995	These indicate the steps to be followed in the EIA process through a project life cycle.
9.	SI 15 National Environmental Protection (The Management of Solid and Hazardous Waste Regulations)	1991	This regulates the collection, treatment, and disposal of solid and hazardous waste for municipal and industrial sources and give the comprehensive list of chemicals and chemical waste by toxicity categories.
10	SI19 National Environmental Protection (The NEP: Pollution Abatement in Industries and Facilities Generating Waste Regulations)	1991	This imposed restrictions on the release of toxic substances and requirements of stipulated monitoring of pollution to ensure that permissible limits are not exceeded during and after the project.
11.	SI 18 National Environmental Protection (National Effluents Limitations Regulation)	1991	This makes it mandatory for industrial facilities to install anti-pollution equipment. It also makes provision for further effluent treatment, prescribe maximum limit of effluent parameters allowed for discharge, and spells out penalties for contravention.
12.	Public Health Law		This deals with public health matters
13.	Environmental Sanitation Edits, Law and Enforcement		This deals with the general environmental health and sanitation, implementation and enforcement in the state.
14.	Workmen Component Act	1987 Revised 2010	This provides for occupational health and safety
Nasarawa State Policy & Regulatory Instrument			
1.	Nasarawa State Ministry of Environment and Natural Resources		This takes charge of all environmental issues including handling collaborations for solving environmental matters
2.	Nasarawa State Environmental Protection Agency (NASEPA) edict	1997	This provide guidelines for general environmental protection in the state and empowers the agency to implement same.
3.	Nasarawa State Ministry of Land, Housing & Survey Policy on Land Acquisition for Public Use		The Policy empowered the ministry to acquire value and allocate public real property for public projects and gazettes such acquisitions by the State with the Ministry.
4.	Nasarawa State Ministry of Local Government Regulations		This includes: <ul style="list-style-type: none"> • Co-ordinating the activities of Local Government Councils • Resolving local government and communal boundary disputes; • Maintenance of law and order in Local Government

			Areas in collaboration with Law Enforcement Agencies.
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2.2 World Bank Safeguard Policies Triggered by NEWMAP Project

The main objective of the World Bank safeguard policies is to prevent and mitigate undue harms to people and their respective environment in the development processes. Table 2.2 provides the World Bank policies triggered by NEWMAP which area applicable to the project sites in Nasarawa State while table 2.3 shows the gap between national legislations, policies and regulations and the World Bank Policies.

Table 2.2 World Bank Safeguard Policies Triggered by the gully Sites Intervention Projects

Safeguard Policies	Triggered by gully Sites projects		Applicability to project	How Project Address policy Requirement
	Yes	No		
Environmental Assessment (GP/BP 4.01)	[x]	[]	Civil works with impacts; construction of detention ponds and underground rectangular box culverts to reduce the peak flow rates and flooding. It also applies to the acquisition of land and resources for these activities which will lead to economic and potentially physical displacement	ESMF prepared for the NEWMAP and project specified mitigation measures developed in this ESMP.
Physical Cultural Resources (OP/BP 4.11)	[x]	[]	Civil works including excavations, construction of open and underground drainage will most likely not be able to avoid all cultural heritage sites as well as presently unknown sites that can be expected to be found in historical cities like Doma, Lafia, Keffi, Nasarawa and Toto which are very rich in cultural values	ESMF prepared for NEWMAP and mitigation measures developed in this ESMP
Involuntary Resettlement (4.12)	[x]	[]	The proposed activities will take place in residential and farming areas. Therefore, restriction of access to sources of livelihood and demolition of structures are unavoidable.	RPF prepared for NEWMAP and the RAP provided spells out site issues to be addresses and how.

Table 2.3: Gap between National Legislations, Policies and Regulations and the World Bank Policies

Category	Nigerian Law	World Bank OP 4.12	Measures to Filling the Gaps
Minimization of resettlement	No requirement to consider all options of project design in order to minimize the need for resettlement or displacement.	Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs	Design of footprints of project-related activities, will be undertaken so as to minimize resettlement
Information and Consultation	It is lawful to revoke or acquire land by the governor after issuance of notice. No consultation is required	PAPs are required to be meaningfully consulted and participate in the resettlement process	PAPs shall be meaningfully consulted and engaged in the resettlement process.
Timing of Compensation	The law is silent on timing of payment	This requires that compensation implementation must take precedence before construction or displacement	Compensation and resettlement to take place before construction or displacement
Livelihood restoration	Makes no proscription on livelihood restoration measures	it requires that vulnerable PAPs have to be rehabilitated	Livelihood restoration measures will be put in place for vulnerable PAPs
Grievance Process	The land use and allocation committee appointed by the Governor is vested with all disputes/ grievances and compensation matters.	This requires that a grievance redress mechanism be set early constituting the representative of PAPs and, prefers local redress mechanism. The law court is the last resort when available mechanism or outcome is unsatisfactory to PAP	A grievance redress committee (GRC) shall be established early and existing local redress process shall be considered to address issues of project induced grievances. PAPs or their representatives shall be members of the GRC.
Community Land with customary right	Compensation in cash to the community, chief or leader of the community for the benefit for the community	Land for land compensation or any other in-kind compensation agreed to with the community	Land for land compensation or any other in-kind compensation agreed to with the community
Agricultural land	Entitled to alternative agricultural land ¹	Land for land compensation	Land for land compensation
Fallow land	No compensation	Land for land compensation	Land for land compensation
Statutory and customary right Land Owners	Cash compensation equal to the rent paid by the occupier during the year in which the right of occupancy was revoked	Recommends land-for-land compensation or other form of compensation at full replacement cost.	Recommends land-for-land compensation or other form of compensation at full replacement cost.

Land Tenants	They are entitled to compensation based upon the amount of rights they hold upon land.	Are entitled to some form of compensation whatever the legal recognition of their occupancy	Are entitled to some form of compensation whatever the legal recognition of their occupancy.
Squatters	These are not entitled to compensation for land, but are entitled to compensation for crops.	These are to be provided with resettlement assistance in addition to compensation for affected assets; but no compensation for land	Are to be provided resettlement assistance in addition to compensation for affected assets; but no compensation for land.
Owners of “Non-Permanent” Buildings	Cash compensation based on market value of the building (that means depreciation is allowed)	Entitled to in-kind compensation or cash compensation at full replacement cost including labour and relocation expenses, prior to displacement.	Entitled to in-kind compensation or cash compensation at full replacement cost including labour and relocation expenses, prior to displacement.
Owners of “Non-Permanent” Buildings, installations	Resettlement in any other place by way of reasonable alternative accommodation or Cash Compensation based on market value.	Entitled to in-kind compensation or cash compensation at full replacement cost including labour and relocation expenses, prior to displacement.	They are entitled to in-kind compensation or cash compensation at full replacement cost including labour and relocation expenses, prior to displacement.

¹Nigerian Land Use Act 1978, (2004 LFN)

2.2.1 International Conventions and Agreements

Nigeria is a signatory to a number of International Regulations and Convention relating to Environmental Protection. Amongst such conventions and agreement applicable to the NEWMAP and specifically those that might be applicable to the project sites are documented in table 2.4.

Table 2.4: International Conventions, Agreements and Protocols to which Nigeria is Signatory and Applicable to the Nasarawa State NEWMAP in the gully sites

International Conventions agreements and protocols	Applicable to NEWMAP		Applicable to the gully Sites		Applicability to projects	How Project Address issues raised
	Yes	No	Yes	No		
Both the Vienna convention for the protection of the Ozone Layer and the Montreal protocol for Control of Substances that deplete the ozone layer.	[x]	[]	[x]	[]	Civil works will extend to forest area. There will be reduction in tree taxonomy and biomass leading to reduction in carbon sink and release of ODS gases	ESMF prepared for the NEWMAP and project mitigation measures developed in this ESMP. Provision of vegetation measures following construction of the engineering measures.

Basel convention on the prevention of trans-boundary movement of hazardous wastes and their disposal	[x]	[]	[x]	[]	ESMF and ESMP did not identify the use and generation of hazardous wastes in the project sites	NA
Convention on the prevention of the international trade in endangered species (CITES).	[x]	[]	[x]	[]	No endangered species(s) of any kind was identified in the project area.	NA
Convention on Biodiversity	[x]	[]	[x]	[]	Civil works may extend to forest areas. This will disturb biodiversity in the project areas	ESMF prepared for NEWMAP and ESMP mitigations measures developed in this ESMP. Bioremediation measures incorporated into the design of project would handle that
Convention on climate change	[x]	[]	[x]	[]	Proposed activities will results in both systemic and cumulative environmental change thereby contributing to sustained increase in temperature.	ESMP prepared for NEWMAP and site-specific mitigation measures developed in the ESMP. Bioremediation measures incorporated into the design of project.
Convention on desertification	[x]	[]	[x]	[]	Proposed activities may lead to deforestation	Bioremediation measures incorporated into the design
Convention on persistent organic Pollutants	[x]	[]	[x]	[]	No organic pollutant will be used for activities design for the proposed project during its lifecycle.	NA
World Health Organization (WHO) Health and Safety component of EIA 1987	[x]	[]	[x]	[]	Proposed activity may be injurious to man and the environment	ESMF prepared for NEWMAP and mitigation measures developed in this ESMP.

2.3 Institutional Framework

The working mechanism of a NEWMAP project involves many federal and state ministries, department and agencies (MDAs), local governments, communities, and the civil societies. These MDAs include those responsible for planning, economy and finance, works, agriculture, water resources, forests, transport, power, emergency response, as well as those focused on climate and hydrological information or watershed/basin regulation. The investments for gully Sites in Nasarawa State is made through the Nasarawa State NEWMAP. However, the Nasarawa State government has the primary responsibility for land management and land allocations of the project sites.

The lead implementing agency for the NEWMAP is the Federal Ministry of Environment (FMEnv). The Federal Project Management Unit (FPMU) headed by a Federal Coordinator housed by FMEnv is responsible for the overall coordination. The Nasarawa State Project Management Unit (NAS-NEWMAP-SPMU) headed by the State Project Coordinator (PC) and housed by the Nasarawa State Ministry of Environment (NSMEnv) is responsible for the coordination in Nasarawa State. Thus, NSMEnv is directly responsible for coordinating the activities of the gully sites intervention, including the implementation of the ESMP through Nasarawa SPMU. Both the Federal and State levels coordinating units have environmental officers who are responsible for the mainstreaming of environmental issues into the NEWMAP subprojects. The Nasarawa State Environmental Officer is directly responsible for coordinating the implementation of the gully Sites ESMP on behalf of the state project coordinator. At the community levels the gully sites Monitoring Committee and the focal NGOs will effectively participate in ensuring a full compliance during the project implementation, including civil work activities.

CHAPTER THREE

3.0 BIOPHYSICAL ENVIRONMENT

The description of the biophysical environmental conditions of the project areas draw on a number of primary and secondary data sources. Primary data source is from one season field sampling obtained through environmental baseline survey conducted in September 2020. Laboratory analysis of the samples were carried out at the Federal University of Agriculture Makurdi Soil Science Laboratory. The laboratory is accredited by the Nigeria Federal Ministry of Environment and other regulatory bodies. Secondary data sources from literature review and desktop studies such as maps, text books and published works were consulted. Data were also obtained from agencies like NIMET which keep primary data. The biophysical environment baseline information relevant to the proposed intervention project Keffi include

- i) Location
- ii) Relief and Drainage
- iii) Soil and Geology
- iv) Climate
- v) Air Quality
- vi) Hydrology
- vii) Types of vegetation
- viii) Wildlife and Biodiversity

3.1 Location

The proposed interventions sites are located in Keffi Nasarawa State.

Geographically the projects are located in the specific area of the communities shown in table 3.1 below with their coordinates. The coordinates also pinpoint locations of sampling for soil, noise, air quality etc. The length of each gully and associated gully fingers are captured. Map 3.1 shows the specific location of the intervention sites



Map 3.1: Location of intervention sites in Keffi

Table 3.1: Keffi sites

STATE: NASARAWA STATE											
LGA: KEFFI											
	LOCATION	MAIN GULLY				GULLY FINGERS					
		UPPER Summital	MIDDLE Rectilinear	LOWER Foot	DISTANCE (KM)	UPPER	MIDDLE	LOWER	DISTANCE KM	TOTAL DISTANCE (KM)	Depth and Width
2A	Maloni Hill	E 7 52 49.9 N 8 51 00.7	E 7 52 05.9 N 8 51 25.8	E 7 53 20.7 N 8 50 59.9	0.9					0.9	3 x 3 8.1
2B	Dadinkowa(Prison Service)	E 7 52 36.1 N 8 51 36.0	E 7 52 53.1 N 8 51 20.7	E 7 53 03.5 N 8 51 17.7	0.7					0.7	4 x 3 8.4
2C	Behind Emir's Palace	E 7 52 19.5 N 8 50 46.4	E 7 52 28.9 N 8 50 16.3		1.03					1.03	3 x 4 12.36
2D	CRDP/Yelwa	E 7 52 11.8 N 8 50 30.8	E 7 52 28.9 N 8 50 16.2	E 7 52 57.9 N 8 49 54.5	1.23					1.23	3 x 4 14.76
	TOTAL									3.86	

3.2 Relief and Drainage

The location in the community slopes moderately but steeply towards the receptor river Antau. There are clear differences in the topography of the originating locations and the terminating locations of the gullies and allied fingers. The origins being of higher elevations than the terminations. The water empties into River Antau

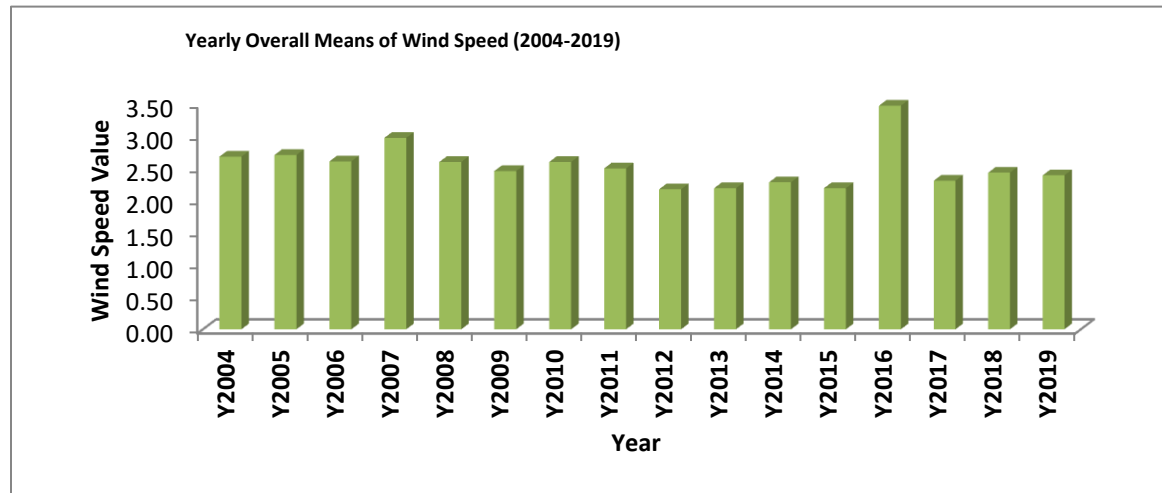
3.3 Climate and Meteorology

Major elements of climate according to Thompson (1975) fluctuate with varying degrees of impacts on natural and human activities. This is not going to be different in the project area. At the microclimate level of rainfall, temperature, relative humidity and wind speed, direction and patterns are expected to influence project activities.

3.3.1 Wind Speed, Pattern and Direction

The 16year period wind characteristics of the project area were extracted form NIMET data who has responsibility of maintaining primary microclimate data for the nation. The data was secured from NIMET office in Lafia and Makurdi which are the closest to the project areas.

The maximum yearly wind speed through the period were predominantly uniform except for 2016 as shown in figure 3.1. the monthly wind speed for the period was also predominantly stable but for January and December as



seen
in
figure
3.2

Figure 3.1 Yearly overall means of wind speed 2004 – 2019 (NIMET)

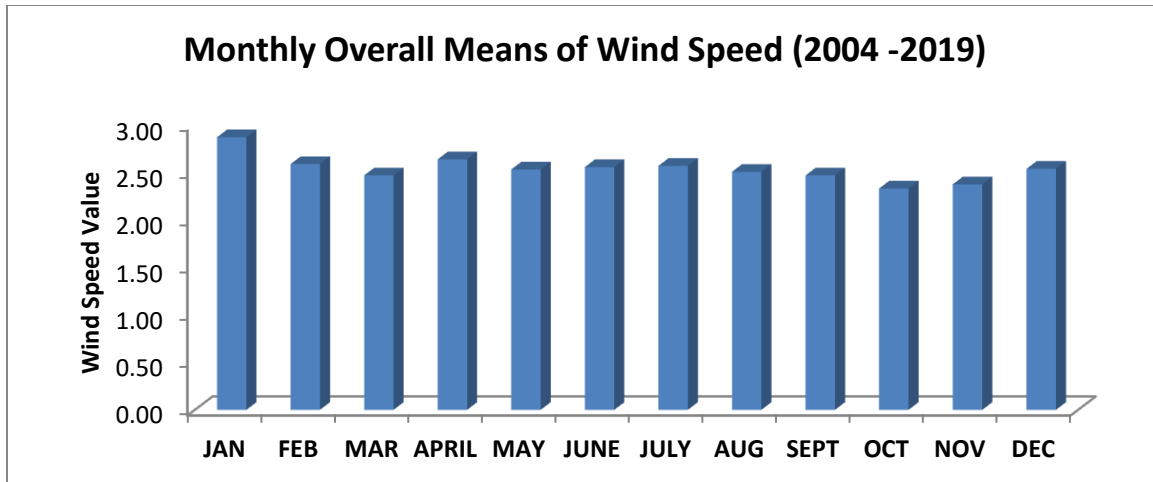


Figure 3.2: Monthly overall means of wind speed 2004 – 2019 (NIMET)

Table 3.2 MONTHLY WIND DIRECTION AND PATTERN 2004-2019

MONTH YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JUL	AUG	SEPT	OCT	NOV	DEC
2004	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2005	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2006	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2007	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2008	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2009	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	^p W, V	V	SW	V	E	V
2010	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2011	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2012	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2013	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2014	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2015	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2016	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2017	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2018	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE
2019	^p NE, ^o SE	NE	^p E, ^v SE-W	V	V	^v S-NW	W	V	SW	V	E	NE

Superscripts: p=predominant, o=occasional, v=variable

Codes: NE=North East; SE=South East; SW=South West; NE=North East; V=Variable; Hyphen (-) = to (NIMET)

The table 3.2 above display the wind patterns and directions within the 16-year period. The pattern and direction appeared predominantly uniform but for 2009 that varied from other years.

3.3.2 Rainfall

The figures 3.3 and 3.4 showed yearly and monthly rainfall within the 16year period of 2004 to 2019 respectively. The years 2019 had the highest rainfall followed closely by 2012, 2009, 2007 and 2006. The years 2004 and 2015 had the least rainfalls. In all the years the months of September, August, June, July, May and October had high rainfall. with the months of December and January having the least. The fall follows a pattern of the normal wet and dry season periods.

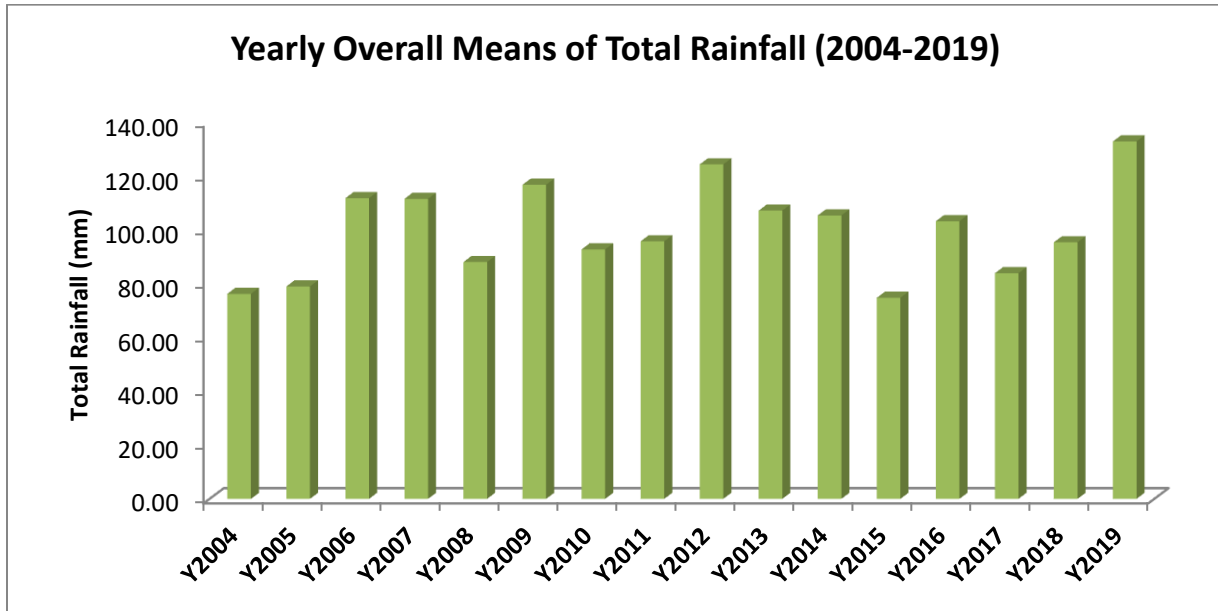


Figure 3.3: Overall yearly mean of total rainfall 2004 – 2019 (NIMET)

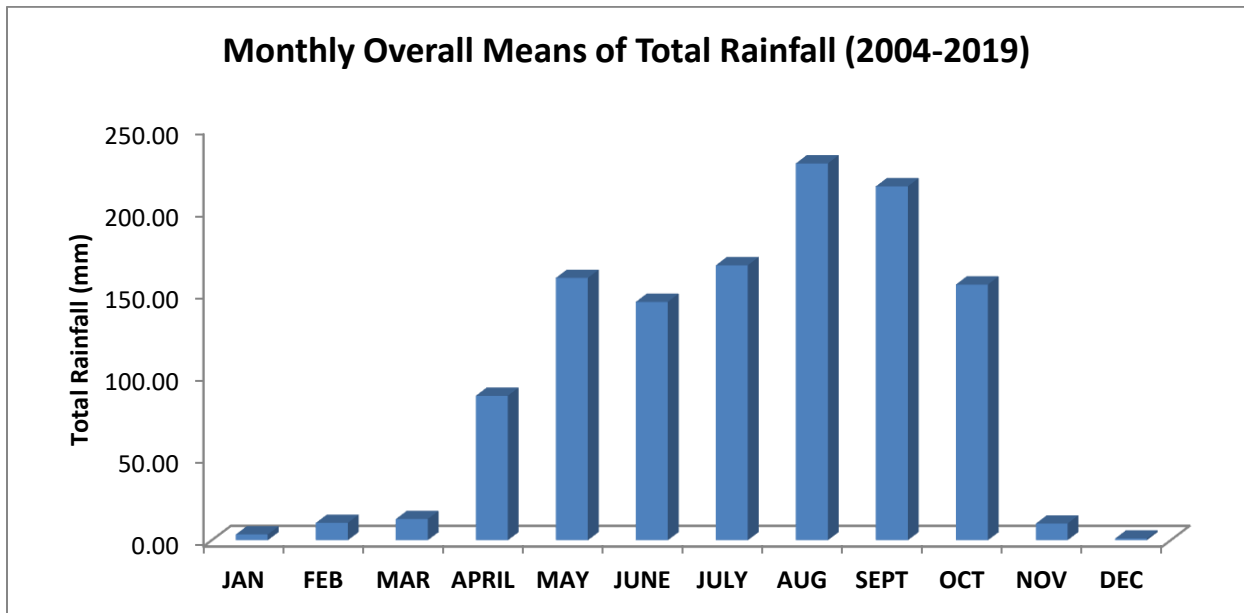


Figure 3.4: Overall monthly mean of total rainfall 2004 – 2019 (NIMET)

3.3.3 Relative Humidity

The figures 3.5 to 3.8 (Tables at appendix) show the yearly and monthly means of relative humidity (high and low) 2004 – 2019. The year 2016 had the highest high relative humidity whereas the year 2007 had the lowest high relative humidity in the 16year period. The month of November for the 16year period had the highest high relative humidity where the lowest high relative humidity amongst the months occurred in December and January of each year. The lowest low relative humidity within the 16year period occurred in 2007 whereas the year 2014 had the highest low relative humidity.

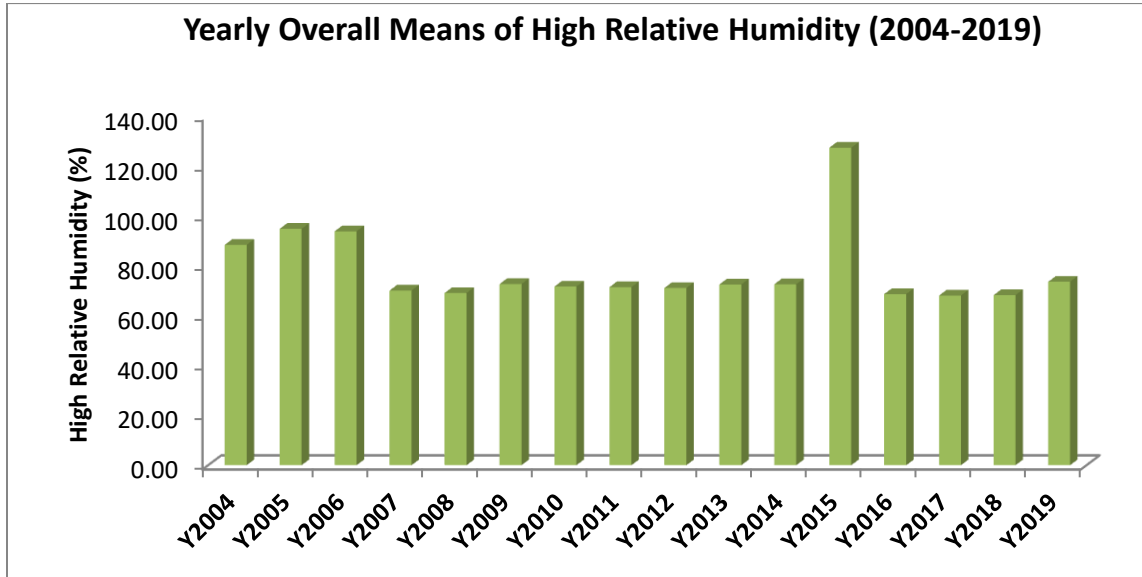


Figure 3.5: Overall yearly mean of high relative humidity 2004 – 2019 (NIMET)

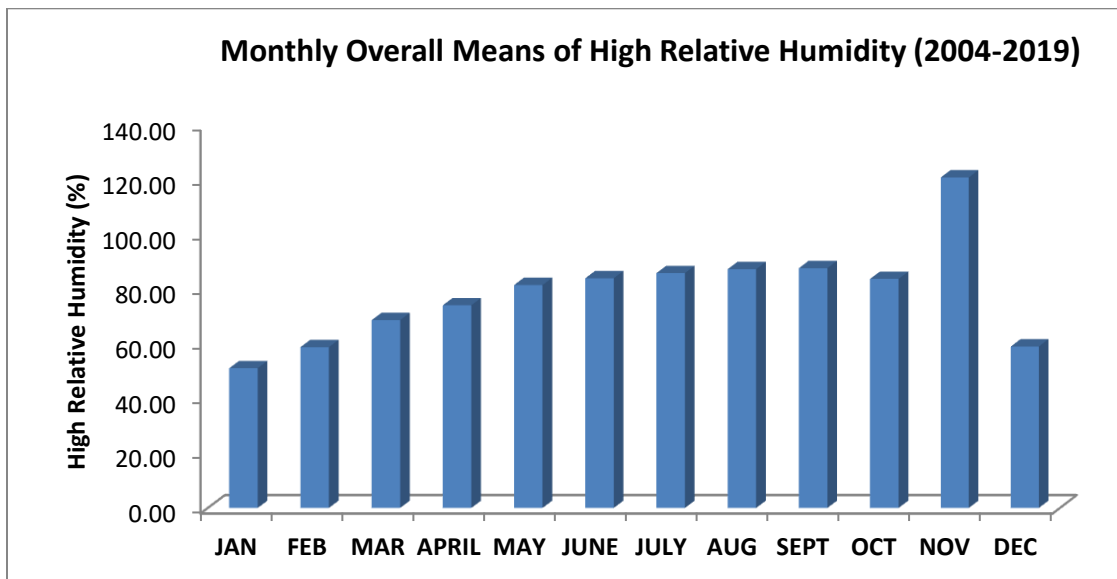


Figure 3.6: Overall monthly mean of high relative humidity 2004 – 2019 (NIMET)

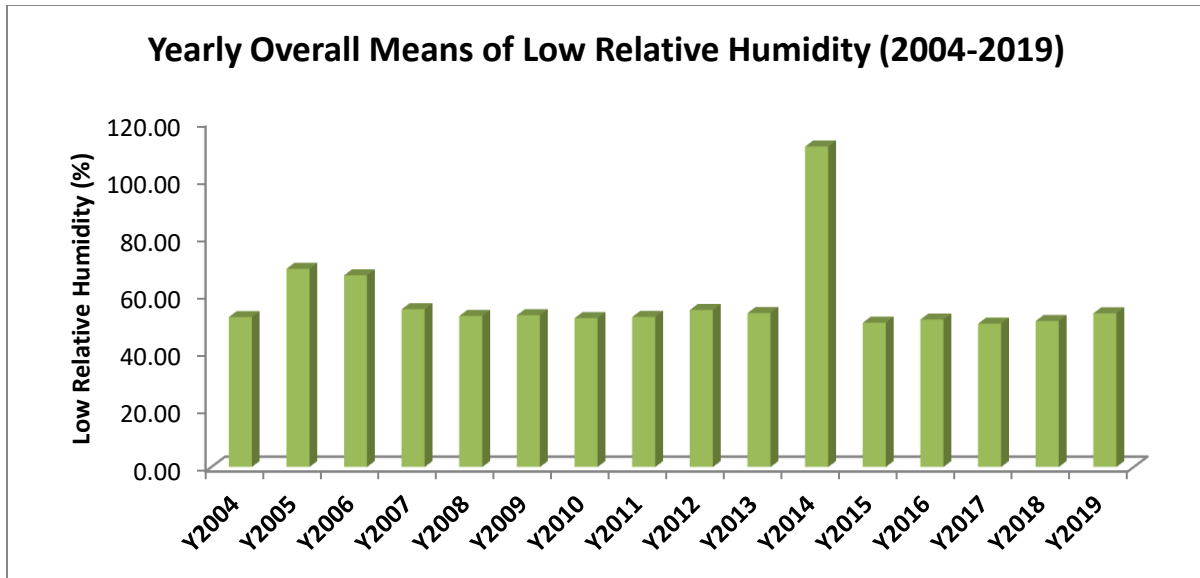


Figure 3.7: Overall yearly mean of low relative humidity 2004 – 2019 (NIMET)

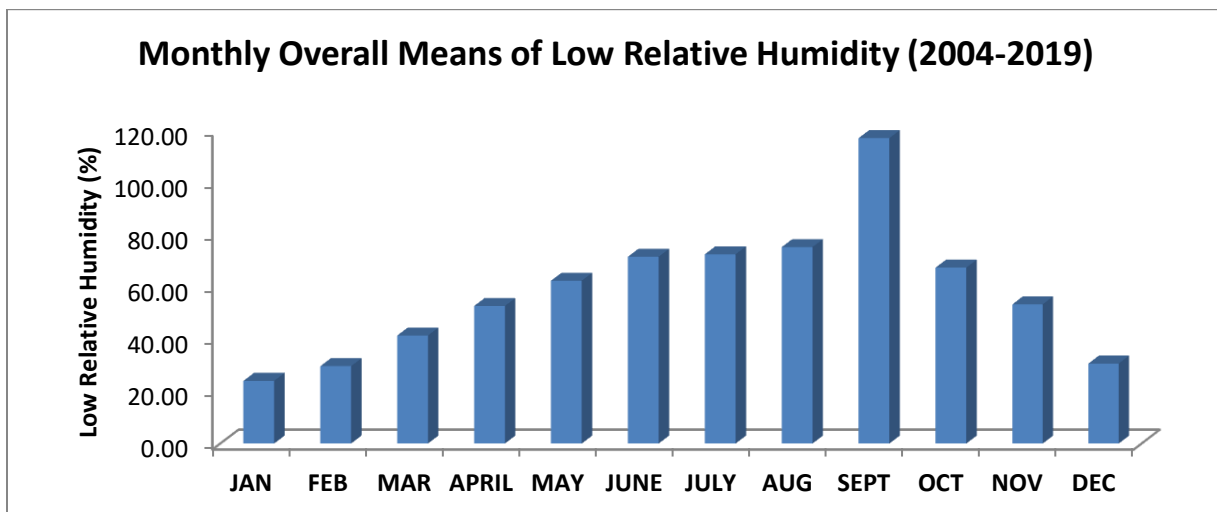


Figure 3.8: Overall monthly mean of low relative humidity 2004 – 2019 (NIMET)

3.3.4 Temperature

The figures 3.9 to 3.12 (Tables at appendix) display the mean yearly and monthly minimum and maximum temperatures of the project area within the 16year period. The yearly overall maximum temperatures as recorded were higher in 2017 followed by 2010 and 2007. The lowest maximum temperatures were recorded in 2012 and 2006. The months February and march had the highest maximum temperatures within the 16year period in the area. The highest minimum temperatures were recorded in the years 2005, 2007 and 2010 whereas the other months had relatively uniform minimum temperatures though March and April had slightly higher minimum temperatures. The years with least minimum temperatures were 2012 and 2014 whereas January and February had the least minimum temperatures within the period.

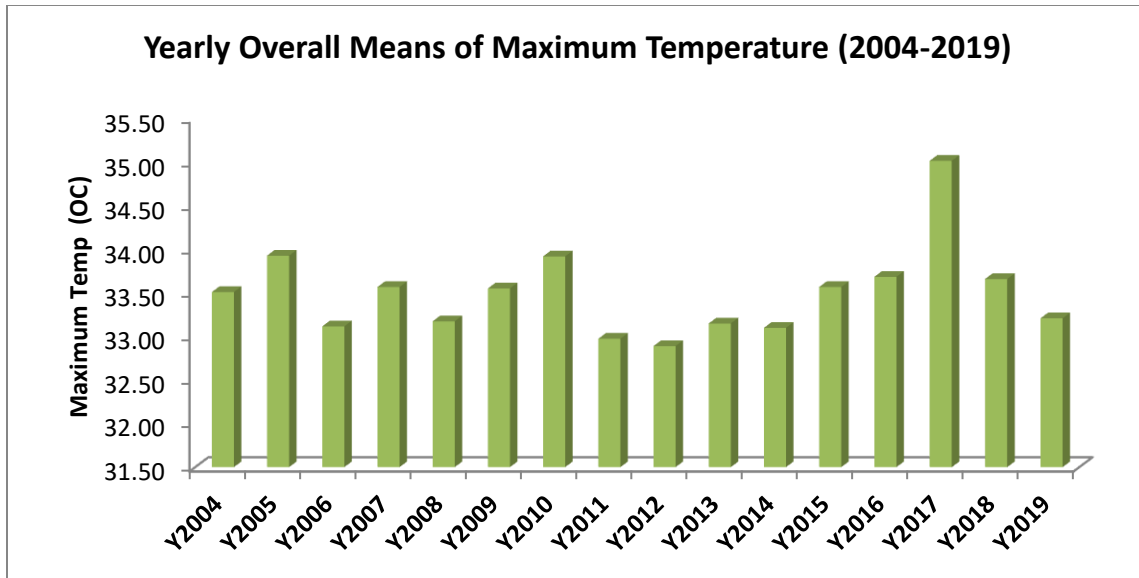


Figure 3.9: Overall monthly mean of maximum temperature 2004 – 2019 (NIMET)

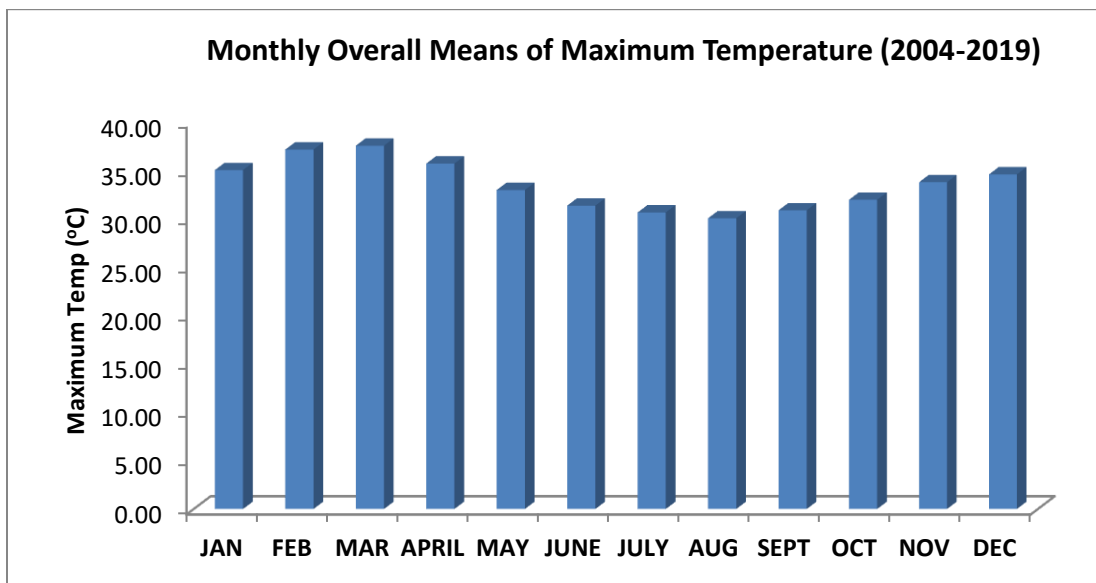


Figure 3.10: Overall monthly mean of maximum temperature 2004 -2019 (NIMET)

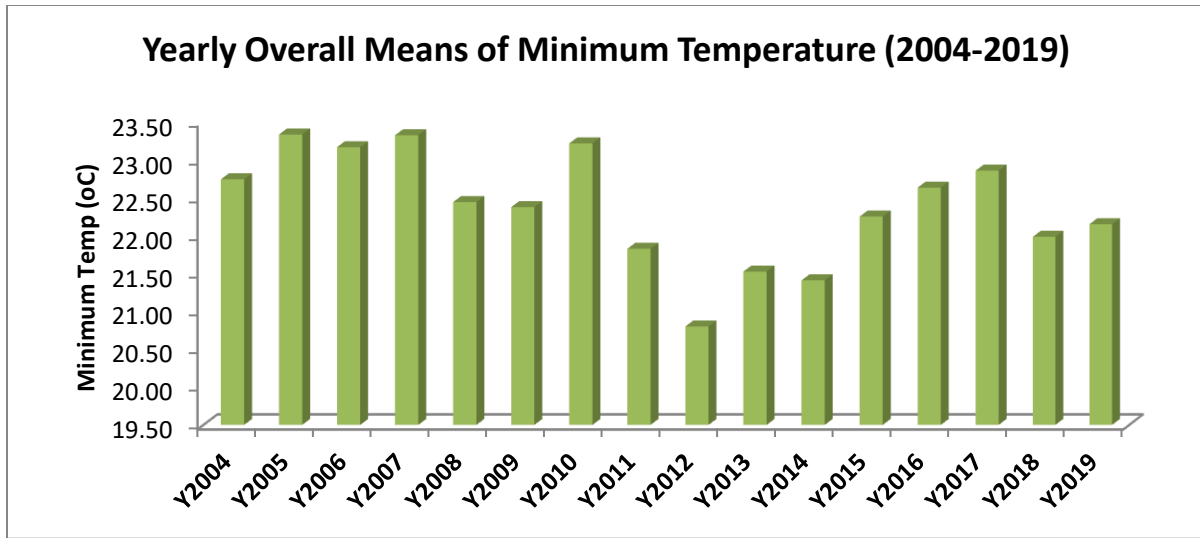


Figure 3.11: Overall yearly mean of minimum temperature 2004 – 2019 (NIMET)

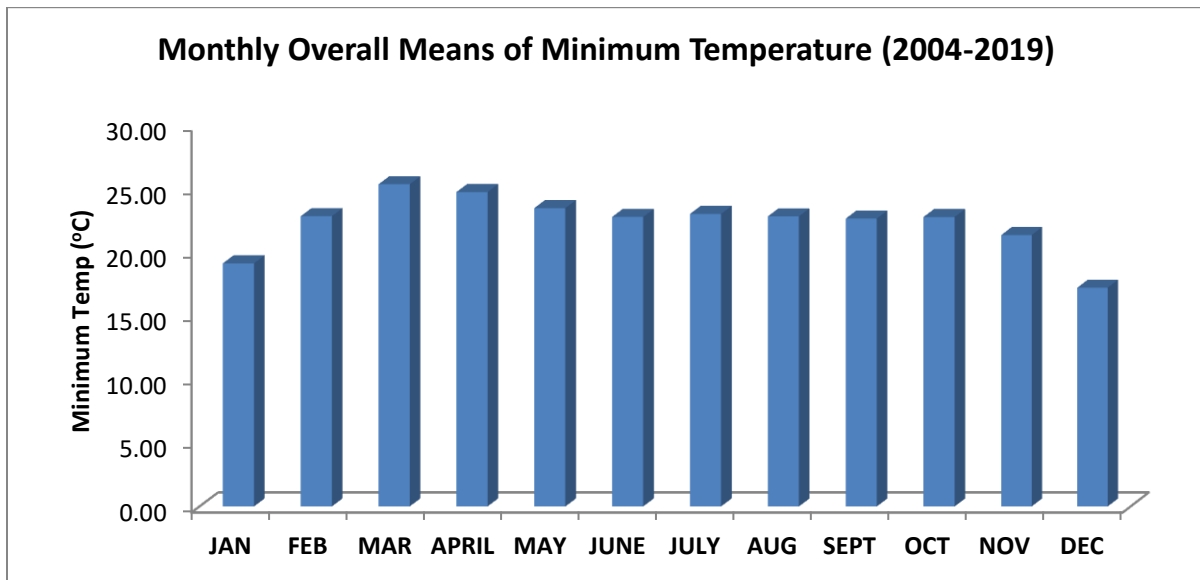


Figure 3.12: Overall Monthly mean of minimum temperature 2004 – 2019 (NIMET)

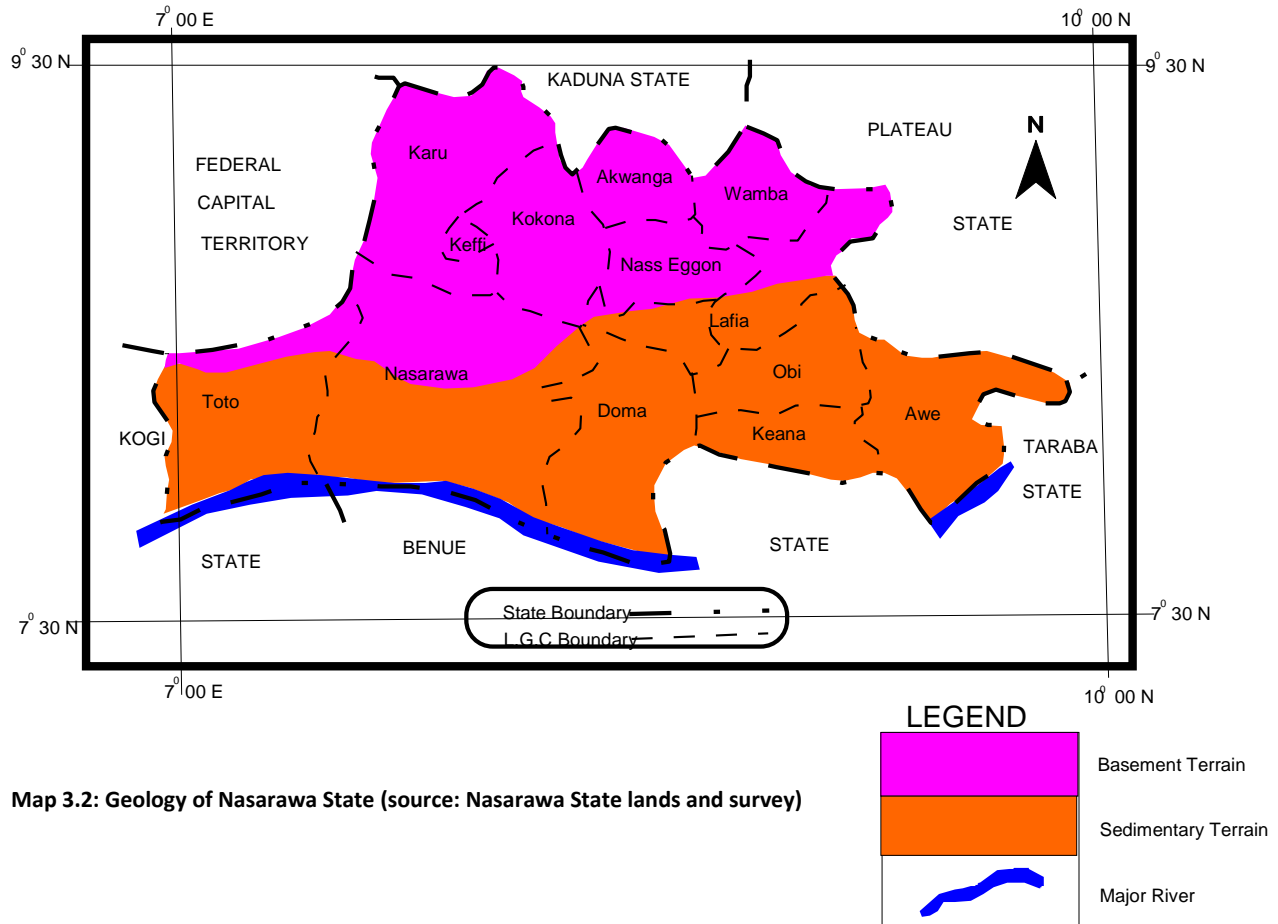
3.4 Geology

As in Geology of Nigeria, Geology of Nasarawa State also comprises of Basement and sedimentary rocks. The Basement rocks cover about 60% of the superficial area of the state while the remaining 40% is made up of sedimentary rocks of the Middle Benue Trough. The Basement complex is comprised essentially of rocks of Precambrian to Cambrian age. The rocks include Older and Younger Granite of different description, and some Meta sediments and some minor intrusive. (Obaje, et al., 2006).

The general succession in the Basement Complex rocks of Nigeria starts with the Older meta-sediments generally thought to be Precambrian in age. The sequence was followed by the Older Granites which comprises migmatite and gneisses quartzite and silicified rocks. This is followed by Younger meta-sediments and the Younger Granite of Jurassic age. The Basement Complex rocks occupy nearly half of Nasarawa State, being confined to the northern part of the state (Map 3.1) and covering areas of Nasarawa, Keffi, and Akwanga Local Government areas. Isolated

outcrops of the meta-sediments are found in Keffi, Kudu-Aquaa and Isawa areas (Offodile, 2002; Obaje et al., 2006)

The Basement Complex rocks at southern part of the state are overlain by marine and terrestrial and transitional marine terrestrial sedimentary formations. These formations include the Asu River Group (Middle Albian), Early Cenomanian Awe formation, Keana formation and Ezeaku formations, the Turanian and Maastrichtian Agwu and Lafia formations respectively. (Offodile, 1976, 2002). There are some volcanic intrusives dotting the area.



Map 3.2: Geology of Nasarawa State (source: Nasarawa State lands and survey)

3.5 Soil studies

The table 3.1 indicates the coordinates of the soil sampling points. The figures indicating the locations on map are in appendix. Soil sampling was carried out at the beginning and end of the gully. Where the gully is more than a kilometre long a third sampling was done at the centre of the gully. All were composited to form a sample for analysis. The samples were collected at the depth 0-30cm. Samples were collected also based on guidelines that are critical for civil works and bioremediation. Graduated auger was used for the sampling and preserved in line with standard practices mainly to avoid loss of measureable physical and chemical properties. The samples were properly labelled and tracking numbers assigned to them written with permanent marker which are also recorded in field log book for samples. The samples were taken to and analysed at the department of Soil Science Laboratory, Federal University of Agriculture Makurdi. The Laboratory is accredited by federal Ministry of Environment. The results of the soil analysis from the various communities and sites are displayed in tables 3.3

Table 3.3: Analysis of Soil at Keffi Project Sites

S/No	PARAMETERS	P ^H	EC	Cl	Total	Sulphate	Phosphate	Nitrate	THC	Na	K	Ca	Mg	Fe	Zn	Cu	Cd	Pb	Cr	Ni	Ba
	LOCATIONS	(TEMP °C)	US/cm	Mg/kg	Nitrogen Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg	Mg/kg
1	Maloni Hills	6.4 (27.2)	0.55	211	1.004	410	45.60	318	ND	160.0	0.98	1.23	0.55	1.04	0.54	0.55	ND	ND	ND	ND	ND
2	Dadin-Kowa (Behind Prison)	5.9 (26.8)	0.84	154	0.958	508	49.20	388	ND	170.2	1.10	4.50	0.35	1.00	0.78	0.48	ND	ND	ND	ND	ND
3	Behind Emirs Palace	6.6 (28.5)	0.49	143	0.894	478	54.00	310	ND	169.0	0.88	1.44	0.64	1.43	0.24	0.62	ND	ND	ND	ND	ND
4	CRDP/YELWA	6.3 (25.8)	0.64	135	0.946	491	39.62	332	ND	140.8	0.94	1.65	0.57	1.81	0.58	0.12	ND	ND	ND	ND	ND
5	FME _{Env} Limits	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	140	36	0.8	85	100	35	NS

NS=Not State; ND= Not Detected (Field work September 2020)

The pH of the soils sampled in the various project area is between 5.9 – 6.6 that is were all below 7.0 but not lower than 5.0. This is an indication of slight acidic condition. The baseline heavy metal contents were within limits. Nickel, Barium, Lead, Cadmium were below detectable limits. All fall within regulatory limits.

3.6: Water studies (Hydrogeology of Nasarawa state)

Nasarawa state and most areas of the Benue Valley, have difficult hydrogeological situations; these conditions arise from the fact that most of the potential aquifers are either limited in extent, thinly developed with consistent clay and shale interbeddings or even so highly indurated that only the development of secondary voids created by fractures, joints and solution channels can attract hydrogeological interest (Offodile, 2002).

The occurrence of groundwater in the sedimentary rocks of Nasarawa State showed that groundwater occurs in the rocks within the following formations:

- i) The Aquifer of Awe Formation
- ii) The Aquifer of Makurdi / Keana and Ezeaku Formations.
- iii) The Aquifer of Awgu Formation and
- iv) The Aquifer of Lafia Formation

The hydrogeology and water bearing potential of the Basement Complex rocks in Nasarawa state varies from place to place. It is dependent on secondary porosity created as a result of fracturing of the basement rocks and weathering of regolith. Table 3.4 display means of various parameter from the proposed project area.

3.6.1 Surface Water

The hydrological network of the area under investigation follows the natural drainage system where runoffs flow towards the rivers or floodplains.

The concentrations of the parameters of surface water (River Antau) in the project areas were measured against the permissible limits of Federal Ministry of Environment for aquatic life. Some unstable parameters like P^H, DO, TDS, Salinity, Temperature, Electrical conductivity etc. were measured in-situ while the rest parameters were analysed at Federal University of Agriculture Makurdi Soil Science Laboratory accredited by the Federal Ministry of Environment. Table 3.4 display the location coordinates of the sampling points and detailed analysis results of the water samples from the receptor rivers.

Table 3.4: Physico-chemical and Microbiological Analysis surface water Samples from the project areas

Sample parameter	FMEne	Keffi
Location		River Antau
Coordinates	Regulatory provision Limits	N08°51' 581" E007°53'098"
PHYSICAL TEST		
Appearance (insitu)	Colourless and clear	Not clear
Colour (Peco Apha)	unobjectionable	410
pH	6.5-9.5	6.9
Temperature (°C)	NS	31.8
Electrical Conductivity (µs/cm)	NS	0.06
Odour		Odourless
Total Suspended Solid (TSS) (mg/L)	ND	21
TDS (mg/L)	1000	30

Turbidity (Fau)	NS	41
Salinity	NS	29
CHEMICAL TEST		
Total Chlorine (mg/L)	250.00	0.60
Nitrate (mg/L)	NS	9.1
Zinc (mg/L)	3.00	0.10
Iron (mg/L)	0.03	0.00
Calcium (mg/L)	300.00	19.20
Copper (mg/L)	2.00	0.00
Sulphate (mg/L)	100.00	14
Phosphate (mg/L)		1.60
Magnesium (mg/L)	200.00	8.90
HEAVY METALS		
Sodium (mg/L)		0.00
Cadmium (mg/L)	0.003	0.008
Lead (mg/L)	0.01	0.00
Chromium (mg/L)	0.05	0.16
Cyanide (mg/L)		ND
ORGANICS		
BOD @ 20°C (mg/L)		10.2
COD (mg/L)		5
DO(mg/L)		9
Phenol (mg/L)		ND
Oil and Grease (mg/L)		Nil
THC (mg/L)		ND
MICROBIOLOGICAL TEST		
Total Bacterial Plate Count (cfu/ml)		12
Total Coliform (cfu/ml)	1	8 <i>Strep.faecalis</i>

ND = Not detected NS = Not Stated (Field work September 2020)

The parameter of surface water samples collected from the project areas as displayed on table 3.10 above were compared with set national limits by federal ministry of environment. All results were below set limits,

3.6.2 Underground Water

Table 3.5: Mean of Physico-chemical and Microbiological Analysis underground water Samples from the project areas

Sample parameter	FME _{envi}	Keffi
Location		Underground water
Coordinates	Regulatory provision Limits	N08°50' 274" E007°52'130"
PHYSICAL TEST		
Appearance (insitu)	Colourless and clear	Not clear
Colour (Peco Apha)		310
Ph	6.5-9.5	5.6
Temperature (°C)		31.8
Electrical Conductivity (µs/cm)	NS	0.06
Odour		Odourless
Total Suspended Solid (TSS) (mg/L)	NS	20
TDS (mg/L)	1000	30
Turbidity (Fau)	NS	34
Salinity	NS	48
CHEMICAL TEST		
Total Chlorine (mg/L)	250.00	1.61
Nitrate (mg/L)	NS	4.5
Zinc (mg/L)	3.00	0.10
Iron (mg/L)	0.03	0.00
Calcium (mg/L)	300.00	10.30
Copper (mg/L)	2.00	0.00
Sulphate (mg/L)	100.00	1.40
Phosphate (mg/L)	NS	1.30
Magnesium (mg/L)	200.00	9.80
HEAVY METALS		
Sodium (mg/L)		0.00
Cadmium (mg/L)	0.003	0.000
ORGANICS		
BOD @ 20°C (mg/L)		11.2
COD (mg/L)		4
DO(mg/L)		24
Phenol (mg/L)		ND
Oil and Grease (mg/L)		ND
THC (mg/L)		ND
MICROBIOLOGICAL TEST		
Total Bacterial Plate Count (cfu/ml)		11
Total Coliform (cfu/ml)	1	-

ND = Not detected NS = Not Stated (Field work September 2020)

The table 3.5 above display results obtained from analysis of underground water from project area. The results have been placed side by side with set limits for each parameter by federal ministry of environment. The pH is 5.6, this is outside the set limit for pH for domestic usage. The levels of other parameters fall within regulatory limits including heavy metals except for chlorine level which fell short of required level.

3.7 Air Quality

Hand held air quality monitoring equipment (E600 portable multi gas detector – Exia II CT3 Ga, Henanhanwei), MSA multiple gas detector and gasman monitors were used for measuring air quality at the areas indicated below. Eight readings were taken for each sampling location and the average was determined. Air quality stations were established within the defined radius. The gas detectors were usually held in the direction of prevailing wind at a height of about two meters. Readings were taken at stability

An Environmental devices cooperation USA Haz-Dust equipment was used to monitor aerosol range suspended particulate matter. This ambient particulate matter monitor records “real time” information on particulate concentration. This portable particulate monitor with alarm alerts user of hazardous particulates. It groups particulate information size range and present result in mass concentration. The sampling stations with the coordinates are displayed on the tables3.1 while the maps are in the appendix section. The results of air quality assessment are displayed in tables 3.6

Table 3.6 Mean values of the various gases in the keffi project sites

s/no	Name of Location	H ₂ S Ppm	SO ₂ ppm	CO ₂ ppm	CO ppm	NO ppm	NO ₂	NH ₃	FI	O ₂ %	THC
1	Maloni Hills	ND	ND	ND	ND	ND	ND	ND	000	19.6	ND
2	Dadin-kowa (Behind Prison)	ND	ND	0.2	ND	ND	ND	ND	000	19.6	ND
3	Behind Emir’s Palace	ND	ND	0.3	ND	ND	ND	ND	000	19.5	ND
4	CRDP/Yelwa	ND	ND	0.2	ND	ND	ND	ND	000	19.6	ND

Field work September 2020

FMEnv provides the following upper limits – NO₂ ppm – 0.04 – 0.06ppm, CO – 10ppm; THC – 10ppm, etc. From the air quality assessment and gases in the proposed project area as displayed table 3.6, none of the gases was up to the FMEnv recommended maximum. The oxygen level is above 19.5% level recommended the occupational organisation in all the project areas

3.8 Noise level Assessment

Ambient noise level measurements were taken with pre-calibrated digital sound level meter CE ΔA28928. The sound level measurements were displayed on meters LCD screen in decibels (dB(A)). The range 30 – 130 dB(A). Noise levels were monitored at the stations displayed on table 3.1 with their coordinates. The maps of the locations are displayed in the appendix. The mean noise levels ranged from 55 to 61. This is below the regulatory limit of 90d(BA) for 8-hour work period for projects this nature. Tables 3.7 display the mean noise levels at the various project areas. CRDP (YELWA) has the lowest mean noise levels

Table 3.7. Mean noise levels at the various project sites in keffi

SNo	Name of area	Mean noise level (dBA)	Regulatory Noise Limit (dBA)
1	Maloni Hills	61	90
2	Dadin-Kowa (Behind Prison)	60	-Do-
3	Behind Emir’s Palace	58	-Do-
4	CRDP (YELWA)	55	-Do-

Field work September 2020

3.9 Vegetation Studies

The main characteristics of the vegetation of the study area is secondary forest resulting from long years of agricultural activities which involved clearing of primary forest for cultivation of available crops and other anthropogenic activities like exploitation of other forest resources such as fuel wood and timber. There were also observed deliberate efforts to plant some trees that could help reduce soil degradation as a result of erosion. Some of the areas like Lafia is nearly completely built up. The behind emir’s palace and prison in Keffi are built areas with no original vegetation covers but deliberately planted economic and sociocultural trees.

3.9.1 Secondary Forest.

This vegetation type is the remnant of the original forest, which has been disturbed by anthropogenic activities like farming, bush clearing/burning, logging but has been left to regenerate. Though the vegetation type is only a small portion within the proposed project areas it still supports plant species like *Alchornea cordifolia*, *Hura crepitans*, *Combretum spp.*, *Albizia spp.*, *Terminalia spp.*, *Adansonia digitate*, *Ageratum conyzoides*, *Aspilia africana*, *Donania spp.*, *Daniela oliveri*. UNESCO (1996) indicated that often times when forest areas are cleared for agricultural purposes remnant indicator plants are still present within the area. The identification of species was carried out in situ and ex situ. Representatives of plant species were taken from the various sites, treated and prepared as herbarium specimens and preserved at the Department of Botany Federal University of Agriculture Makurdi Herbarium. This is for future reference as it would serve as records of vegetation composition of the various locations

3.9.2 Arable Crop Farms

Arable crops are a distinct vegetation type within the proposed project areas. These crop plants are cultivated at a very small scale and subsistence level. Crop plants within the proposed project areas included *Zea mays*, *Capsicum frutescens*, *Sesamum indicum*, *Solanum spp.*, *Manihot esculentum.*, *Oryza spp.*, *Capsicum annum*, *Ipomea spp.*

3.9.3 Fallow Land Vegetation

This describes land areas that have not been cultivated for one or more cropping seasons. These abound within some of the transects and outside the transect area. The rapid assessment method was use to evaluate fallow land vegetation type.

3.9.4 The Aquatic Macrophyte

Aquatic plants are observed in the study areas because of the presence of River Antau in Keffi into which the various gullies and fingers drain their content. Some species such as *Ipomea aquatica.*, *Dryopteris sp.* are rooted at the Bank of the Rivers. Other species are free floating, examples are *Nymphaea lotus*, *Azolla pinnata* *Pistia spp.*, *Cytosperma spp.*

3.9.5 Floristic Composition of the project Areas.

The project areas are rich in species because of the favourable climatic condition which favours agricultural practices and other development activities. These agricultural practices and other anthropogenic activities have altered part of the original vegetation and resulted in introduction of several other species. The dynamic species composition of the fallows observed is aided by surrounding vegetation where wind-borne seeds come to colonise the fallows. Table 3.8 shows the diversity of species and their occurrence in the various project areas. The floristic

arranges the plant species as grasses/sedges, herbs, shrubs and trees. X is used denote presence of a species in an area. Nasarawa State has a relatively uniform vegetation cover across the project areas.

Table 3.8 Species composition in the various project areas

S/no	Taxon	Keffi
<i>Grasses/Sedges</i>		
1	<i>Andropogon gayanus</i>	X
2	<i>Brachia spp</i>	X
3	<i>Brachiaria deflexa</i>	X
4	<i>Chloris gayana</i>	X
5	<i>Cyperus dilatatus</i>	X
6	<i>Dactyloctenium aegyptium</i>	X
7	<i>Echinochloa colonum</i>	X
8	<i>Eleusine indica</i>	X
9	<i>Eragostis tremala</i>	X
10	<i>Hach loris gramuralis</i>	X
11	<i>Hyperrhemia rufa</i>	X
12	<i>Hypethelia dissolute</i>	X
13	<i>Maricus alternifolius</i>	X
14	<i>Oryza sativa</i>	X
15	<i>Panicum maximum</i>	X
16	<i>Paspalum orbiculare</i>	
17	<i>Paspalum conjugatum</i>	X
18	<i>Pennisetum typhoides</i>	X
19	<i>Rohboellia cochincinesis</i>	X
20	<i>Setaria pallidefusca</i>	X
21	<i>Sorgum bicolour</i>	X
22	<i>Sporobulus pyramidalis</i>	X
23	<i>Sorgum aetuanis</i>	X
24	<i>Zea mays</i>	
HERBS.		
25	<i>Abrus precatorius</i>	X
26	<i>Abelmoscus esculentus</i>	X
27	<i>Anchosmonos difformis</i>	
28	<i>Amorphalus sp</i>	X

29	<i>Aspilia Africana</i>	X
30	<i>Arachis hypogea</i>	
31	<i>Borreria radiate</i>	X
32	<i>Borreria ocymoides</i>	X
33	<i>Calopogonium mucunoided</i>	
34	<i>Cassia erecta</i>	X
35	<i>Cissus ibuensis</i>	
36	<i>Cissus curculata</i>	X
37	<i>Cleome ciliate</i>	
38	<i>Commelina benghalense</i>	
39	<i>Cochorus aestuans</i>	X
40	<i>Cochorus filiasus</i>	X
41	<i>Cochorus trideus</i>	X
42	<i>Crimon ornatum</i>	X
43	<i>Desmodium spp.</i>	X
44	<i>Desmodium velutinum</i>	X
45	<i>Dioscorea buchifera</i>	
46	<i>Hibiscus suratensis</i>	X
47	<i>Hyptis suaveolens</i>	
48	<i>Indogofera pulchra</i>	X
49	<i>Ipomea aguatica</i>	X
50	<i>Lippia spp.</i>	X
51	<i>Luffa cylindrical</i>	X
52	<i>Momordica charantia</i>	X
53	<i>Pyllantus amarus</i>	X
54	<i>Physallis angulate</i>	
55	<i>Sanserveira liberica</i>	
56	<i>Senna nigricans</i>	X
57	<i>Senna rotundifolia</i>	X
58	<i>Sesamum indicum</i>	
59	<i>Sida rhombifolia</i>	X
60	<i>Sida corymbosa</i>	
61	<i>Striga hermontica</i>	X
62	<i>Stylosanthes lamata</i>	X

63	<i>Tacca involucrate</i>	
64	<i>Tridax procumbens</i>	X
65	<i>Urena lobeta</i>	X
SHRUBS		
66	<i>Annona senegalensis</i>	
67	<i>Bryocarpus coccineus</i>	
68	<i>Celophalus virosa</i>	X
69	<i>Chromolaena odorata</i>	X
70	<i>Cochlospermum tinctorium</i>	X
71	<i>Combretum elliotia</i>	X
72	<i>Combretum molte</i>	
73	<i>Ficus spp.</i>	
74	<i>Flugia virosa</i>	
75	<i>Gardenia aqualla</i>	X
76	<i>Gardenia equisitifolia</i>	X
77	<i>Grewia mottis</i>	X
78	<i>Hymenocardia acida</i>	X
79	<i>Lannea kertingii</i>	X
80	<i>Manihot esculenta</i>	X
81	<i>Mimosa pigra</i>	X
82	<i>Mimosa pudica</i>	X
83	<i>Mitrogyna inermis</i>	X
84	<i>Neuboldia laevis</i>	X
85	<i>Nuclear latifolius</i>	X
86	<i>Parinati curatellifolia</i>	
87	<i>Monostegia kerstingii</i>	X
88	<i>Pericopsis latifolis</i>	X
89	<i>Pitiosigma thormingii</i>	X
90	<i>Sarcocephalus latifolius</i>	X
91	<i>Securinega virosa</i>	X
92	<i>Sesbania sesban</i>	X
93	<i>Strychnos spinose</i>	X
94	<i>Terminalia avicenoides</i>	X
95	<i>Terminalia glaucuscencus</i>	X

96	<i>Trichillia spp</i>	X
97	<i>Trema orientalis</i>	X
TREES		
98	<i>Acacia spp</i>	X
99	<i>Azadiracta indica</i>	X
100	<i>Borassus aegyptiacum</i>	X
101	<i>Cocos nucifera</i>	X
102	<i>Daniella oliveri</i>	
103	<i>Diospyros mesipliformis</i>	
104	<i>Elacis guinensis</i>	X
105	<i>Erythophylum suaveolens</i>	X
106	<i>Ficus thorningii</i>	X
107	<i>Ficus iteophylla</i>	X
108	<i>Ficus umbrellata</i>	
109	<i>Hura crepitans</i>	
110	<i>Irvingia smithii</i>	X
111	<i>Lannea schimperiana</i>	X
112	<i>Mangifera indica</i>	X
113	<i>Parkia biglobosa</i>	X
114	<i>Pericopsis laxiflora</i>	X
115	<i>Prosopis Africana</i>	X
116	<i>Pterocarpus erinaceus</i>	X
117	<i>Spondias mombin</i>	X
118	<i>Sterculia setigera</i>	X
119	<i>Stereospermum kunthiamum</i>	X
120	<i>Vitellaria paradoxa</i>	X
121	<i>Vitex donania</i>	X
122	<i>Vitex simplisifolia</i>	X
123	<i>Uvaria picta</i>	X

X = presence in the area under investigation. Field work September 2020



Plate 3.9.5.1 Vegetation cover Keffi

3.10 Fauna/Wildlife studies

The main amphibians documented in the area are the West African toads (*Buffo. spp*) and various species of frogs. Because of the swampy nature of some of the corridors especially behind the Nigeria Corrections (Prison) and the CRDP Keffi gully areas they are good breeding grounds for the frogs. The extent of the devastation caused by the erosion at Maloni intervention corridor made the habitation of the gullies by dangerous snakes possible. It was reported that the snakes capture their domestic animals like goats and chickens that stray into the gullies.

The macro benthic fauna is composed primarily of molluscs mainly Gastropoda such as *Archatina sp.* (African giant land snail) and *Limocolaria spp.* (Garden snail).

The annelids and Arachnids are also relatively abundant in the areas. A good number of the reptilia species were observed in the project corridor. E.g. *Gekko spp.*, *Lacertillia spp.* *Viperidae spp.* etc.

The cattle Egrets (*Egretta garzetta*) are the dominant Aves in the area. Fish samples which were collected at fishermen berthing points and oral interviews at the major markets in the areas amongst women that deal in fresh fish were used to determine the types of fish found in the area. Table 3.9 below display Fauna and wildlife in the project area. The state of Nasarawa has a relatively uniform fauna habitation

Table 3.9 Terrestrial Fauna Species encountered in the project areas

s/no	Major taxa/spp	Common Names	Keffi
A	MYRIAPODA		
1	Diploda	Millipedes	X
B	ARACHNIDA		
1	Araneae	Spiders	X

C			
INSECTA (INSECTS)			
1	Coleoptera	Beetles	X
2	Bombyliidae	Boefly	X
3	Mantidae (<i>Sphodromantis</i> sp)	Praying mantis	X
4	Diptera	Flies	X
5	Carabidae <i>Anthia</i> sp	Ground beetles	X
6	Glossinidae; <i>Glossina</i> sp	Tsetse fly	X
7	Lepidoptera	Butterflies & Moths	X
8	Apidae: <i>Apis</i> sp	Bees	X
9	Acrididae	Grasshopper	X
10	Formicidae: <i>Formica</i> ; <i>Oecophylla</i>	Ants	X
11	Gryllotalpidae: <i>Gryllotalpa africana</i>	Mole-cricket	X
13	Hemiptera	Bugs	X
14	Sarcophagidae	Flash fly	X
D			
MOLLUSCA: GASTROPODA			
1	Achatinidae: <i>Archachatina marginata</i>	Giant Snail	X
2	<i>Limicolaria flammea</i>	Garden Snail	X
E			
AMPHIBIA			
1	Bufo: <i>Bufo regularis</i>	Toads	X
2	<i>H. picturatus</i>	Tree frog	X
3	Xenopustropicalis	Clawed frog	X

F	REPTILIA		
1	Varanidae: <i>Varanus niloticus</i>	Monitor Lizard	X
G	AVES		
1	<i>Egretta garzetta</i>	Cattle Egret	X
2	<i>Columba guinea</i>	Dove	X
3	Turturafer	Dove	X
4	Apodidae: <i>Apusaffris</i>	Little Swift	X
5	<i>Anthreptes collaris</i>	Sunbird	X
6	Nectariniidae: <i>Nectarinia olivacea</i>	Sunbird	X
H	MAMMALIA		
1	Sciuridae: <i>Nerus erythropus</i> <i>Protoxerus sp</i>	Squirrels	X
2	Thryonomyidae: <i>Thryonomys swinderrianus</i>	Grass cutter	X
3	<i>Ratus ratus</i>	Common rat	X
4	<i>Ratus morio</i>	Bush rat	X
5	<i>Epomops frangueti</i>	Fruit bat	X
6	<i>Heliosciuru spunctatus</i>	Sun squirrel	X

X= Denotes presence in the area. Field work September 2020

3.11 Protected Areas

There were no protected areas encountered or natural forest around any of the project sites that could affect any development

CHAPTER FOUR

SOCIOECONOMIC CHARACTERISTICS AND PUBLIC CONSULTATION

4.0 Public Consultation

Public consultation is the process by which the concerns of local affected persons and others who have plausible stake in the environmental impact of a project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. The consultations were done amongst community leaders, women groups and other vulnerable people, youth leaders and religious leaders

4.1 Socio-Economic Assessment Methodology

The socio-economic assessments of the projects were carried out through the administration of structured questionnaires for households, Focus Group Discussion (FGD) for stakeholders and in-depth interviews. The following approaches were used to acquire the socio-economic data. These include:

- Review of secondary data;
- Reconnaissance survey to identify all communities that will be directly or indirectly affected and to alert the communities' leaders and residents on the proposed project;
- In-depth interviews with community leaders of the identified communities (traditional leaders, women leaders, religious leaders and youth leaders);
- Focus Group Discussions (FGDs) with stakeholders and project affected communities(PACs) including youth, women. Each group was met jointly and separately;
- Field observations by the consultant;
- Democratic tools including FGDs, Community mapping, and Paired needs ranking and case studies formulation; and
- Structured questionnaire to collect baseline information and the perception of the Project Affected Persons(PAPs) on the intervention.

A simple random sampling was used for the administration of the questionnaire. Questionnaire administration was done in such a way that the exact number of questionnaires was actually returned by the respondents. Population estimation was based on combinations of questionnaires survey and a projection from the last official census figures by the National Population Commission (NPopC). A sample of the questionnaire administered, minutes and photographs of the meetings held, the attendance at the meetings and the contacts of persons met can be found in the appendices.

4.2 SOCIOECONOMIC CHARACTERISTICS

Socioeconomic data were collected using structured questionnaires administered to 46 respondents living around Gully sites such that each respondent represented a household. Interviews were conducted in English and Hausa.

4.2.1 Background information

Respondents comprised 39 males and 7 females. The dominant age groups were 20-30 years (37%), 31-40 years (26%) and 41-50 years (15%). Respondents attained Secondary (34.8%) and Tertiary (32.6%) levels of education, thus literate except few persons (13%) without any formal education. Information on marital status shows 70% married, 22% single and 9% divorced. About 98% of the respondents have been residing in the area since birth.

Table 4.1 Sex, Age, Education and Marital Status

RESPONDENTS' BACKGROUND INFORMATION	No of respondents	Percentage respondents (%)
SEX		
Male	39	84.78
Female	7	15.22
Total	46	100.00
AGE OF RESPONDENTS		
<20	5	10.87
20-30	17	36.96
31-40	12	26.09
41-50	7	15.22
51-60	0	0.00
61-70	3	6.52
>70	2	4.35
Total	46	100.00
LEVEL OF EDUCATION		
Primary	5	10.87
Secondary	16	34.78
Quaranic +Secondary	4	8.70
Non formal	6	13.04
Tertiary	15	32.61
Total	46	100.00
MARITALS STATUS		
Married	32	69.57
Single	10	21.74
Widow	0	0.00
Divorced	4	8.70
Total	46	100.00

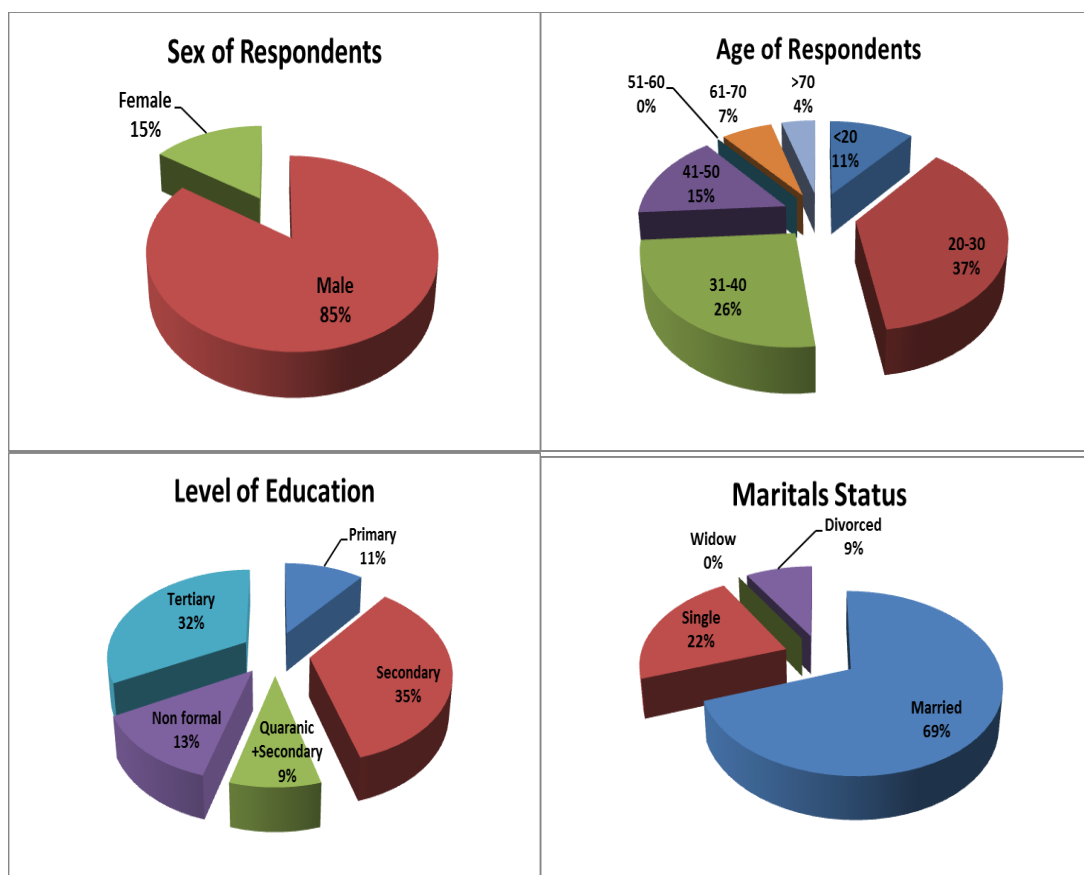


Figure 4.2.1 Sex, age, marital status and educational level of respondents Keffi

Table 4.2 Residency Status of Respondents

RESIDENCY STATUS	No of respondents	Percentage respondents (%)
RESIDENCY		
Resident	45	97.83
Visitor	1	2.17
Total	46	100.00
LENGTH OF STAY		
Since birth	45	97.83
Visitor	1	2.17
Total	46	100.00

4.2.2 Standard of Living

Employment status shows that 40% of the people are gainfully employed (the highest), 13% are self-employed and 28% are unemployed. The prevailing job types are evenly distributed such that civil service alone forms 28% of the occupation type, followed by those that combine civil service with farming (26%), artisans alone (24%) and trading

alone (22%). Average monthly income shows that 46% of the people receive <N20, 000 while 54% receive >N20,000 monthly. About 50% have less than 10 members while 30% have 10-20 members per household.

Table 4.3 Employment, Occupation and Income status

EMPLOYMENT, OCCUPATION AND INCOME	No of respondents	Percentage respondents (%)
EMPLOYMENT STATUS		
Employed	17	36.96
Unemployed	13	28.26
Self-employed	6	13.04
Total	46	100.00
OCCUPATION		
Civil service alone	13	28.26
Trading alone	10	21.74
Artisan alone	11	23.91
Farming + civil service	12	26.09
Total	46	100.00
AVERAGE INCOME		
<20,000	21	45.65
20,000-50,000	7	15.22
50,000-80,000	8	17.39
80,000-110,000	5	10.87
>110,000	5	10.87
Total	46	100.00

Table 4.4 Size of households along intervention corridor

MEMBERS OF HOUSEHOLD	No of respondents	Percentage respondents (%)
<10 members	23	50.00
10-20 members	14	30.43
21-30 members	5	10.87
>30 members	4	8.70
Total	46	100.00

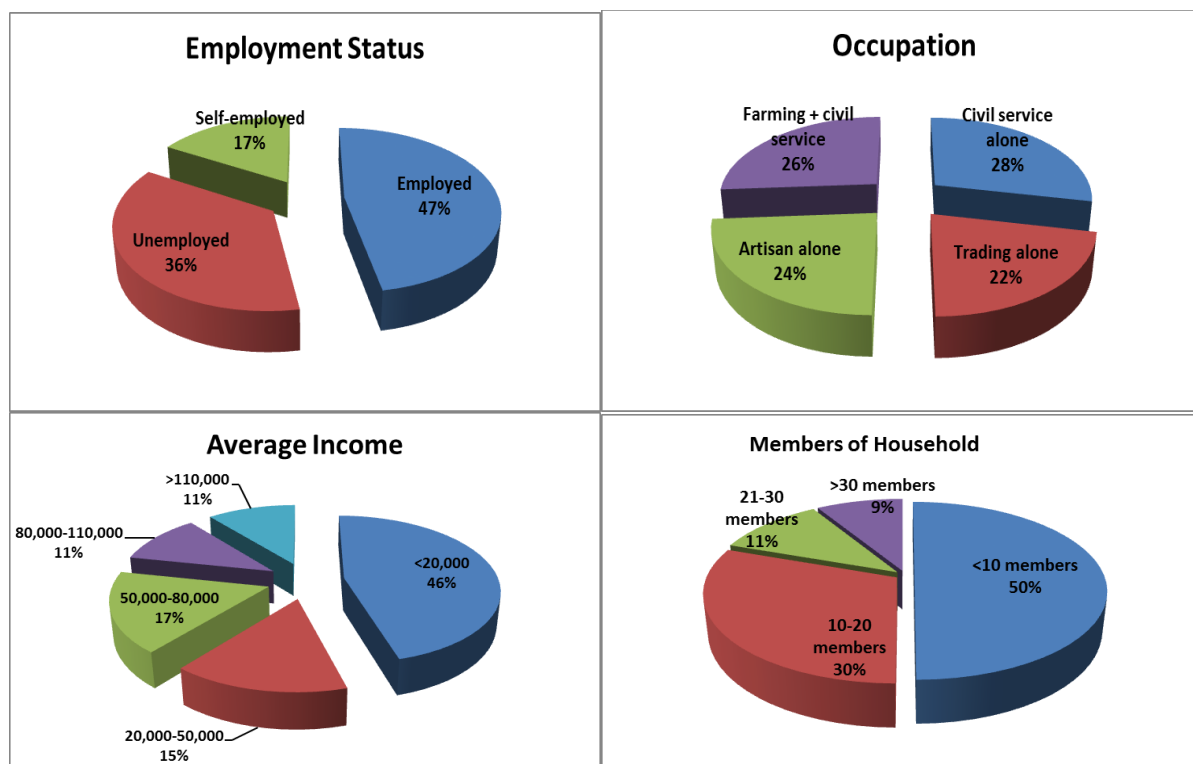


Figure 4.2.2 Employment, Education, Income status & population of house hold Keffi project areas

4.2.3 Causes of Gully and Challenges in the Area

The dominant anthropogenic causes of gully in the area is an interaction of many factors because 39% of the respondents gave residents' attitude, blockage of bridges and expansion of the area due to developmental projects as the major human causes. Other respondents voted for at least one of the above factors. Six (6) persons representing 13% of the respondents picked encroachment on flood plain alone as a major human factor. Natural causes of gully are largely attributed to rain storm alone (63%). Environmental challenges in the area are majorly gully erosion and waste disposal (43%). Poverty and unemployment (35%) are the major societal problem apart from lack of portable water and electricity. Residents largely dump their wastes either in the gully/drainages (28%) or in the community refuse dump (24%). About 22% of the people dump their refuse using both the community and household refuse dump while others adopt the Government waste management system.

Table 4.5 Causes of Gully erosion

CAUSES OF GULLY IN THE AREA	No of respondents	Percentage respondents (%)
HUMAN CAUSES OF GULLY		
Residents' attitude	9	19.57
Blockages of bridges	5	10.87
Expansion	8	17.39
Encroachment on flood plain	6	13.04
Residents' attitude+blockage of bridges+expansion	18	39.13
Total	46	100.00
NATURAL CAUSES		

Rain storm	29	63.04
Rain storm+Wind	5	10.87
Rain storm+Gravity	12	26.09
Total	46	100.00

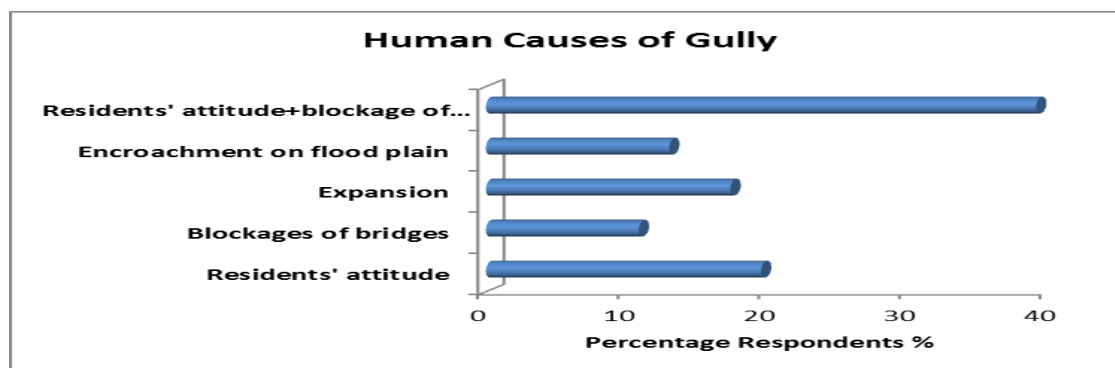


Figure 4.2.3 Anthropogenic causes of gully Keffi.

Table 4.6 Major Challenges/Problems in the area

MAJOR CHALLENGES/PROBLEMS IN THE AREA	No of respondents	Percentage respondents (%)
ENVIRONMENTAL PROBLEMS		
Gully erosion	13	28.26
Waste disposal	8	17.39
Gully erosion+Waste disposal	20	43.48
Waste disposal+Deforestation	5	10.87
Total	46	100.00
SOCIETAL PROBLEMS		
Poverty	8	17.39
Unemployment	5	10.87
Poverty+Unemployment	16	34.78
Poverty+unemployment+portable water	5	10.87
Poverty+unemployment+portable water+electricity	6	13.04
Lack of schools	6	13.04
Total	46	100.00

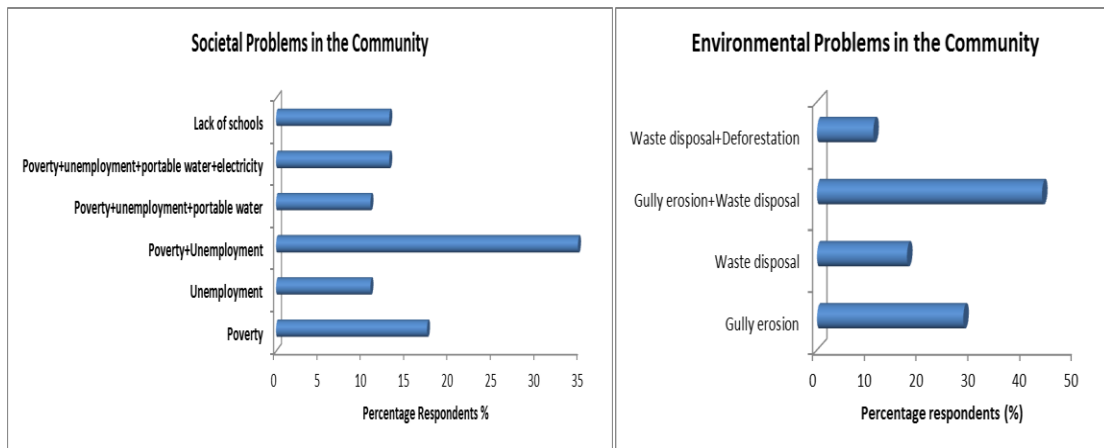


Figure 4.2.4 Societal and Environmental problems project sites Keffi

Table 4.7 Waste disposal methods

MEANS OF DISPOSING WASTE	No of respondents	Percentage respondents (%)
Community refuse dump	11	23.91
Household refuse dump	5	10.87
Community refuse dump+Household refuse dump	10	21.74
Government waste management	7	15.22
Drainage	13	28.26
Total	46	100.00

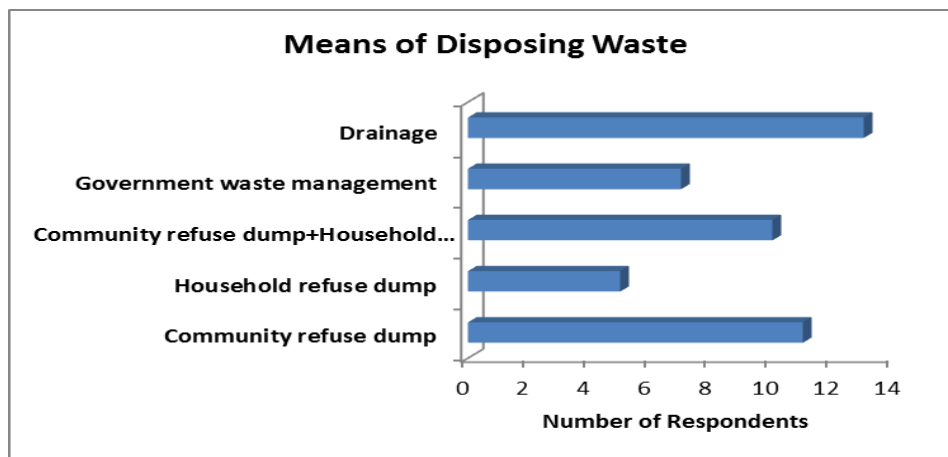


Figure 4.2.5 Means of Waste disposal Keffi

4.2.4 NEWMAP Project and Impact on Community

A combination of community cohesion and economic empowerment was selected by 41% of the respondents as the most likely major impacts of the project on the community, followed by a combination of social sustainability, health and empowerment (22%). The project is perceived as more of community owned (65%) than government owned. Levels of community participation in project in descending order are *good* (47%), *average* (30%), *very good* (17%) and *poor* (4%). Acceptance level of the project in the community is 93%.

Table 4.8 Expected Project impact on communities along the intervention corridor

PROJECT IMPACTS ON THE COMMUNITY	No of respondents	Percentage respondents (%)
Economic empowerment+empowerment	4	8.70
Health	5	10.87
Community cohesion+ economic empowerment	19	41.30
Social sustainability+health+empowerment	10	21.74
Security and safety+ health	8	17.39
Total	46	100.00

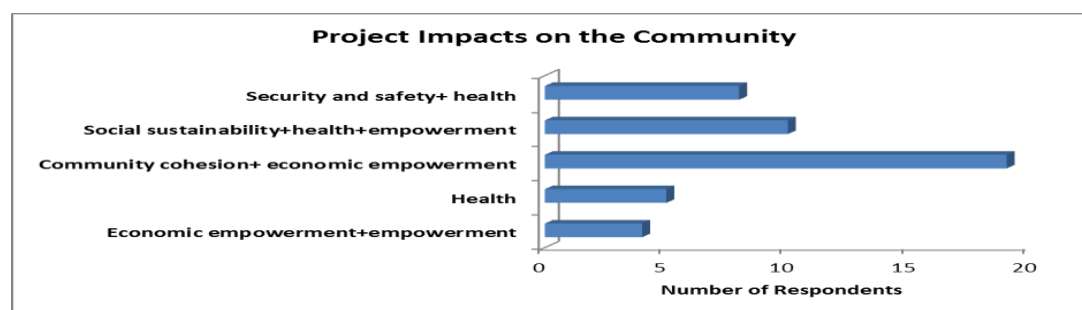


Figure 4.2.6 Expected impacts of project on communities in Keffi

Table 4.9 Community participation

PROJECT AND COMMUNITY PARTICIPATION	No of respondents	Percentage respondents (%)
OWNERSHIP OF THE PROJECT		
Community	30	65.22
Government	16	34.78
Total	46	100.00
LEVEL OF COMMUNITY PARTICIPATION IN PROJECTS		
Very good	8	17.39
Good	22	47.83

Average	14	30.43
Poor	2	4.35
Total	46	100.00
PROJECT ACCEPTANCE BY THE COMMUNITY		
Yes	43	93.48
No	3	6.52
Total	46	100.00

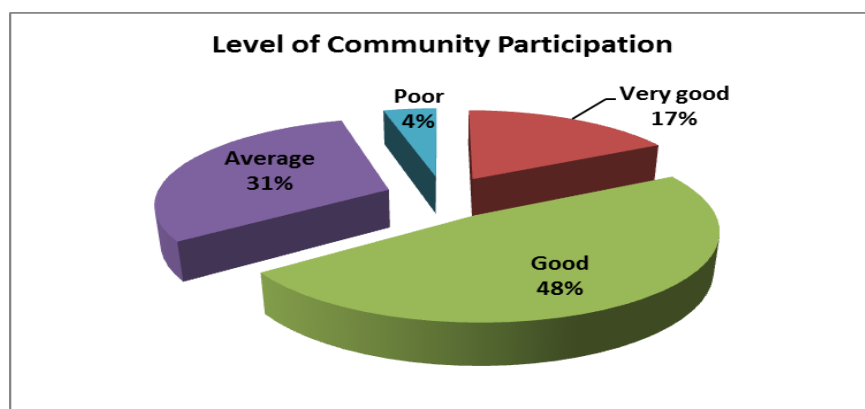


Figure 4.2.7 Expected levels of communities’ participation in projects Keffi

4.2.5 Gender Issues and Impact

On gender issues 98% of respondents had a positive view on the right of women in the community and to an extent allowed to hold elective position (61%) as against 39% of respondents who stated that women are not allowed to hold elective position in the area. Women are given access right to land (67%) but 33% of the people stated otherwise. Women associate among themselves (100%) but 46% of the people stated that women are not allowed in decision making. When allowed (54%), level of involvement in decision making are moderate (22%), high (17%) and low (15%) according to the respondents. Women’s perception regarding the potential impacts of the project on the women and their children was positive (83%) and negative (17%) among the respondents.

Table 4.10 Gender issues and impacts

GENDER ISSUES AND IMPACT	No of respondents	Percentage respondents (%)
VIEWS ON RIGHTS OF WOMEN		
Positive	45	97.83
Negative	1	2.17
Total	46	100.00
WOMEN HOLDING ELECTIVE POSITION IN THE COMMUNITY		

Yes	28	60.87
No	18	39.13
Total	46	100.00
WOMEN AND ACCESS RIGHT TO LAND		
Yes	31	67.39
No	15	32.61
Total	46	100.00
WOMEN AND ASSOCIATIONS		
Yes	46	100.00
No	0	0.00
Total	46	100.00
WOMEN AND DECISION MAKING		
Yes	25	54.35
No	21	45.65
Total	46	100.00
INVOLVEMENT OF WOMEN IN DECISION MAKING		
High	8	17.39
Moderate	10	21.74
Low	7	15.22
Total	25	54.35
WOMEN'S PERCEPTION REGARDING THE POTENTIAL IMPACTS OF THE PROJECT ON THE WOMEN AND THEIR CHILDREN		
Positive	38	82.61
Negative	8	17.39
Total	46	100.00

4.2.6 Challenges and Sustainability of the Project

Among the 46 respondents, only 11 (24%) were affirmative on the problem the project may likely face. The problems are; lack of inclusiveness (5 respondents), lack of inclusiveness and community non-compliance (3 respondents). Among the factors that may determine the success and sustainability of the project, a combination of community engagement and provision of amenities is the highest as given by 17 respondents (37%). A combination of the above in addition to adequate funding was selected by 12 (27%) respondents.

Table 4.11 Likely Problems project may face

Problem This Project May Face	No of respondents	Percentage respondents (%)
Yes	11	23.91
No	35	76.09
Total	46	100.00
Nature Of Likely Problems The Project May Face		
Lack of inclusiveness	5	10.87
Lack of inclusiveness+community non compliance	3	6.52
Community non compliance	3	6.52
Total	11	23.91
Factors That Will Determine The Success And Sustainability Of The Project		
	No of respondents	Percentage respondents (%)
Community engagement	8	17.39
Provision of amenities	9	19.57
Community engagement+amenities	17	36.96
Community engagement+amenities+funding	12	26.09
Total	46	100.00

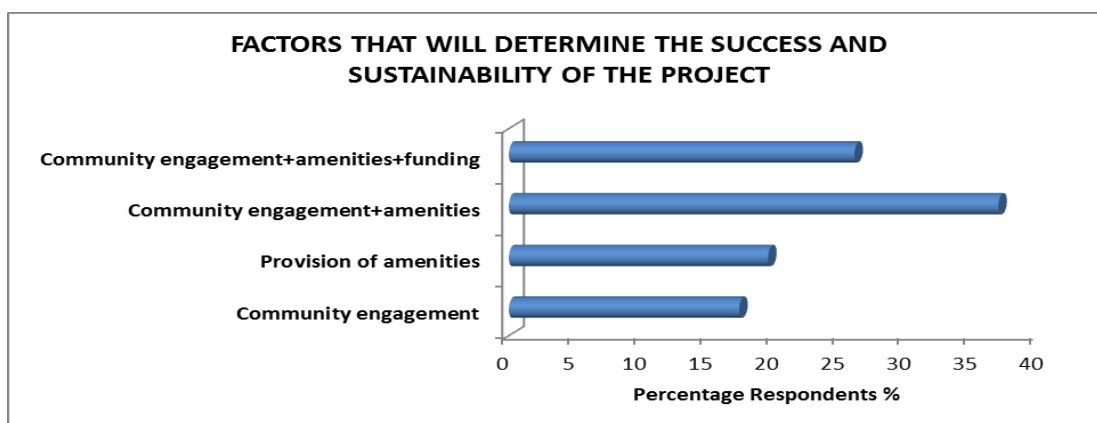


Figure 4.2.8 Factor that may determine success of project in Keffi

4.2.7 Health Issues and Impacts

On health issues, 91% of the respondents agreed to the effect of gully erosion on their present state of health predominantly malaria (52%) or in combination with water borne disease (22%). These diseases become severe during flood conditions (89%). In managing the diseases, 67% of the people do visit the hospital/clinic while 11% either visit either nearby chemist or use traditional medicine (13%). The last visit to the hospital/clinic was within the last 6 months (67%). Frequent malaria with typhoid is the ailment suffered by the people (54%). Other ailments are: frequent typhoid alone (11%), occasional whooping cough with diarrhoea (11%) and occasional hypertension (9%). However, 40(87%) of the respondents believed that the proposed intervention at the gully erosion would not affect their health condition. Six (6) persons who had different view held that the proposed intervention might engineer the breeding site of vectors (3) or a combination of breeding site of vectors with contamination of water bodies. No suggestion was given on how these could be averted during construction and implementation.

Table 4.12 Health Issues

Health Issues And Impacts	No of respondents	Percentage respondents (%)

Likely Effect Of Gully Erosion On Present State Of Health		
Yes	42	91.30
No	4	8.70
Total	46	100.00
Ways In In Which Gully Erosion Affects Present State Of Health		
Malaria	24	52.17
Malaria+Water borne	10	21.74
Water borne	8	17.39
Total	42	91.30
Severity Of Illness During Flood Periods		
Yes	41	89.13
No	1	2.17
Total	42	91.30
Management Of Health Conditions When Sick		
Hospital/Clinic	31	67.39
Neaby chemist	5	10.87
Traditional medicine	6	13.04
Total	42	91.30
Last Visit To The Hospital/Clinic		
<6 months	35	76.09
Last one year	7	15.22
Total	42	91.30
Ailment Suffered Most By Respondents		
Frequent Malaria+Typhoid	25	54.35
Frequent Typhoid	5	10.87
Occassional whooping cough+Diarrhoea	5	10.87
Occasional hypertension	4	8.70
None	7	15.22
Total	46	100.00
Possibility Of The Proposed Interventon At The Gully Erosion Affecting Health Condition		
Yes	6	13.04

No	40	86.96
Total	46	100.00
How The Proposed Intervention At The Gully Erosion May Affect Health Condition		
Breeding site of vectors	3	6.52
Contamination of water+breeding site of vectors	3	6.52
Total	6	13.04

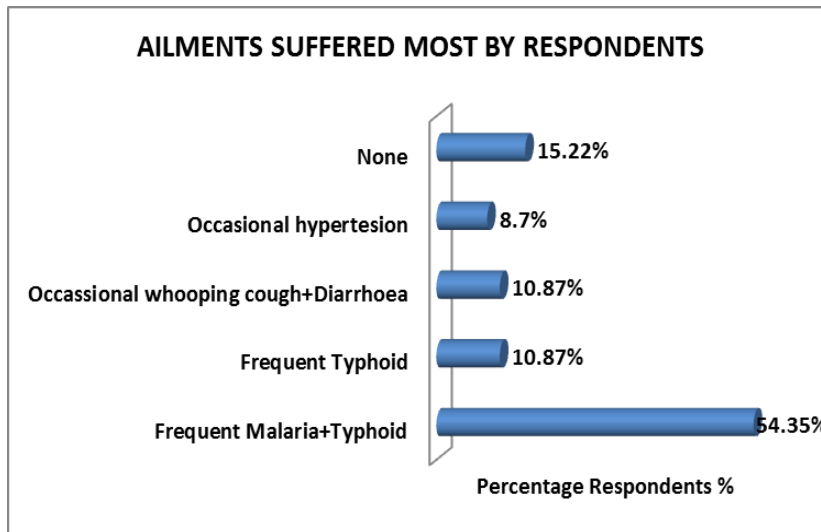


Figure 4.2.9 Ailments suffered most by residents of projects corridors in Keffi



Plate 4.1 Eldest man in Keffi project sites with consultant during socioeconomic data gathering

4.2.8 KEFFI FGD

4.2.8.1 HISTORICAL PERSPECTIVES

The history of gully erosion in Keffi was traced to the attitudes of the people towards waste disposal. It was noted that the people in the area had no definite arrangement for waste disposal hence indiscriminate disposal which led to blockages of water ways.

4.2.8.2 EFFECTS OF GULLY EROSION

At the meeting, it was clearly noted that business activities as well as social cohesion were grossly affected by the erosion in the area. It was gathered during the FGD that health status of the people has been under threat with malaria and typhoid which are usually more severe during the rainy season as manifestations.

4.2.8.3 PERCEIVED BENEFITS OF PROJECT INTERVENTION

The benefits of the intervention as established during the FGD are: a boost in their economic activities as hitherto separated communities would be reconnected.

4.2.8.4 ROLE OF CBOs

Like other communities earlier discussed, Keffi has functional and effectively structured Community Based Organizations such as Youth clubs and Women Associations. During the FGD session, it was agreed that the CBOs have played very positive roles in stabilizing the area socio-economically. This indicates that mobilization of human resources for project execution will not be a major challenge when the project commences.

4.2.8.5 GENDER ISSUES

On gender issues, it was clearly stated that it was near impossible for women to be allowed to participate in crucial decision-making processes directly. As far as they were concerned, women were not permitted to inherit land or any productive resources and so their opinions on matters affecting the communities were not considered. It suggests therefore, that there may be tendency for discrimination or violence against women.

4.2.8.6 CHALLENGES AND SUGGESTIONS

It was noted that carrying out any intervention project may not generate any violence or restiveness among members of the communities. It was however, suggested that it was safer to involve the youth and other major stakeholders in the execution of the project to forestall any breakdown of law and order. Consequently, it was agreed that aggressive awareness should be created among the people on the benefits of community development projects vis-à-vis who constitute the major beneficiaries.

CHAPTER FIVE

5.0 POTENTIAL IMPACTS AND ANALYSIS OF ALTERNATIVES

Impact is how a project would affect the matters it comes in contact with. By appraising the impact of a project definitions are given to both positive and negative impacts expected from the project on the environment, organization, community, people etc. Impacts are normally considered to decide if the benefits of a project on a particular location outweighs its negative impact. Moreover, impact appraisal and consideration helps to establish mitigation measures and improve on designs

5.1 Impact Assessment Methodology

A combination of methods was employed in assessing the impacts and this included the use of checklists, matrix, public consultation, professional experience and judgement. The phases of impacts assessment include:

- i. Impact Identification to specify the impact associated with each phase of the projects activities;
- ii. Impact prediction to forecast the nature, magnitude, extent and duration of the impacts;
- iii. Impact Evaluation – to determine the significance of the impacts

5.1.1 Impact Identification

A checklist based on an in-depth understanding of the local environment, existing baseline information and the key project activities were used to develop a checklist of potential impacts of the project. The following were appraised:

- The source and/or the cause of the problem (project activity/environment aspect)
- The receptor of the impact (environment component i.e. existing ecological and socioeconomic condition of the project environment).
- The way in which the effect is transmitted from the source to the receptor (pathway); and
- The potential consequences (environmental impact)

5.1.2 Impact Prediction

In order to further qualify the impacts of the various project activities on the environment, identified impacts were characterized based on the nature, duration and reversibility of impacts as follows:

- Beneficial impacts – these are impacts that have positive and beneficial effects;
- Adverse impact – these are impacts that have negative and untoward effects;
- Direct Impacts – these are impacts that are most obvious and are directly related to the proposed project and can be connected to the action that caused them;
- Indirect Impacts – these are secondary impacts that occur later in the or further away from the impact source;
- Cumulative Impacts – this typically occur from the incremental impact of an action when combined with impacts from projects that have been undertaken recently or would be carried out in the near future.
- Reversible Impacts – these are impacts over which the components involved have the ability to recover after the disturbances caused by the impact;
- Irreversible Impacts – these are impacts whose effects are such that the environmental component cannot be returned to its original state even after adequate mitigation measures are applied.

- Short Term Impacts – these are impacts whose effects remain for a brief period after mitigation measures have been applied.
- Long Term Impacts – these are impacts whose effects expand over a long period of time, even after the application of mitigation measures.

5.1.3 Impact Evaluation

The third stage in the assessment procedure involved the evaluation of the concerns, issues and impacts identified. This was based on the Risk Assessment Matrix (RAM). The risk of the impacts occurring was analysed by determining the consequence/severity of the impacts and the probability of their occurrence. The severity of the consequences was determined by using a consequence severity table while the probability of an impact resulting from a pathway was determined with a Likelihood Ranking Table (LRT). The RAM in Table 5.1 was then used to determine the level of risk and the significance or otherwise of the impact. The results of the impact identification, characterization and evaluation exercise are presented in Tables 5.4 to 5.9

Table 5.1 Probability of Occurrence, Consequence Severity, Likelihood Ranking and Risk Matrix

Probability	Attributes
Certain	Impacts that can reasonably be expected to occur during the project
Likely	Impacts that are likely to occur during the project
Possible	Impacts that might occur sometime during the project
Unlikely	Impacts that can reasonably be expected NOT to occur during
Rare	Impacts that are unlikely to occur except in exceptional circumstances
Severity	Attributes
Negligible	No detectable environmental and socio-economic impact
Marginal	Minimum Environmental and socio-economic Impact. Localized reversible habitat loss or minimal long-term effects on habitat species or media/public health and safety
Critical	Significant environmental and socio-economic harm. Significant widespread and persistent changes in species, habitat and media (e.g. widespread habitat degradation/ public health and safety)
Catastrophic	Detrimental environmental and socio-economic impact. Loss of a significant portion of a valued species or effective ecosystem function on a landscape scale/injury and death is possible.

	Severity			
Probability	Negligible	Marginal	Critical	Catastrophic
Certain	Yellow	Yellow	Red	Red
Likely	Yellow	Yellow	Yellow	Red
Possible	Green	Yellow	Yellow	Red
Unlikely	Green	Green	Yellow	Red
Rare	Green	Green	Yellow	Yellow

Low	Green
Medium	Yellow
High	Light Green
Extreme	Red

Impact Rating

- Low Risk: No Response plans will be needed for these risks
- Medium Risk: Actions may be required to control acceptable risk
- High Risk: Adequate action and management attention are required to control risk. There is need for some response planning for these risks.
- Extreme Risk: Significance additional action and high priority management attention will be required to control risk. There is need for an in-depth response plans for these risks.

5.2 Project Associated Activities

The construction and operation of the proposed Keffi gully intervention projects and associated activities shall include the following: -

Installation/Pre-construction phase

- Awarding of the contract;
- Surveying of the site;
- Site clearing;
- Construction of access road; and
- Assembly of heavy machinery and equipment

Construction

- Bulldozing, grading and compaction of soil;
- Clearing and excavation of drainage channels;
- Disposal of vegetable and excavation spoils;
- Soil excavation and
- Laying of concrete drains and box culverts

Operation

- Operation of drainage;
- Routine maintenance;
- Security of facilities;
- Regular inspection;
- De-siltation and clearance of drains & manholes;
- De-silting drainage channels;
- Repair of damaged engineering structure;
- Cleaning of drainage channels to prevent mosquitoes;
- Training of operators;
- Maintenance of equipment used; and
- Sanitation and waste management system.

5.3 Potential Impacts of the Proposed Projects activities**5.3.1 Positive Environmental Impacts of the Proposed Project Activities**

The essential positive impacts of the projects are listed as follows.

- **Rehabilitation of degraded lands and their conversion into productive land:** The land degraded by gully erosion in Keffi which has inhibited developments and effective utilization for various uses will be rehabilitated so that the land resources can be put to more effective use.
- **Increased Value for Structural and Landed Properties:** The execution of the project will increase the value of both structural and land properties along the hitherto gully erosions prone areas.
- **Securing Public Infrastructures:** The roads, which are within the catchment sites in Keffi site connects the communities to the rest of Nasarawa State. These roads shall be salvaged from the gully erosion and will be put to optimal use. Once the areas are salvaged from gully erosions the lifespan of the roads will increase. Consequently, this will retain and enhance the mobility and connectivity merits that the roads provide to the communities in the catchment areas of the projects and beyond.

5.3.2 Positive Social Impacts of the Proposed Project Activities

- **Public Safety:** The proposed project will in no small measure increase civil safety in the areas. Particularly, with respect to safety of properties and human lives, which have been hitherto at the risk of the gully erosion. Safety of lives particularly during the rainy season will be guaranteed and the potential landed properties at risk will diminish.
- **Employment Opportunities:** Provision of employment opportunities to the project affected communities is an essential positive impact. The project will create significant temporary employment for construction workers, equipment maintenance and support staff. While a small number of senior project managers may come from elsewhere in Nigeria, the majority of the project staff are expected to be recruited locally from the affected communities. There will be economic opportunities for local people (petty traders, food vendors and other artisans especially during construction. Also, the hitherto degraded lands will be put to productive use. Also, the rehabilitation will increase access to farmlands and source of livelihoods.

5.3.3 Potential Negative Environmental and Social Impacts of the Proposed Project Activities

For the proposed projects, the potential negative impacts have been identified on the basis of whether they will occur during the pre-construction, construction or operation phase in the subsequent section. This is to facilitate the implementation of the mitigation measures that are outlined in the Environmental and Social Management Plan (ESMP).

5.3.3.1 Pre-Construction Phase

Negative Environmental Impacts

- **Proposed Project Induced Development:** With the proposed civil work, the hitherto gully sites will increase in intensity. The extent to which development becomes a positive or negative impact will be determined by the effectiveness of the planning framework. With an ineffective framework, the overall impact would be substantially negative.

Negative Social Impacts

- **Displacement of Landed Properties and source of livelihoods:** The proposed development will lead to the displacement of landed properties at the risk of gully erosion particularly along the corridors of the proposed channels development. A Resettlement Action Plan(RAP) based on the World Bank OP 4.12 is being developed to address these issues.
- **Expectations of Improvement in Livelihood:** The proposed projects raise the hopes of better infrastructure provision to the communities. There is also anticipation of a general improvement, with a rise in economic activities as a result of civil work activities and potential employment opportunities offered by the project activities. This perception has an adverse impact on the project as residents may develop overwhelming expectation beyond what the projects can offer.

5.3.3.2 Construction Phase

A decisive requirement at the construction phase is the creation of the buffer zone and right of way. Vegetation will be cleared from around the gully site, large drains will be constructed and other related construction activities will be carried out. Broadly speaking, the key potential negative impacts during this phase are:

- **Potential Impact on Flora and Fauna:** Plant and animal life irrespective of size and extent of living footprints will be negatively impacted. Birds and climbing animals as well as life forms attached to the soil of the project area will also be affected. Animals in high densities that have built adaptation mechanisms and those living naturally in the area will be directly and indirectly displaced from their habitats. Thus, a mitigation strategy is required.
- **Potential Impact on Biodiversity and Loss of Habitat:** The level of civil work anticipated at the construction sites will not cause significant effects on the generality of the biodiversity of the projects catchments. Since the site does affect trees and other biological life forms. However, tree and bush clearance will be limited to channel alignment. The cleared vegetation will be recovered by planting small trees and plants. The construction works will not harm any major bird or animal migration routes.

- **Soil/Land Excavation and Construction of Camp Sites:** The nature of the gully areas will require some form of land excavations and other land clearance. This could stimulate further land degradation if defectively managed or executed. Thus, the activities will have to be carried out in accordance with engineering best practices. Depots and working camps should be located in such a way that they can be used for other purposes after the time of construction.
- **Potential Noise Impact:** At the construction phase, permissible or acceptable human noise levels can be temporarily exceeded due to the operations of lorries and equipment in the working zone of the gully sites. Noise abatement measures will be taken in the zones, including adequate work scheduling. In order to reduce any form of infringement, the scheduling should also be designed to incorporate every form of social activities that might be affected. Typical noise emissions for plant and equipment likely to be deployed are listed with international standards in table 5.2.

Table 5.2: Noise Emission Levels for Various Types of Construction Equipments

	5m	20	50m	day	Night
Loader	90	78	70	75	55
Grader	90	78	70	75	55
Vibration Roller	86	74	66	75	55
Bulldozer	86	74	66	75	55
Generator	98	86	78	75	55
Impact Drill	87	75	67	75	55
Concrete Mixer	91	79	71	70	55
Concrete Pump	85	70	62	70	55
Pneumatic Hammer	84	86	78	75	55

Figures in dB (A) (Source= Manufacturer’s manuals)

- **Potential Impact on Water and Water Resources:** This is critical to the project area. The watershed structures of the gully areas show an interconnected drainage pattern, which links to River Antau in Keffi. Hence, a point source of water pollution from the construction activities could lead to a severe impact on the surface and groundwater resources of the areas. Sources of waste-related point source and non-point pollution of water bodies could include wastewater containing high suspended solids; oil residues and industrial fluids from washing of plant and vehicles that would spill into nearby water body and seep into groundwater, spill of fuel oil around fuel storage tanks that would seep into groundwater and nearby stream and waste oil, grease and de-greasing solvents from vehicle and plant servicing.

Negative Social Impact

- Disruption to Communication Routes:** The excavation of trenches and installation of concretes may result in considerable and unavoidable delay in traffic flows especially in Lafia and Keffi locations. Beginning from the time of construction till its completion, the overall impact upon the communities would be characterized by difficulty of accessibility to free traffic flow. Therefore, impact on vehicular movement will generally be confined to increased journey time and other costs associated with delays, particularly during the morning and afternoon peak periods, which in the majority of cases may cause minor inconveniences.
- Disruption to Public Utilities:** During the fitting of new infrastructure, it would be very easy to damage existing service cables and electrical lines or temporarily interrupt supplies to consumers. The levels of the likely impacts that will arise from the disruption damage to public utilities are summarized in Table 5.3.
- Disruption of Public Access:** Besides the general disruption of communications, civil works of the gully affected areas might also result in the temporary loss of access to other areas as work progresses past the individual property entrances.
- Workers' Safety:** Generally, construction sites are inherently unsafe; and for those employed on the project, the risks are varied and omnipresent, safety issues must for that reason be crucial to all workers to maintain the principle of "safety first" in the execution of dedicated responsibilities. It is also of utmost expectation that the inherent dangers would have been communicated to all site workers concerning the best safety practices to be imbibed and followed strictly during construction works.

Table 5.3: Potential Impacts of Disruption to Public Utilities

Medium Voltage Electricity Cables	Interruption of supply	severe production loss and public inconvenience
Low Voltage Electricity Cables	Interruption of supply	Localized but severe public inconvenience
Local Water Networks	Interruption of supply	Localized but significant public inconvenience
	personal injury	Unlikely
	Cost of Repair/Delay to work	Minor
Telecom Cables	Interruption of Supply	Extreme disruption to national and International telecommunication
	personal injury	Unlikely
	Cost of Repair/Delay to work	Very severe

5.2.2.3 Operations Phase

Negative Environmental Impacts

During the operations phases, there are a series of activities that will impact on the environment across diverse scales. These activities include; desilting and clearance of drains and manholes, desilting drainage channels, repair of damaged engineering structure, cleaning of drainage channels to prevent mosquitoes, training of operators,

maintenance of equipment used, sanitation and waste management system. Operational activities could stimulate issues such as air quality impairment, noise and vibration, water quality, traffic and transportation, occupational health and safety issues among others.

- **Air Quality:** The operational phase is also expected to bring about air quality issues, which will arise due to increased vehicular traffic in the project area. However, this is expected to be minimal.
- **Traffic, Noise and Vibration:** The operation phase of the project will attract heavy traffic thus, the number of vehicles will increase and the facilities that will be used for the maintenance of the structures put in place will also generate noise in the area. This may not be beyond residential permissible limits of 90 dB for an 8-hour working period as established by FMEnve.
- **Water Quality Issues:** water quality issues could occur from runoff from the roadways that crisscross the communities. It is therefore imperative to ensure that measures such as pH levels, turbidity, water colour and other physical and chemical measures (BOD) and (COD) are examined from time to time.
- **Occupational Health and Safety:** Workers and other contractor staff members might be exposed to accidents at this stage. Thus, proper safety measures must be put in place while first aid materials must be made available. The contractor should conduct a risk-based assessment of all operations tasks, and provide appropriate safety measures. Also, the contractor should register with a government hospital or a certified private hospital with solid logistics for emergency situation
- **Sand Mining in rehabilitated channel:** This can cause additional damages to the gully site and destroy the structures put in place to control further expansion of gully.

Negative Social Impacts

The proposed project areas are located within residential areas with adjoining land uses like farmland. The local populace is mainly engaged in small-scale agriculture and trading in low scale at local markets. Hence, there will likely be large negative impacts especially on the peasant farmers except for the Keffi project site around the Emir's palace.

- **Cultural Impacts:** Watershed alignment would not necessarily cause any damage to historical, archaeological and cultural sites in the project sites. This notwithstanding the Nasarawa State NEWMAP office will consult widely, in conjunction with the Gully Site Monitoring Committees, to monitor the operations of the contractors throughout the works period to ensure that buildings and any other archaeologically valuable are not destroyed.
- **Immigration of New Comers:** Movement of new comers from within and outside the state in search of employment opportunity will occur, with the possible implication to generate negative social behaviours that mainly include the spread of sex immorality, drug use, alcohol abuse, insecurity, banditry, theft, STD, HIV/AIDs, etc.
- **Impact on Settlements and Community Facilities:** Most of the Impact on social lives will occur during the construction period. Favourable impacts as mentioned earlier include temporary markets for goods and services, including sources of employment for certain tasks (culinary services, etc.) during the construction phase. Some of the recreation requirements of the work force are likely to cause negative sanitation, health

facility and accommodation may not be adequate to cope with the increase in population during the construction phase.

- **Impact on Ambient Air and Traffic:** The air emissions from machinery will be minor and they will have negligible impact on ambient air quality. Major access roads at the communities are usually impaired during the rainy season. Thus, road signs and other road safety measures as well as traffic diversion signs will be used to properly direct traffic to ensure safety and proper movement of vehicles plying the roads.
- **Solid Waste Management:** there will be solid waste generated from the excavation works. Some of the excavated soil could be roused as backfill while the rest will be disposed of to the designated areas. Solid topsoil wastes from the sites will be the main form of solid waste. Other solid wastes will include metallic pieces, wooden planks, and stone debris. All the wastes will be disposed of according to the legislation guiding.
- **Health Issues:** In this instance, the contractor remains the only responsible party to ensure that his or her workers are provided with the required health facilities. The arrangement could be done such that the personnel working could get facilities from retained medical facilities.
- **Gender Issues:** In order to care for women's concerns, it was gathered during the field survey that the livelihood of the women folks will be adversely impacted by the project. It is therefore paramount to provide training for the women in alternative skills for survival. In addition, some also requested that they should be permitted to offer culinary services to construction workers during the construction phase.
- **Safety Issues:** At the construction phase, the work will involve the use of sharp objects, noisy machineries and dusty environment.

Table 5.4: Characterization and Evaluation of Potential Impacts Pre-Construction Phase

S/ N	Project Activities	Potential Environmental Social Impact	Impact Qualification									Rank		Impact Category		
			Direct	Indirect	Reversible	Irreversible	Cumulative	Long Term	Short Term	Beneficial	Adverse	Residual	Probability		Severity	
1.	Land acquisition for the intervention project	conflict from the members of the community to vacate areas allocated for the project especially the drainage channel sites.	X			X	X	X				X		possible	Catastrophic	EXTREME
2.	Awareness/ Expectations of improvement in Livelihood (Perception)	Pessimistic community perception on disrupt the proposed project activities while over expectation can lead to disappointment	X		X					X		X		possible	Marginal	LOW

Table 5.5: Characterization and Evaluation of Potential Impacts Environmental Impact in the construction Phase

S/ N	Project Activities	Potential Environmental Social Impact	Impact Qualification									Rank		Impact Category		
			Direct	Indirect	Reversible	Irreversible	Cumulative	Long Term	Short Term	Beneficial	Adverse	Residual	Probability		Severity	
1.	Excavation, channelization, concretization, filling, lining, gabion drop structures and re-vegetation	Channel Bank failure	X		X					X		X		possible	Marginal	High
2.		Rock material cave in during channel and baffled chute construction	X		X					X		X		possible	Marginal	High
3.		Mudflow	X		X					X		X		possible	Marginal	High

4.		Soil impacts on activities such as excavating, grading, levelling, compacting etc	X		X				X		X		possible	Marginal	High
5.		In situ waste management	X		X				X		X		possible	Marginal	Low
6.		Channelization of flood waters	X		X				X		X		possible	Marginal	High
7.		Topographic alterations and other civil works for remediation purposes	X		X				X		X		possible	Marginal	High
8.		Air Quality Issues (Dust)	X		X				X		X		possible	Marginal	High
9.		Water quality concerns	X		X				X		X		possible	Marginal	High
10.		Air Quality (Noise)	X		X				X		X		possible	Marginal	High
11.		Increased Siltation and runoff	X		X				X		X		possible	Marginal	High

Table 5.6: Characterization and Evaluation of Potential Impacts for the Biological Impacts in the construction Phase

S/n	Project Activities	Potential Environmental Social Impact	Impact Qualification									Rank		Impact Category	
			Direct	Indirect	Reversible	Irreversible	Cumulative	Long Term	Short Term	Beneficial	Adverse	Residual	Probability		Severity
1.	Clearing of Forest	Impact on flora and fauna	X		X				X		X		Certain	Critical	High
2.		Impact on Wildlife	X		X				X		X		possible	Marginal	High

Table 5.7: Characterization and Evaluation of Potential Impacts for the Socioeconomic Impacts during construction Phase

S/	Project	Potential	Impact Qualification									Rank		Impact
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N	Activities	Environmental Social Impact	Impact Qualification											Severity	Category
			Direct	Indirect	Reversible	Irreversible	Cumulative	Long Term	Short Term	Beneficial	Adverse	Residual	Probability		
1.	Mobility of machineries and materials	Traffic and transportation impact	X		X				X		X		Certain	Marginal	High
2.		Accident and Road Crashes	X		X				X		X		possible	Marginal	High
3.		Employment opportunities	X		X				X		X		possible	Marginal	High
4.		Human displacement	X		X				X		X		possible	Critical	High
5.		Aesthetics	X		X				X		X		possible	Negligible	High
6.		Shrines and Cultural sites	X		X				X		X		possible	Marginal	High

Table 5.8: Characterization and Evaluation of Potential Impacts for the Public Health Impacts during the construction Phase

S/ N	Project Activities	Potential Environmental Social Impact	Impact Qualification											Rank		Impact Category
			Direct	Indirect	Reversible	Irreversible	Cumulative	Long Term	Short Term	Beneficial	Adverse	Residual	Probability	Severity		
1.	Sexual Activities	HIV/AIDs and STDs	X		X				X		X		Certain	Marginal	High	
2.	Domestic Water Usage	Water borne diseases	X		X				X		X		possible	Marginal	High	
3.	Increase mosquito vector breeding sites	Malaria Issues	X		X				X		X		Likely	Critical	High	

Table 5.9: Characterization and Evaluation of Potential Impacts for Operation Phase

S/ N	Project Activities	Potential Environmental Social Impact	Impact Qualification									Rank		Impact Category	
			Direct	Indirect	Reversible	Irreversible	Cumulative	Long Term	Short Term	Beneficial	Adverse	Residual	Probability		Severity
1.	General maintenance operations * Regular inspection * Desilting and clearance of drains, manholes, * Desilting drainage channels, * Repair of damaged engineering structure, * Cleaning of drainage channel to prevent mosquitoes, * Training of operators, * Maintenance of equipment used, * Sanitation and waste management system	Generation of waste, spill of oil from equipment, loss of vegetation	X		X				X		X		Certain	Marginal	High
2.	Air quality	Poor visibility, increase air pollution level/ dust	X		X			X		X		Possible	Marginal	High	
3.	Noise and vibration	Noise and vibration from machinery	X		X			X		X		Possible	Marginal	High	
4.	Water quality	Spill from equipment could pollute surface and	X		X			X		X		Possible	Marginal	High	

		ground water													
5.	Traffic and transport	Obstruction to free flow of traffic during maintenance.	X		X				X		X		Possible	Marginal	High
6.	Health and Safety	Health and safety issues	X		X				X		X		Possible	Marginal	High
7.	Sand mining in rehabilitated channel	Increase soil erosion, create gully and cause land degradation	X		X				X		X		Possible	Marginal	High

5.4 Analysis of Alternatives

In the context of the ESMP, the analysis of the project alternatives refers to a comparison of possible alternatives to be considered with respect to the proposed project at the Keffi gully sites. One of the stated alternatives will be prescribed owing to its outstanding merits over the others. The choice will be centred on the fundamentals of meeting with the threshold of criteria concerning all considered environmental and social variables that are paramount to the projects (i.e. Applicable or Relevant and Appropriate Requirements ARAR).

5.4.1 Non-Action Alternative

The assumption on this alternative is based on the impression that there will be no alteration to the existing condition at the Keffi Nasarawa State gully sites. Specifically, the prevailing gully erosion areas will be left untouched, unaddressed and without any civil works or any engineering construction works carried out on it. In addition, the flood plains and the gully expansion at these areas will be left to persist without any attempt at addressing the environmental challenge they pose. Consequently, the conditions at the gully sites and its watershed will worsen and result in the destruction of more houses, roads and road infrastructures, public facilities educational facilities etc. The situation may worsen to the point of abandonment of the locations. With a non-action alternative, annual loss of income, impaired access, unsafe status of lives and properties will increase, and thus, the gully erosion will persist unchecked and uncontrolled. Other environmental and social unfavourable impacts such as reduction of existing road capacity, exposure to risk and dangers from the high currents of floodwaters, high cost of transportation, destruction of soil, exposure of flora and fauna to devastating imprints of erosion, loss of land and landed properties, and likely surface and groundwater pollution will be aggravated. Basically, the current conditions will be left without any improved efforts. Consequent upon the numerous effects, the non-action alternative is not recommended for this project.

5.4.2 Delayed-Action and Right-Away Action Alternatives

The delayed-action may be caused by the restiveness in the areas or delay due to bureaucratic process that may delay the mobilization of the contractor. The right-away action alternatives anticipated the rehabilitation of the gully induced damage at Keffi, Nasarawa State where is pervious action adopted a delayed tactic that has result into

further damages and degradation of the watershed. Inflation and other economic forces may cause avoidable monumental changes to the cost of materials thereby increasing the financial burden of the rehabilitation. The later (right-away action) is preferable as it ensures immediate attention to address the issues and benefit from both short-term and long-term effectiveness.

5.4.3 Use of Civil Works, Bioengineering and Technological Options

All the elements of the watershed including the environmental and social components, were considered in the process of adopting the use of civil works, bioengineering and technological options analysis. This approach will ensure that relevant components of the natural and human environment under the threat and risk of destruction such as soil, public infrastructure, social and community infrastructures and facilities will be secured in the affected communities.

The proposed intervention will involve intensive civil works across the broad spectrum of the affected and high-risk areas. Consequently, construction works, bioengineering and technological approaches will be adopted in restoring and enhancing affected areas as envisioned in the goals of the NEWMAP. Adverse impacts of these activities will be highly reduced to the extent that the benefits will outweigh the demerits as necessary.

In conclusion, the merits of the Civil Works, bioengineering and Technological Alternative outweigh the No-Action Alternative, Civil Works alone, Bioengineering work alone option, it is recommended. The alternatives are presented in Table 5.10. As shown in Table 5.10, a combination of Civil Work, Bioengineering and Technological Alternative is better than other alternatives even though its cost implication is higher. The Civil Work, Bioengineering and Technological alternative will provide the solution that NEWMAP sought while the No-Action alternative will undoubtedly aggravate the problem being experienced in the area.

Table 5.10: Appraisal of the ‘No Action’ Alternative and Technological Option

Criteria	No Action	Delayed Action	Right Away Action	Biological works alone	Civil works alone	Technological option (Biological & the construction of Hard Structures)
General safeguard of Environment and Human Health (General protection mechanisms)	This will not benefit the concerned stakeholders and community residents considering the observed level of destruction the gully has had on the area. Private properties and public infrastructures have been severally	This will not benefit the concerned stakeholders and community residents. The damage may become catastrophic and the level of human and material losses may be well beyond repair. The delay action may be caused by the	This will be the right step to safeguard the environment and human wellbeing from further degradation	This remediation of the biological life forms will lead to improvement of life, properties will be secured, lives saved, resources recovered transportation facilities enhanced and general restoration of	The implementation of this proposed project will lead to improvement of life Properties will be secured, lives saved, resources recovered, transportation facilities enhanced and general restoration of livelihood. It	The rehabilitation of degraded environment coupled with remediation of the biological life form will lead to improvement of life properties will be secured, lives saved, resources recovered transportation facilities enhanced and general restoration of livelihood. It will benefit the Project Affected People and the Residents

	affected and this has led to loss of lives and landed properties, land degradation, loss of agricultural fields and produce etc. Adopting this alternative will not benefit project affected people and the environment in general	restiveness in the area, delay due to bureaucratic process that may delay the mobilization of the contractor		livelihood. It will benefit the Project Affected people and the residents	will benefit the project Affected People and the residents.	
Short-Term Usefulness	No-Action alternative does not add any specific input to the stated criteria.	delayed action will contribute nothing to short-term usefulness	This will be immediate derivable benefits and a sustained long-term benefit will be achieved.	The timeline for the biological works is long term. Nevertheless, the benefits derivable are still better than a No-Action and Delayed-action alternatives.	The timeline for the civil work is long term. Nevertheless, the benefits derivable are still better than a No-Action and Delayed-Action alternatives	The timeline for the civil and biological works are long term. Nevertheless, the benefits derivable are still better than a No-Action and Delayed-Action alternatives.
Long-Term Effectiveness and Permanence	This option does not meet the long term effectiveness and permanence criteria.	Already incurred damages may obliterate the gains from long-term effectiveness.	The option perfectly meets both the long-term and short-term effectiveness and permanence criteria	The biological works alone will provide long-term effectiveness for the watershed but may not be sustainable without the	The Civil works alone will provide long-term use for the watershed but may not be sustainable without the biological works	The combination of the Civil and Biological works will provide long-term effectiveness for the watershed

				civil works		
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CHAPTER SIX

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

MITIGATION MEASURES

6.0 Environmental and Social Management Plan (ESMP) documents the project risk management strategy and becomes an integral part of a project proposal. It documents expected risks of every phase of the project and how they would be tackled to reduce or eliminate their negative effects on biotic and abiotic components of the environment and equally enhance the beneficial effects at every phase of a project.

6.1 Pre-Construction Phase

At this phase, the mitigation measures are provided to resolve the identified potential adverse impacts of the project prior to the commencement of civil works. The phase covers the preliminary activities and works that predate the construction and developmental works. The two critical issues of cogent significance at this phase, as discussed below, are: land acquisition and community perception of the project.

- **Land Acquisition:** It is unavoidable and critical to acquire land, particularly along the alignment of the proposed watershed affected by the gully erosion. This will cover the legally binding right-of-way for civil construction features such as the large drains along the channel of the project and the drainage channels. To mitigate this activity, comprehensive actions must be taken such as presented in Table 6.1 and in the RAP.
- **Community Perception of the Project:** Divergent perceptions about the authenticity of the proposed intervention by the community could create a setback for the project kick-off, especially where there has been previous negative experiences and failure to execute promises in the past. In order to resolve such challenges, there are relevant steps to be taken as mitigation measures to checkmate any doubt about the legitimacy and authenticity of the project. These measures are shown in Table 6.1.

6.2 Construction Phase

Civil work is anticipated to have various environmental and social impacts. Such impacts are expected also to traverse different aspects of the environmental and socio-cultural components of the project area. As required, several governmental MDAs (State Ministries, Departments and Agencies) will be involved in the mitigation process. Table 6.2 – 6.5 shows the mitigation measures to the various impacts during construction phase.

6.3 Operation and Maintenance Phase

During the operation phase, several environmental and social issues arising from the project activities will need to be mitigated. The specific mitigation measures, thus designed to separately curb the identified adverse impacts are outlined in Table 6.6.

Table 6:1: Mitigation Measures for Pre-Construction Phase

	Project Activities	Potential Environmental and Social Impact	Mitigation Measures	Responsibility
1	Land acquisition for the intervention project	Conflict from the members of the community to vacate areas allocated for the project	Refer to the RAP	SPMU
2	Public Awareness	Pessimistic Community perceptions can disrupt the proposed project activities	<ol style="list-style-type: none"> 1. Proper awareness/sensitization of the host community on the project. 2. Executive members of the local monitoring committees should be contacted to act as local information disseminators 3. The communities should be engaged using English, Hausa and Local languages to communicate all areas as much as possible. 4. Prospects and challenges of the project should be discussed to find a common ground for resolving emerging issues. 5. Posters, notices and signboards should be erected at strategic and vantage points to pass information to local people as necessary. 6. Ensure full involvement of the community during preparation and implementation 	SPMU

Table 6:2: Mitigation Measures for the Environmental Impacts in the Construction Phase

S/N	Proposed Project Activities	Potential Environmental and Social Impact	Mitigation Measures	Responsibility	Surveillance and control
1	Excavating, filling, scooping of earth material and other related activities	Channel/River Bank Failure and river courses siltation	<ol style="list-style-type: none"> 1. Heavy duty machinery and filling material should be about 30m away from the channel 2. Vibration induced machines should be avoided. 3. Lower the overhand before suing excavator with a boom of at least 25 meters. 4. Excavated material should be removed within 24 hours. 	Contractor	Site Engineer
2		Rock material cave in	<ol style="list-style-type: none"> 1. Heavy duty machinery and filling material should be about 30m away from the channel. 2. Avoid Machines that can cause vibration 3. Use manual efforts to reduce overburden 4. Ensure filling materials are compacted 	Contractor	Site Engineer
3		Mudflow	<ol style="list-style-type: none"> 1. Possibly limit civil work to dry season. 2. Proper re-channelization of runoff before actual work. 3. Temporary shoulder must be hydrologically stable to avoid being washed away. 4. Temporary ballast and wicker work out in place 	Contractor	Site Engineer
4		Soil impacts on activities such as excavating, grading, levelling, compacting etc.	<ol style="list-style-type: none"> 1. Erosion control measures should be implemented 2. Planting of trees should be encouraged. 3. Localised environmental 	Contractor	Site Engineer

			designs should be implemented.		
5		In situ waste management	<ol style="list-style-type: none"> 1. Designated sites should be selected for waste management 2. Measures to ensure that waste is properly handled should be encourage. 3. Cover of waste collection materials. 4. Construction waste could be recycled and reuse, this option should be prioritized. 	Contractor	Site Engineer
6		Land use Conflicts	<ol style="list-style-type: none"> 1. RAP report should be properly followed. 2. World Bank safeguard policy should be implemented based on the land use issues. 	Nasarawa State Ministry of Land	Site Engineer
7		Channelization of flood waters	<ol style="list-style-type: none"> 1. Ensure free flow of storm water into the drains to ease construction activities. 2. Where necessary, dive water to a safe environment where it could be utilized 3. Watershed and bioengineering techniques should be implemented. 	Contractor	Site Engineer
8		topographic alterations and other civil works for remediation purposes	<ol style="list-style-type: none"> 1. The construction works should be done according to local relief and hydrology requirements. 2. Old drainage systems should be maintained and new ones prioritized. 3. Ensure that site-specific plans are designed with respect to local topography. 	Contractor	Site Engineer
9		Air Quality Issues (Dust)	<ol style="list-style-type: none"> 3. 1. Use of breathing protection masks and route water sprinkling to curtail dust. 	Contractor	Site Engineer

			<ol style="list-style-type: none"> 4. Use of dust suppression method to minimize airborne particulate matter. 5. Provide PPE as necessary. 6. Reduce travel distances by placing constructions composites close to work areas. 7. International standards for exhaust emission should adequately comply with 		
10		Water Quality Concerns	<ol style="list-style-type: none"> 1. Mobile toilet facilities should be provided and be properly maintained 2. Ensure provision of proper storage facilities to proper Waste Management Plans (WMPs) 	Contractor	Site Engineer
11		Air Quality (Noise)	If possible, construction activities should be limited to day time.	Contractor	Site Engineer
12		Increased Siltation and runoff	Ensure stipulated water flow and safe environment designs are adhered to and the high flow of water during rain should be controlled using the stipulated construction guidelines pollution	Contractor	Site Engineer

Table 6:3: Mitigation Measures for the Biological Impacts in the Construction Phase

S/N	Proposed Project Activities	Environmental and Social Impact	Mitigation Measures	Responsibility	Surveillance and control
1	Clearing of Forest	Impact on flora and fauna	<ol style="list-style-type: none"> 1. Identify all Sites of special Scientific Interest. 2. Co-operate with relevant MDAs at both the Federal and State levels such as the Federal Department of Livestock, Privately-owned 	Contractor	Site Engineer

			wildlife conservation parks, zoos and Zoological departments of Universities, for the housing of possible animals that may be relocated in this phase.		
2		Impact on Wildlife	Ensure that all the necessary World Bank safeguard policies on wild animals and their related habitats are addressed and strictly adhered to such policies include OP 4.04 and OP 4.36 on Natural Resources and Forestry respectively.	Contractor	Site Engineer

Table 6:4: Mitigation Measures for the Socio-Economic Impacts During Construction Phase

S/N	Proposed Project Activities	Environmental and Social Impacts	Mitigation Measures	Responsibility	Surveillance and control
1	Mobility of machineries and materials	Traffic and transportation impact	The contractor should liaise with state transportation and traffic maintenance agency as well as the Federal Government agencies such as the Federal Road Safety Corps (FRSC) through the construction phase to ensure that traffic safety is maintained and ensured during the period.	Contractor	Site Engineer
2		Accidents and Road Crashes	<ol style="list-style-type: none"> 1. All Workers should be sensitized and monitored on the need to keep the first rule of civil and construction works which is "Safety First". 2. Contractor should conduct a risk-based assessment of all construction tasks and provide appropriate safety measures. 	Contractor	Site Engineer

3		Employment Opportunities	<ol style="list-style-type: none"> 1. Ensure that individuals from the project community are given priority to improve any socioeconomic rife from local youths. 2. The camp site for workers should be located remotely away from the community to enhance the progress the civil work. 3. Workers should be prohibited from patronizing commercial sex workers. 	Contractor	Site Engineer
4		Human Displacements	<ol style="list-style-type: none"> 1. World Bank OP 4.12 should be applied for this issue on the affected Areas. 2. All issues of resettlement/compensation are being addressed in RAP. 	Nasarawa State NEWMAP-SPMU	Site Engineer
5		Kidnapping	<ol style="list-style-type: none"> 1. Enhance security by law enforcement agents such as police, civil defence and the military including Vigilante especially at Maloni hill project sites 	Nasarawa State NEWMAP-SPMU	Site Engineer
6		Aesthetics	<ol style="list-style-type: none"> 1. Proper use of engineering practice should be adopted with the best available construction technology which recognizes the need to keep local aesthetics and an engineering expert in the field of aesthetics should be employed as part of the team. 	Contractor	Site Engineer

Table 6:5: Mitigation Measures for the Public Health Impacts during in the Construction Phase

S/N	Proposed Project Activities	Environmental and Social Impacts	Mitigation Measures	Responsibility	Surveillance and control
1	Increased Sexual activities by immigrant	HIV/AIDs and STDs	<ol style="list-style-type: none"> 1. HIV/AIDs and STD awareness programme should be prioritized. 2. Other activities should include treating any sexually transmitted diseases, distributing condoms, and providing counselling, screening, 	Contractor	Site Engineer

			<p>and support services for employee.</p> <p>3. Medical examinations on general health issues should be performed on new employee and repeated regularly throughout the term of employment.</p> <p>4. Workers should be prohibited from patronizing prostitute and the use of alcohol and drugs</p>		
2	wastewater pollution of domestic water usage	Water-borne diseases	Good sanitation including hygienic water supply and proper waste disposal at its operation and residential accommodations during the phase of the project.	Contractor	Site Engineer
3	Breeding of mosquito from open ditches	Malaria Issues	Government programmes to improve existing medical and health services in the local communities should be supported as much as possible. This includes Mosquito control programme such as the distribution of insecticide treated nets to affected community members.	Contractor	Site Engineer

Table 6:6: Mitigation Measures for Operation Phase

S/N	Proposed Project Activities	Environmental and Social Impacts	Mitigation Measures	Responsibility	Surveillance and control
1	<ul style="list-style-type: none"> - Routine maintenance; - Security of facilities - Regular inspection and clearance of drains and manholes. - Desilting drainage channels - Repair of damaged engineering structure - Cleaning of 	Generation of waste, spill of oil from equipment, loss of vegetation around detention ponds	<p>1. Maintenance operation should be designed according to environmental safety guidelines of the Nasarawa State Environmental Protection Agency and Federal Ministry of Environment</p>	Contractor/Nasarawa State NEWMPA-SPMU	Site Engineer

	<p>drainage channels to prevent mosquitoes</p> <ul style="list-style-type: none"> - Training of operators - Maintenance of equipment used, sanitation and waste management system 				
2	Air Quality	Poor visibility, increase air pollution level/dust	<p>1. Periodic checks on ambient environmental quality particularly air, vehicles road worthiness should be prioritized and regular checks on the nature of the road should be conducted with respect to air quality parameters.</p>	Contractor/Nasarawa State NEWMPA-SPMU	Site Engineer
3	Noise and vibration	Noise and vibration from machinery equipment	<p>Speed limits signboards should be placed at strategic locations along the major roads for the use of motorists and road users. The local road transportation officials should be empowered to checkmate the activities of careless motorists.</p>	Contractor/Nasarawa State NEWMPA-SPMU	Site Engineer
4	Water quality	Spill from equipment could pollute surface and ground water	<p>Ensure waste dumps are not situated close to the project area to avoid water pollution cases. Wastewater and sewage should be channelled according to safety guidelines</p>	Contractor/Nasarawa State NEWMPA-SPMU	Site Engineer
5	Traffic and transport	Obstruction to free flow of traffic during maintenance, increase cost	<p>Ensure free flow of traffic and traffic officials are strategically positioned at specific junctions to provide</p>	Contractor	

		of transportation in the area	safety guidelines and ensure free flow of traffic within the project area.		
6	Health and Safety	Accident in workplace and other health and safety issues	Maintenance workers are expected to imbibe the workplace safety rules via proper sensitization procedures prior to maintenance works. Ensure that workers utilize safety tools such as safety boots, safety helmets, and other essential safety wears on-site, first aid tools are provided for minor injuries which are to be treated prior to being forwarded to a medical center for proper treatment, Health, Safety and Environment (HSE) Officer is available prior to and during operations works.	Contractor/Nasarawa State NEWMPA-SPMU	Site Engineer
7	Sand mining in rehabilitated channel	Increase soil erosion, create gully and cause land degradation	ensure mining is not done in the rehabilitated channel	Contractor/Nasarawa State NEWMPA-SPMU	Site Engineer

6.4 Monitoring: Project Implementation and Mitigation Measures

- Pre-Construction Phase

At this phase, measures are provided to ensure that the activities that needed to be done for the smooth running of the project are carried out before proper civil work commences. Table 6.7 shows monitoring activities for pre-construction phase.

-Construction Phase

As mentioned in the section on mitigation measures, civil work is anticipated to have various environmental and social impacts; such impacts are expected to traverse different aspects of the environmental and socio-cultural components of the project area. The mitigation measures for the identified impacts have been stated. Therefore, both project implementation and mitigation measures implementation need to be monitored. Table 6.8 – 6.11 shows monitoring for both project implementation and mitigation measures to various impacts during construction phase.

- Operation and Maintenance Phase

Table 6.12 shows the monitoring activities for environmental and social issues identified and for which mitigation measures have been proffered.

Table 6.7: Monitoring for Pre-Construction Phase during Project Implementation

S/ N	Project Implementation Activities	Potential Environmental and Social Impact	Monitoring		Monitoring Indicators	Frequency	Responsibility			Cost (USD \$)
			Project Implementation	Mitigation Measures			Project Implementation	Mitigation Measures	Surveillance and Control	
1	Land acquisition for the intervention project	Conflict from the members of the community to vacate areas allocated for the project	As indicated in the RAP report	As indicated in the RAP report	As indicated in the RAP report	All issues should be settled before the starting of civil works	Nasarawa State NEWMPA-SPMU	Gully Sites Monitoring Committees & RAP Implementation Committee	Site Engineer	
2	Public Awareness	Pessimistic Community perception can disrupt the proposed project activities	Before commencement of the civil Works and during civil works.	Proper awareness/sensitization of the host communities on the project	<ol style="list-style-type: none"> Number of public awareness campaigns Number of adverts placed in the media. Complaints made by the project affected community members 	Periodically during the pre-construction, construction and operational phases	<ol style="list-style-type: none"> Community Based Organization. various gully Site Monitoring Committee. Nasarawa State NEWMAP Focal NGO 	Nasarawa State NEWMPA-SPMU	Site Engineer	36,000
3	Clearing of Forest	Impact on flora and fauna	Before commencement of the civil works	<ol style="list-style-type: none"> Identify design right of way. Restrict clearance to the right of way 	<ol style="list-style-type: none"> Area cleared outside the gully remediation corridor Extent of area cleared, for installation 	Daily during clearance for installation and along the right of way	Contractor	Contractor/ Nasarawa State NEWMPA-SPMU Nasarawa State Ministry of Environment and Natural Resources; NESREA	Site Engineer	36,000
Sub-Total										\$72,000

Table 6.8: Monitoring for Mitigation Measures for the Environmental Impacts in the Construction Phase During Project Implementation

S/ N	Proposed Project	Potential Environmental and	Monitoring		Monitoring Indicators	Frequency	Responsibility			Cost (\$)
			Project	Mitigation			Project	Mitigation	Surveillance	

	Activities	Social Impact	Implementation	Measures			Implementation	Measures	Site and Control	
1	Excavating, filling scooping of earth material and other Related activities	Channel/ River Bank failure	During implementation of civil works	<ol style="list-style-type: none"> 1. Location of heavy duty machines during civil work 2. Position of excavator. 	<ol style="list-style-type: none"> 1. Distance of heavy duty machines from the channel during civil works. 2. Overhead position of excavator with boom of at least 25 meters 3. Vibration level of machinery during civil works 	Every day during the construction phase	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,350
2.		Rock material cave in	during implementation of civil works	<ol style="list-style-type: none"> 1. Location of heavy duty machines during civil work 2. Position of excavator 	<ol style="list-style-type: none"> 1. Location of heavy duty machines during civil works 2. Overhead position of excavator with boom of at least 25 meters 2. Vibration level of machinery during civil works 	Every day during the construction phase	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,050
3.		Mudflow	During implementation of civil works	<ol style="list-style-type: none"> 1. Provision of solid waste bins 2. Regular evacuation of rock falls on the channel course 3. Alternative runoff channel 	<ol style="list-style-type: none"> 1. Number of solid waste disposal bins and cabins available. 2. Physical presence of objects, fly rock etc, deposited along the courses of rivers. 3. Runoff paths are re-channelled before construction 	Every day during the construction phase	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,050

4.		Soil impacts on activities such as excavating, grading, levelling, compacting etc	During implementation of civil works	1. Planting of trees and re-vegetation of affected area	1. Number of trees planted. 2. Area of vegetated lawn created 3. Number of community complaints on soil/ and degradation	Every day during the construction phase	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,050
5.		In situ waste management	During implementation of civil works	Provision of waste management plan. provision of site waste bins Ensure an appropriate/ approved location for waste disposal Good house keeping	1. Availability of waste management plan for the entire project cycle 2. Number of waste disposal vehicle 3. System in practice to manage degradable site 4. Number of complaints received from the community member over the improper waste disposal 5. Cleanliness of the specific work sites	Every day during the construction phase	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,000
6.		Land use conflicts	As stated in the RAP report.	1. RAP report should be properly followed. 2. World Bank safeguard policy should be implemented based on the land use issues	as stated in the RAP report	Three months before actual construction	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,100
7.		During implementation of civil	Provide alternative route for water to	1. Sighting Visual observation	1. Number of flow obstruction material	This should be set before the starting	Contractor	Nasarawa State NEWMAP, Nasarawa	Site Engineer	1,000

		works	flow.		identified along the channel	of civil work on the gully		State Ministry of Environment		
					2. Direction of flow					
8.		During implementation of civil works	Excavation/ scooping should be top down and no down or base cutting with huge rock hanging	Visual estimate/ observation	1. Height of bank stabilization to the local relief 2. Depth and area extent of excavation 3. Number and area extent of cut and fill 4. Terraced areas (extent)	Before actual civil work on the gully site	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,100
9.		In-situ measurement during implementation of civil works	1. Sprinkle water daily Regular assessment of airborne particulate matter Provision of PPEs – noise mask, eye goggles, cover all to site workers	1. In-situ measurement 2. Visual observation Water sprinkled records	1. Suspended particulates (TSP, PM10, or smaller), SC2, Nos, CO, THC 2. Number of time water is sprinkle on daily bases during construction 3. Level of airborne particulate matter during construction 4. Number of PPB provided 5. Number of time routine maintenance was done on equipment and machinery, 6. Number of community complaints received	Daily check for adherence to safety concerns	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	2,200
10		During construction and operation	In-situ/Laboratory measurement	In-Situ measurement of Visual	1. Number of mobile toilet provided	Weekly during the construction phase of	Contractor	Nasarawa State NEWMAP, Nasarawa	Site Engineer	1,300

		phase	s of water quality periodically provision of mobile toilet 2. Visual observation	observation	2. Type of storage facility provided 3. Regular clearing of workshop for maintenance 4. Water Quality (pH, TDS, TSS, BOD, COD, Turbidity, THC, heavy metals) measurement	the project		State Ministry of Environment		
1 1		During implementation of civil works	1. In-situ measurements 2. Regular maintenance of machinery 3. Limit work hours to daytime	In-situ Measurement of complaint register of visual observation	1. Noise level in dB 2. Number of complaints received from the community 3. Number of time heavy duties were maintained	Daily during the construction exercises	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,200
1 2		During implementation of civil works	1. In-Situ measurement of suspended sediment and flow i. Ensure free flow of water in channels ii. Prevent mudflow into the water channel	In-Situ Measurement of visual observation	1. Water level in channels during construction 2. Physical presence of objects, fly rock e.g. deposited along the courses of rivers 3. Number of acceptable erosion/ flood control measure	Weekly and more frequently during wet season	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,000

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Table 6.9: Monitoring for Mitigation Measures for the Biological Impacts in the Construction Phase During Project Implementation

S/N	Proposed Project Activities	Potential Environmental and Social Impact	Monitoring		Monitoring Indicators	Frequency	Responsibility			Cost (\$)
			Project Implementation	Mitigation Measures			Project Implementation	Mitigation Measures	Surveillance and Control	
1	Clearing of forest	Impact on flora and fauna	Visual observation	Visual Observation	1. Area cleared outside the gully remediation corridor 2. Extent of area cleared for installation 3. Number of trees planted and area extent of lawns developed	Daily during construction phase	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	3,000
2.		Impact on Wildlife	* Visual Observation * Visual Estimate of Cover	* Visual Observation * Visual Estimate of Cover	1. Number and extent of protected/ conserved area developed 2. Number of tree planted	Site engineer and/or contractor	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	2,000
	Sub-Total									5,000

Table 6.10: Monitoring for Mitigation Measures for the Socioeconomic Impact During Project Implementation

S/N	Proposed Project Activities	Potential Environmental and Social Impact	Monitoring		Monitoring Indicators	Frequency	Responsibility			Cost (\$)
			Project	Mitigation			Project	Mitigation	Surveillance	

			Implementation	Measures			Implementation	Measures	and Control	
1	Mobility of machineries and materials	Obstruction to free flow of traffic during maintenance, increase cost of transportation in the area	During implementation of civil works	Ensure free flow of traffic and traffic officials and signals are strategically positioned at specific junctions to provide safety guidelines and ensure free flow of traffic within the project area/ corridor	1. Number of road signs and traffic officials present 2. Number of community complaints received on traffic issues	Every day during the construction phase	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,025
2.		Accident and Road crashes	During implementation of civil works	Traffic officials and signals are strategically positioned at specific junctions to provide safety guideline	1. Number of road signs in the corridor of movement 2. Number of traffic officials present during construction 3. Number of sensitization and awareness campaign conducted 4. Number of complaints made by the project affected community members	Every day during the construction phase	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,500
3.		Unemployment/ employment opportunities	During implementation of civil works	Guidelines for the engagement of locals by the contractors local engagement to be parts of contractors agreement	1. Availability of a functional unit monitoring compliance status 2. Availability of staff job descriptions recruitments and engagement 3. Numbers of local people employed at as both skilled and unskilled	Every day during the construction phase	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,200

					workers					
4.		Human displacement	As spelt out in the RAP report	As spelt out in the RAP report	1. No of PAPs 2. Amount of compensation paid 3. No. of PAPs (requiring involuntary resettlement)	As spelt out in the RAP report	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,300
5.		Aesthetics	During implementation of civil works	1. Number of ornamental uses planted 2. Area extent of garden and parks provided	Regularly during the construction phase	Regularly during the construction phase	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,500
	Sub-Total								6,750	

Table 6.11: Monitoring for Mitigation Measures for the Public Health Impacts in the Construction Phase during Project Implementation

S/N	Proposed Project Activities	Potential Environmental and Social Impact	Monitoring		Monitoring Indicators	Frequency	Responsibility			Cost (\$)
			Project Implementation	Mitigation Measures			Project Implementation	Mitigation Measures	Surveillance and Control	
1	Sexual activities	HIV/AIDs	Before and during implementation of civil works	Public awareness and training to both locals and migrant workers	1. Number of HIV/AIDs and STDs awareness 2. Preventive measures introduced 3. No of community complaints received 4. No of people affected by HIV/AIDs and STD	Constantly, during the construction phase in weekly basis	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	2,500
2.	Domestic Water Usage	Water borne diseases	During implementation	Provision of functional waste management plan maintaining a clean work environment	1. Availability of waste management plan for perusal by the contractor 2. System to practice to manage waste and water borne	Daily, during the civil work activities	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	3,300

					diseases					
					3. Cleanliness of the specific work site					
3.	Malaria	Malaria issue	During implementation	Health awareness campaign		Regularly, right through the construction phase	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	2.300
Sub-Total									\$8,300	

Table 6.12: Monitoring for Operation Phase during Project Implementation

S/N	Proposed Project Activities	Potential Environmental and Social Impact	Monitoring		Monitoring Indicators	Frequency	Responsibility			Cost (\$)
			Project Implementation	Mitigation Measures			Project Implementation	Mitigation Measures	Surveillance and Control	
1	<ul style="list-style-type: none"> • Operation of drainage, • Routine maintenance, and • Security of facilities • Regular inspection, • Desilting and clearance of drains & manholes • Desilting drainage channels • Repair of damaged engineering structure, • Clearing of drainage channels to prevent mosquitoes • Training of operators • Maintenance of equipment used sanitation and waste management system 	Generation of waste spill of oil from equipment, loss of vegetation around detention ponds	During implementation	Maintenance operations should be designed according to environmental safety guidelines of Nasarawa State Ministry of Environment and Public Utilities/ Federal Ministry of Environment.	1. Number of maintenance conducted per year.	Quarterly during the operation phase of the project	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1.400
2.	Air quality	Air quality issues (Dust	In-situ measurement during implementation	Sprinkle water daily	1. Noise level in db during operation 2. Number of	Weekly, throughout the operation phase of	Contractor	Nasarawa State NEWMAP, Nasarawa State	Site Engineer	1,500

			on	regular assessment of airborne particulate matter Provision of PPEs – nose mask, eye goggles, cover all to site workers	time water is sprinkled on daily bases during dry season 3. Level of airborne particulate mater 4. Number of community complaints received	the project.		Ministry of Environment		
3.	Noise and vibration	Noise and Vibration issues	In-Situ Measurement of machineries	1. Noise level in dB during communication 2. Number of community complaints received		Weekly, throughout the operation phase of the project.	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,700
4.	Water quality	Water Quality issues (water pollution)	In-Situ measurement Measurement during operation	Provision of mobile toilet maintenance of good water storage facility proper waste management	1. Number of mobile toilet provided 2. Type of storage facility provided 3. Location of dumpsite	Weekly, throughout the operation phase of the project.	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,800
5.	Traffic and transport	Obstruction to free flow of traffic	during operation	Liaise with relevant agencies throughout the operational phase to ensure that traffic safety is maintained and ensured during the period	1. Number of traffic ... available 2. Number awareness campaign throughout the operation phase	Daily for traffic officers and quarterly for awareness campaign throughout the operation phase	Nasarawa State Ministries Transport Works and Infrastructure	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,150
6.	Health and Safety	Health and safety issues (diseases and accidents)	During operation	Ensure water pollution free environment PPEs Safety talk	1. No of complaints about pollution due to operations 2. Number of workers with PPEs	Quarterly throughout the operation phase of the project.	Contractor	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,200

					3. Number of FRSC and police present in the area 4. Number of safety talk and awareness conducted					
7.	Sand Mining in rehabilitated channel	Land degradation	Visual sighting during operation	Ensure channels and ponds desilting is done using best practices	1. Number of truckloads of sand evacuated from the channels	Weekly	Environmental Officer, SPMU and Environmental officer Nasarawa State Ministries Environment	Nasarawa State NEWMAP, Nasarawa State Ministry of Environment	Site Engineer	1,500
Sub-Total									\$10,250	

6.5 Institutional Responsibilities and Accountabilities

Roles and responsibilities and adequate institutional arrangements are vital to the efficient execution of the environmental and social safeguard measures outlined in this ESMP. Thus, details of institutional arrangements and the roles and responsibilities of the various institutions in the implementation of the ESMP are discussed.

6.5.1 Pre-Construction Phase

6.5.1.1 Key Agencies

Main agencies with major roles in the implementation of the ESMP during the pre-construction phases are:

- The consultants;
- The Federal NEWMAP PMU;
- The Nasarawa State NEWMAP-SPMU
- Nasarawa State Ministries, Departments and Agencies (Health and Environment, Information, Land, Finance, Physical Planning and Urban Development and Agriculture);
- Community Based Organization;
- The gully sites monitoring Committees, and
- The World Bank

6.5.1.2 Role of the Involved Agencies

The key duty for monitoring of the ESMP lies with the Engineer and the Ministry of Environment and Natural Resources while the implementation of and reporting on the ESMP lies with the Contractor. At the initial stage, ground works and preparatory meetings and consultations are conducted with the gully sites monitoring committees, community based Organization (CBOs) as well as members of the concerned communities in the areas. The contractor must liaise with the Nasarawa State NEWMAP-SPMU on issues raised in order to arrive at a balance of opinion before responding to the issues. This is in order to meet international safeguard policies of the World Bank.

These concerns should be communicated to the appropriate State Ministries with their respective departments and agencies (MDAs) for prompt action on issues raised.

6.5.1.3 Reporting and Follow-Up

The gully site monitoring committees through its secretaries should forward the details of the meetings held to the Nasarawa State NEWMAP-SPMU. This is to enhance feedback, reporting and follow-up mechanisms for the issues raised and the respective means of their implementations. Any issues raised should be forwarded together with the contributions of the Nasarawa State NEWMAP, which would have reviewed the comments within the scope of the project and their suitability to World Bank needs. The Contractor must ensure that the observed comments and notes are implemented strictly as agreed upon and the feedback relayed to the Nasarawa State NEWMAP-SPMU. This process should continue through a chain of reporting-feedback, follow-up and response mechanism until the pre-construction phase is completed.

6.5.2 Construction Phase

6.5.2.1 Key Agencies

Major agencies with roles in the implementation of the ESMP during construction works are:

- The Engineer/monitoring firm;
- The Contractor;
- The Nasarawa State NEWMAP-SPMU
- The Federal NEWMAP-PMU;
- Nasarawa State Ministries, Departments and Agencies (Works and Infrastructure, Health and Environment, Agriculture and Forestry);
- The Federal Ministries of Environment (FMEnv), NESREA; and
- The World Bank
- In addition to the key agencies, the Nasarawa State Government through the MDAs also has a role in the general oversight monitoring of the ESMP implementation.

6.5.2.2 Role of Concerned Agencies

The key responsibility for monitoring and reporting on the implementation of the ESMP lies with the site engineer and contractors. Through its Environmental and Social Specialist (ESS) the contractor will be responsible for the regular supervision and reporting on ESMP implementation. The Engineer's ESS will have access to a team of experts in different fields (Water, soil, social consultant etc.) in order to ensure sufficient capacity to oversee implementation of ESMP.

The implementation of the ESMP will be managed by the Nasarawa State NEWMAP-SPMU through the Environment Officers (ESO) who will be primarily responsible for the daily inspection and monitoring of the ESMP implementation. The Nasarawa State Ministries of Works, Health, Environment and Agriculture and Forestry should monitor the ESMP implementation using the fundamentals of the internal mechanisms and policies as established by laws guiding their operations. These institutions may conduct site visits with representatives of the Federal NEWMAP-FMU. The reports of the findings should be forwarded to the World Bank.

The Federal Ministry of Environment (FMEnv) and NESREA should also send Environment Officers and Officials monitoring the ESMP project under the Federal NEWMAP approved project to observe the level of implementation

of the provisions of the ESMP and its compliance. At the local level, the Nasarawa State Ministry of Environment can also pay visits to the project site to observe and monitor the level of compliance to the provisions of the ESMP.

6.5.2.3 Reporting and Follow-Up

A follow-up process is duty-based. The Environmental and Social Specialists (ESS) of the Engineer/Monitoring Firm must prepare document, and report incidents monthly. These reports should be submitted to the Nasarawa State NEWMAP Project Coordinator for comments, observations, and recommendations. Afterward, the Nasarawa State NEWMAP-SPMU Environmental Officer or directly when urgent action is required. Impromptu checking and reporting on the implementation of follow-up action will also be part of the duties of the ESS.

The Contractor and the Site Engineer should submit monthly reports on the implementation of the ESMP to the Nasarawa State NEWMAP-SPMU. The ESS officers who will advise the project management unit should vet this report. In case of any discrepancy on environmental issues, the project coordinator should convene a Project Environmental Management Meeting (PEM) to discuss the way forward.

6.5.3 Operational and Maintenance Phase

It should be stated that mitigation and monitoring activities during the operational activities the project areas is neither the sole responsibility of the Nasarawa State NEWMAP nor the Federal NEWMAP during the operational phase. The Nasarawa State NEWMAP and the Federal NEWMAP as the managing entities of the rehabilitated gully site jointly have the responsibility to consider these measures, and to bring these to the attention of other government agencies especially the state ministry of health and environment for proper action.

6.5.3.1 Key Agencies

At the operational phase. The main institutions, which Nasarawa State NEWMAP will collaborate with include:

- Health and Environment;
- Forestry;
- Transport;
- Works and Infrastructure; and
- Police

Also, the local government administrative councils during the operational phase should have a role in the general oversight of ESMP implementation and in ESMP up-dating during the operational phase of the project.

6.5.3.2 Role of Concerned Agencies

The duties of the institutions that have roles in the process of the operation of the gully area monitoring Nasarawa state are as follows: -

- The Monitoring and Supervision Union of the Nasarawa State Ministry of Health and Environment should ensure regular/ constant visit to the site to check and confirm the gully site is operated and maintained. Monitoring activities should be conducted within the legal and administrative capacities of the Ministry of Health and Environment through their remediation departments, and agencies.
- Nasarawa State Department of Forestry should conduct regular inspections on compliance with afforestation plans, which should be in concordance with international standards.

- The Ministry of Transport or works whichever is in-charge should check the nature of vehicular traffic and road transportation pattern in the area with respect to transportation safety and vehicular control.
- The Ministry of Works should conduct normal checks on the nature of infrastructure provided within the duration of the project and the period of assessment.
- The police should ensure that crime and criminal activities are reduced to the barest minimum in order to avoid wrong attachment of criminal activities to the proposed project activities.

6.5.3.3 Institutional and Implementation Actions for the ESMP at the Local Levels

At this level, the NEWMAP ESMF vests the overall implementation of the ESMP on the site monitoring committees. The gully sites monitoring committees have already been constituted by the Nasarawa State NEWMAP and so the committees form a critical mass of source of information and community liaison during the field activity for the preparation of this ESMP. The committees have several sub-committees including the Women Wings and environmental sub-committees.

Considering the various background of the committee members and the need for adequate knowledge on the environmental procedure of the project, the committee and sub-committee members would need further capacity building on environmental and social issues concerning the implementation of the ESMP at all the stages of the implementation. Consequently, capacity strengthening and sensitization of the gully sites monitoring committees and the Environmental sub-committee members would be critical to the successful implementation of this ESMP. The content of the training should include but not limited to (i) Role of community during construction and post construction (ii) Sustainable practice to ensure gully stabilization and; (iii) Implementation of the ESMP at the local level.

6.6 Training Programmes

The Nasarawa State NEWMAP will develop, implement, and track training programmes at SPMU and community levels. Table 6.13 describes the institutional capacity strengthening plan, which should be followed at the SPMU and community levels.

Table 6:13: Institutional Capacity Strengthening Plan

S/No	Nature of capacity building	Persons/Groups	Outcome Expected	Resource Persons	Length of Training period	Cost in USD (US\$)
1.	Personnel require appreciation of WBs, Federal/ State environmental policies, as well as, an application of these policies in implementing the World Bank support for gully control sites	SPMU Training: PC, Environment and safeguards specialist, Project engineer and Social safeguards specialist. The estimated number of participants is	In-depth consideration of the mitigation measures proffered by the ESMP. Satellite image interpretation of the sites watershed imagery for critical assessment of changes	Remote sensing and environmental science specialist	4 days seminar	10,000

		Ten (10) persons per area	overtime.			
2.	NEWMAP Institutional arrangements largest audience responsible for site monitoring and liaison between community and the Nasarawa State NEWMAP and contractors	Community Training: Gully sites monitoring committees' members. The estimated number of participant is Twenty Five (25) persons	General Environmental awareness seminar that will include ecological and social science principles, as it affects the gully site. Mitigation measures proffered in the ESMP.	Remote sensing and environmental science specialist	1 day workshop	5,000
	Total				15,000	

6.7 Implementation Schedule

An implementation schedule gives a clear-cut direction on the timeline for the implementation of the stipulated mitigation measures. It is anticipated that each of the stated measures should be time-based for suitable implementation and appropriate monitoring. Table 6.14 documents the schedule for the mitigation measures with respective time lapse in each of the project sites

Table 6.14: ESMP Implementation Schedule at each Site

S/N	Mitigation	Mitigation Timeline (Monthly)																									
		1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th	12 th	13 th	14 th	15 th	16 th	17 th	18 th	19 th	20 th	21 st	22 nd	23 rd	24 th		
1.	Pre-construction phase																										
	i. Land Acquisition																										
	ii. Community sensitivity of the project																										
2.	Construction phase																										
	1. Environmental impacts																										
	2. Biological impacts																										
	3. Socioeconomic impacts																										
	4. Public Health																										

	Nasarawa State NEWMAP including the purchase of safety imageries over time.	10,000
	Community	5,000
	Total for Institutional Capacity	15,000
	Grand Total	\$67,105

6.9 Grievance Redress Mechanism

A Grievance Redress Committee(GRC) will be set up by the Nasarawa State NEWMAP-SPMU to address complaints arising from project implementation. This committee will comprise relevant officers (legal, safeguards, engineering) of the SPMU, representative of the Ministry of Environment and Natural Resources, representative of the various communities who are nominated by the traditional heads of these communities. The committee shall report to the Chairman NEWMAP Technical Committee, Ministry of Environment. The GRC shall work in synergy with the Site Committees and the Contractors’ Health and safety officer. The functions of the Grievance Redress committee are:

- Provide support to Project Affected Persons(PAPs) on problems arising from pollution of environmental media: - water, land and air, arising from the project implementation.
- Record the grievance of the PAPs, categorize and prioritize the grievances that need to be resolved by the committee, and
- Report to the aggrieved parties about the developments regarding their grievances and the decision of the project authorities.

The main objective of the procedure will be to provide a mechanism to mediate conflict and cut down on lengthy litigation, which often delays such developmental projects. It will also provide people who might have objections or concerns about the impacts of the project, a public forum to raise their objections and address these issues adequately.

The committee will provide many opportunities to redress complaints informally, in addition to the existing formal administrative and legal procedures. However, the major grievances that might require mitigation include: -

- PAPs at risk of the project impacts;
- Pollution of the water bodies in the area from project activities
- Danger or loss of lives due to inadequate safety measures;
- Insecurity, cases of theft and sexual abuse;
- Conflict of interest between project and the community;
- Delay in response to the concerns of PAPs

6.10.1 Health, Safety, Security and Environment (HSE)

The project shall be guided by the metrics below for regular reporting:

- a. environmental incidents or non-compliances with contract requirements, including land air and water 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. Borrow pit, 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 of 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 each month and highlights of environmental and social protection (land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation);
- e. Health and safety supervision:
 - i. safety officer: number of days worked, number of full inspection & 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 expatriate 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: providers 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 expatriates and locals separately); number of female workers, percentage of workforce, gender issue 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, number of workers receiving training (each month and in the past); same questions for gender sensitization, flag lady/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 violation 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 centre, community centres, etc.), highlights of activities (including violations of environmental and/or social requirements observed, action taken), reports to environmental and/or social specialist/construction/site management; and
- xi. community liaison person(s): days worked (hours community centre open), number of people met, highlights of activities (issues raised, etc.) report to environmental and/or social specialist/construction/site management.
- k. Grievance: list each month's and unresolved past grievances by date received, complainant, how received, to whom referred to for action, resolution and date (if completed), date resolution report 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 accident 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 vehicle/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 browsers, number of watering/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, action 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 each month at each location 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 notice, evacuations, etc.) incidents of off-site damage of complaints (cross-reference other sections as needed).

- xxi. spill clean-ups, if any: material spilled, location, amount, action 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 each month;
 - xxiv. details of water and swamp protection mitigations required undertaken this month if required.
- 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.

6.10.2.1 HEALTH, SAFETY, AND SECURITY MANAGEMENT PLAN

The Health, Safety, and Security Management Plan for the Project will comply with all Nasarawa State requirements as well as international best practices. It will address measures for hygiene, health, and safety at the work place and include an ongoing training programme for all employees' project beneficiaries. Nasarawa State Ministry of Environment will provide the necessary safety equipment to its employees. The plan will address issues such as:

- The proper provision and use of personnel protective equipment (PPE) such as safety boots, respirators, eye protection, hearing protection, gloves, and hardhats during construction and site visit;
- Analysis of risks associated with job activities in order to develop standard requirements for PPE on a job-specific and station-specific basis;
- Provision of training on the proper use of PPE and penalties for the improper use of PPE;
- Training on the proper and safe use of all equipment to be used on site;
- Physical barriers so that unauthorized personnel are not admitted to areas where gully rehabilitation and restoration using dangerous equipment is taking place;
- Training related to job-specific risks and activities; including:
- Mechanical equipment (e.g. crushing of gully fingers, wounds, equipment shock);
- Lifting devices (e.g. crushing risk, injury caused by appurtenances, falling, collision); Nasarawa State Nigeria Erosion and Watershed Management
- Machinery and vehicles (e.g. risk of accident on contact with other materials, collision with or knocking down of persons, obstacle shock, fall by the operator, collision with a vehicle or machine);
- Hand tools, electric or other welding equipment (e.g. risk of injury, electrocution, poisoning, dazzle);
- Workshops and garages (e.g. risk of mechanical injury, shock and collision with machines);

- Also, the Health, Safety, and Security Management Plan will address safety in “Confined Spaces and Excavations. Examples of likely confined spaces of the proposed include: hoppers, utility vaults, tanks, sewers, pipes, access shafts, ditches and trenches. The occupational hazards associated with confined spaces and excavations should be prevented according to the following recommendations:
- Controlling site-specific factors which may contribute to excavation slope instability including, for example, the use of excavation dewatering, side-walls support, and slope gradient adjustments that eliminate or minimize the risk of collapse, entrapment, or drowning;
- Providing safe means of access and egress from excavations, such as graded slopes, graded access route, or stairs and ladders; and
- Avoiding the operation of combustion equipment for prolonged periods inside excavations areas where other workers are required to enter unless the area is actively ventilated.

6.10.2.2 COMMUNITY HEALTH & SAFETY PLAN

The purpose of the Community Health and Safety Plan is to address the potential impacts on the human population living in and around the settlement within the project vicinity. These mitigation measures include:

- Construction activities can draw significant numbers of single men and others attracted by the opportunity to provide goods and services to construction workers and project beneficiaries with disposable income. Some of these activities such as alcohol, drugs, and sex trade can lead to increased crime and diseases, including HIV/AIDS, so Nasarawa State Ministry of Environment /Nasarawa State Nigeria Erosion and Watershed Management Project

Works / Contractors will attempt to recruit most of the construction workers from the immediate area, thus minimizing the number of single men migrating for work;

- The Nasarawa State Ministry of Environment will also ensure that it and its contractors provide adequate training and enforcement codes of conduct to minimize worker participation in risky activities such as sex trade, drugs, and alcohol;
- The Nasarawa State Ministry of Environment will conduct sensitization of local communities regarding potential impacts from construction workers and inform those communities about the terms and conditions of Nasarawa State Ministry of Environment Worker Code of Conduct;
- The Nasarawa State NEWMAP PMU will conduct community training and awareness programmes to ensure that the local population understands the risks of participating in risky economic activities (drugs, sex trade, alcohol) for short-term economic gain;
- The Nasarawa State Ministry of Environment will coordinate with local Government Councils to ensure that they fully understand the risks of large-scale construction activities and support Nasarawa State Ministry of Environment efforts from a law enforcement perspective;
- The Nasarawa State Ministry of Environment will work closely with the health districts of the Ministry of Health in the State and promote sensitization campaigns to help the local population avoid risky activities; and
- Nasarawa State Ministry of Environment will work closely with the health districts to monitor the incidence of diseases and other health measures that has indicated a need for further intervention to protect community health and safety.

6.11 Labour influx and Gender Based-Violence (GBV)

6.11.1 Labour Influx

The project may face an influx of non-local labour and working conditions issues as skilled labourers might not be available in the project areas. The project shall take concrete measures to mitigate potential labour influx-related

risks such as workers' sexual relations with minors and resulting pregnancies, presence of sex workers in the community, the spread of HIV/AIDSs, sexual harassment of female employees, child labour and abuse, increased dropout rate from school, inadequate resettlement practices, and fear of retaliation, failure to ensure community participation, poor labour practice, and lack of road safety. These risks require careful consideration to improve social and environmental sustainability, resilience and social cohesion. Therefore, the project shall include mitigation measures such as (a) assessing living conditions of workers' camps and ensuring appropriate living conditions, (b) establishing and enforcing a mandatory code of conduct for the company, managers and workers, and an Action Plan for implementation; (c) ensuring appropriate location for these camps; (d) taking countermeasures – indicated in the Social Management Plan – to reduce the impact of the labour influx on the public services; and, (e) devising and implementing a strategy for maximizing employment opportunities for local population, including women. The following guidelines lays out the principles that will guide the management of adverse impacts that may result from temporary NEWMAP induced labour influx into the project communities.

- The SPMU shall have to hire, to the maximum extent, skilled and unskilled workers from affected communities in the project area. The SPMU shall adopt or implement all possible measures to avoid if not minimize labour influx into the project area.
- The SPMU shall assess and manage labour influx risk based on appropriate instruments such as those based on risks identified. Depending on the risk factors and their level, appropriate mitigation instruments need to be developed including the ESMP, Site-specific Labour Influx Management Plan and/or a Workers' Camp Management Plan²,
- Risk factors to the SPMU that shall be considered, include,
 - predominant presence of contractors without strong worker management and health and safety policies;
 - anticipated high volumes of labour influx;
 - pre-existing social conflicts or tensions;
 - weak local law enforcement,
 - prevalence of gender-based violence and social norms towards it in the community (acceptance of gender based violence);
 - prevalence of transactional sex;
 - local prevalence of child and forced labour;
 - existing conflict situation between communities;
 - absorption capacity of workers to the community (See <http://pubdocs.worldbank.org/en/497851495202591233/Managing-Risk-of-Adverse-impact-from-project-labor-influx.pdf>).
 - The SPMU will incorporate social and environmental mitigation measures into the civil works contract and responsibilities for managing these adverse impacts. This will be building a contractual obligation on the SPMU, with appropriate mechanisms for addressing non-compliance.

The Supervision Consultant shall be responsible for monitoring the contract performance and adherence to the labour influx guideline and that of its Sexual Exploitation and Abuse (SEA) obligations, with a protocol in place for immediate, timely, mandatory and confidential reporting in case of incidents to project community.

This allows the SPMU to enforce the implementation of such mitigation measures, which are required to ensure that the consultants own compliance with World Bank policy requirements.

6.11.2 Gender Based Violence (GBV)

Nigeria is among the 10 percent of countries worldwide that exhibit the highest levels of gender discrimination according to the Social Institutions and Gender Index. Some of the categories of gender discrimination in Nigeria include; discriminatory family code, restricted physical integrity, son bias, restricted resources and assets and restricted civil liberties. It also falls into the group of countries with highest gender inequality in human development outcomes (UNDP 2016). However, Gender-Based Violence (GBV) remains pervasive and underreported in the country, largely constraining women’s autonomy and life chances. The 2013 Demographic Health Survey (DHS) indicates that nationally 38 percent of women between the ages of 15-49 have experienced some form of physical or sexual violence from the age of 15, and 11 percent experienced physical violence within the 12 months prior to the survey. 45 percent of women who experienced violence never sought help or never told anyone about the violence. Besides interpersonal and sexual violence, child marriage and Female Genital Mutilation are the other culturally harmful practices prevalent across Nigeria. Culturally Nasarawa State falls amongst the states in Nigeria with early child marriage and sexual violence. In 2018 it was reported in Doma, one of the intervention areas of sexual exploitation by a man of over 27years of a girl child less than six months old. Specifically, GBV risks in the project target areas might include; Intimate Partner violence (IPV), public harassment including harassment, verbal insults, physical abuse, rape, harmful widowhood practices and women and child trafficking, sexual violence and exploitation.

6.11.3 GBV Risk Management Mechanisms

A GBV workshop to sensitize the SPMU staff on the key principles and specific requirements to address GBV/SEA shall be included in the bidding documents (‘pre-qualification’ and ‘employers’ requirements’). As such specific measures to reduce and mitigate the risk of GBV/SEA in the project include:

- i) GBV/SEA assessment of project;
- ii) Mandatory contractors’ code of conduct on sexual harassment;
- iii) Appointment of NGO to monitor GBV/SEA during construction
- iv) Community and workers’ sensitization on GBV,
- v) Provision of referral units for survivors of GBV/SEA;
- vi) Contractor and consultants’ requirement to ensure a minimum target of female employment with incremental rewards of the attainment of this target.

- vii) Developing a clear internal ‘Reporting and Response Protocol’ to guide relevant stakeholders in case of GBV/SEA incidents;
- viii) Strengthening operational processes of SPMU on GBV/SEA in the project areas,
- ix) Identifying development partners and cultivating pragmatic partnership on GBV/SEA prevention measures and referral services.
- x) Developing Codes of Conduct for civil works contractors with prohibitions against GBV/SEA;
- xi) Strengthening consultations and operationalizing GBV/SEA specific grievance redress mechanisms;
- xii) Providing financial support for implementation of the GBV/SEA actions described herein, including training and awareness building for various stakeholders;
- xiii) Establishing inter-ministerial committee to advance GBV/SEA actions described above.

6.12 ESMP Disclosures

After a review and clearance by the World Bank, the ESMP will be disclosed at the FMEnv, SMEnv and host LGA offices as well as at the communities designated points. The purpose will be to inform stakeholders about the project activities, impacts, anticipated and proposed environmental management actions. The purpose is also to obtain the certificate of conformity from the Federal Ministry of Environment.

The ESMP will be subjected to mandatory Technical Review as scheduled by Federal Ministry of Environment followed by the Impact Mitigation Monitoring (IMM) exercise for the purpose of Certification.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This Environmental and Social Management Plan (ESMP) has provided a distinct operational guide, including actionable plans, to incorporate environmental and social considerations into the proposed gully rehabilitation project at the gully sites located in Keffi areas of Nasarawa State, Nigeria. The biophysical and social baseline information of the proposed intervention areas were assessed. The study also, identified susceptible environmental parameters which may be positively or negatively impacted upon at the different identified phases of the project development, and presented the necessary mitigation measures for such identified impacts.

Since the development objective of Nasarawa State NEWMAP project is to remove gully induced damage and reduce longer-term gully vulnerability in targeted areas, this ESMP designed for the proposed NAS-NEWMAP interventions, also adequately provides the guidelines for achieving the NAS-NEWMAP objectives without compromising the tangible and intangible human and environmental values within the proposed project areas. A full implementation of the activities proposed in this ESMP to ensure sustainable development of the gully erosion sites intervention projects is therefore recommended.

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APPENDICES

Appendix #1

GENERAL ENVIRONMENTAL MANAGEMENT CONDITIONS GUIDELINES FOR CONSTRUCTION CONTRACTS	
General	<ol style="list-style-type: none"> 1. In addition to these general conditions, the Contractor shall comply with any specific Environmental Management Plan (EMP) in the Environmental and Social Management Plan (ESMP). The Contractor shall inform himself about such EMP, and prepare his work strategy and plan to fully take into account relevant provisions of the EMP. If the Contractor fails to implement the approved EMP after written instruction by the Supervising Environmental Officer (EO) to fulfill his obligation within the requested time, the Owner reserves the right to arrange through the EO for execution of the missing action by a third party on account of the Contractor. 2. Notwithstanding the Contractor’s obligation under the above clause, the Contractor shall implement all measures necessary to avoid undesirable adverse environmental and social impacts wherever possible, restore work sites to acceptable standards, and abide by any environmental performance requirements specified in an EMP. In general, these measures shall include but not limited to: <ol style="list-style-type: none"> (a) Minimize the effect of dust on the surrounding environment resulting from earth mixing sites, asphalt mixing sites, dispersing coal ashes, vibrating equipment, temporary access infrastructure such as roads, etc. to ensure safety, health and the protection of workers and communities living in the vicinity dust producing activities. (b) Ensure that noise levels emanating from machinery, vehicles and noisy construction activities (e.g. excavation, blasting) are kept at a minimum for the safety, health and protection of workers within the vicinity of high noise levels and nearby communities. (c) Ensure that existing water flow regimes in rivers, streams and other natural or irrigation channels is maintained and/or re-established where they are disrupted due to works being carried out. (d) Prevent bitumen, oils, lubricants and waste water used or produced during the execution of works from entering into rivers, streams, irrigation channels and other natural water bodies/reservoirs, and also ensure that stagnant water in uncovered burrow pits is treated in the best way to avoid creating possible breeding grounds for mosquitoes. (e) Prevent and minimize the impacts of quarrying, earth burrowing, piling and building of temporary construction camps and access infrastructure such as roads on the biophysical environment including protected areas and arable lands; local communities and their settlements. In as much as possible restore/rehabilitate all sites to acceptable standards. (f) Upon discovery of ancient heritage, relics or anything that might or believed to be of archaeological or historical importance during the execution of works, immediately report such findings to the SE so that the appropriate authorities may be expeditiously contacted for fulfilment of the measures aimed at protecting such historical or archaeological resources. (g) Discourage construction workers from engaging in the exploitation of natural resources such as hunting, fishing, collection of forest products or any other activity that might have a negative impact on the social and economic welfare of the local communities. (h) Implement soil erosion control measures in order to avoid surface run off and prevents siltation, etc. (i) Ensure that garbage, sanitation and drinking water facilities are provided in construction workers camps. (j) Ensure that, in as much as possible, local materials are used to avoid importation of foreign material and long distance transportation. (k) Ensure public safety, and meet traffic safety requirements for the operation of work to avoid accidents. 3. The Contractor shall indicate the period within which he/she shall maintain status on site after completion of civil works to ensure that significant adverse impacts arising from such works have been appropriately addressed. 4. The Contractor shall adhere to the proposed activity implementation schedule and the monitoring plan / strategy to ensure effective feedback of monitoring information to project management so that impact management can be implemented properly, and if necessary, adapt to changing and unforeseen conditions. 5. Besides the regular inspection of the sites by the Nasarawa State NEWMAP and other supervising agencies for adherence to the contract conditions and specifications, the Owner may appoint an Inspector to oversee the compliance with these environmental conditions and any proposed mitigation measures. State environmental authorities may carry out similar inspection duties. In all cases, as directed by the EO, the Contractor shall comply with directives from such inspectors to implement measures required to ensure the adequacy rehabilitation measures carried out on the bio-physical environment and compensation for socio-economic disruption resulting from implementation of any works.
Worksite/Campsite Waste Management	<ol style="list-style-type: none"> 6. All vessels (drums, containers, bags, etc.) containing oil/fuel/surfacing materials and other hazardous chemicals shall be banded in order to contain spillage. All waste containers, litter and any other waste generated during the construction shall be collected and disposed off at designated disposal sites in line with applicable government waste management regulations.

7. All drainage and effluent from storage areas, workshops and camp sites shall be captured and treated before being discharged into the drainage system in line with applicable government water pollution control regulations.
8. Used oil from maintenance shall be collected and disposed off appropriately at designated sites or be re-used or sold for re-use locally.
9. Entry of runoff to the site shall be restricted by constructing diversion channels or holding structures such as banks, drains, dams, etc. to reduce the potential of soil erosion and water pollution.
10. Construction waste shall not be left in stockpiles along the infrastructure such as road, but removed and reused or disposed of on a daily basis.
11. If disposal sites for clean spoil are necessary, they shall be located in areas, approved by the SE, of low land use value and where they will not result in material being easily washed into drainage channels. Whenever possible, spoil materials should be placed in low-lying areas and should be compacted and planted with species indigenous to the locality.

Material Excavation and Deposit

12. The Contractor shall obtain appropriate licenses/permits from relevant authorities to operate quarries or burrow areas.
13. The location of quarries and burrow areas shall be subject to approval by relevant local and national authorities, including traditional authorities if the land on which the quarry or burrow areas fall in traditional land.
14. New extraction sites:
 - (a) Shall not be located in the vicinity of settlement areas, cultural sites, wetlands or any other valued ecosystem component, or on high or steep ground or in areas of high scenic value, and shall not be located less than 1km from such areas.
 - (b) Shall not be located adjacent to stream channels wherever possible to avoid siltation of river channels. Where they are located near water sources, burrow pits and perimeter drains shall surround quarry sites.
 - (c) Shall not be located in archaeological areas. Excavations in the vicinity of such areas shall proceed with great care and shall be done in the presence of government authorities having a mandate for their protection.
 - (d) Shall not be located in forest reserves. However, where there are no other alternatives, permission shall be obtained from the appropriate authorities and an environmental impact study shall be conducted.
 - (e) Shall be easily rehabilitated. Areas with minimal vegetation cover such as flat and bare ground, or areas covered with grass only or covered with shrubs less than 1.5m in height, are preferred.
 - (f) Shall have clearly demarcated and marked boundaries to minimize vegetation clearing.
15. Vegetation clearing shall be restricted to the area required for safe operation of construction work. Vegetation clearing shall not be done more than two months in advance of operations.
16. Stockpile areas shall be located in areas where trees can act as buffers to prevent dust pollution. Perimeter drains shall be built around stockpile areas. Sediment and other pollutant traps shall be located at drainage exits from workings.
17. The Contractor shall deposit any excess material in accordance with the principles of the general conditions, and any applicable EMP, in areas approved by local authorities and/or the SE.
18. Areas for depositing hazardous materials such as contaminated liquid and solid materials shall be approved by the SE and appropriate local and/or national authorities before the commencement of work. Use of existing, approved sites shall be preferred over the establishment of new sites.

Rehabilitation and Soil Erosion Prevention

19. To the extent practicable, the Contractor shall rehabilitate the site progressively so that the rate of rehabilitation is similar to the rate of construction.
20. Always remove and retain topsoil for subsequent rehabilitation. Soils shall not be stripped when they are wet as this can lead to soil compaction and loss of structure.
21. Topsoil shall not be stored in large heaps. Low mounds of no more than 1 to 2m high are recommended.
22. Re-vegetate stockpiles to protect the soil from erosion, discourage weeds and maintain an active population of beneficial soil microbes.
23. Locate stockpiles where they will not be disturbed by future construction activities.
24. To the extent practicable, reinstate natural drainage patterns where they have been altered or impaired.
25. Remove toxic materials and dispose of them in designated sites. Backfill excavated areas with soils or overburden that is free of foreign material that could pollute groundwater and soil.
26. Identify potentially toxic overburden and screen with suitable material to prevent mobilization of toxins.
27. Ensure reshaped land is formed so as to be inherently stable, adequately drained and suitable for the desired long-term land use, and allow natural regeneration of vegetation.
28. Minimize the long-term visual impact by creating landforms that are compatible with the adjacent landscape.
29. Minimize erosion by wind and water both during and after the process of reinstatement.
30. Compacted surfaces shall be deep ripped to relieve compaction unless subsurface conditions dictate otherwise.
31. Revegetate with plant species that will control erosion, provide vegetative diversity and, through succession, contribute to a resilient ecosystem. The choice of plant species for rehabilitation shall be done in consultation with local research institutions, forest department and the local people.

Water Resources Management

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

33. Abstraction of both surface and underground water shall only be done with the consultation of the local community and after obtaining a permit from the relevant Water Authority.
34. Abstraction of water from wetlands shall be avoided. Where necessary, authority has to be obtained from relevant authorities.
35. Temporary damming of streams and rivers shall be done in such a way avoids disrupting water supplies to communities downstream, and maintains the ecological balance of the river system.
36. No construction water containing spoils or site effluent, especially cement and oil, shall be allowed to flow into natural water drainage courses.
37. Wash water from washing out of equipment shall not be discharged into water courses or infrastructure such as road drains.
38. Site spoils and temporary stockpiles shall be located away from the drainage system, and surface run off shall be directed away from stockpiles to prevent erosion.

Traffic Management

39. Location of access infrastructure such as roads/detours shall be done in consultation with the local community especially in important or sensitive environments. Access infrastructure such as roads shall not traverse wetland areas.
40. Upon the completion of civil works, all access infrastructure such as roads shall be ripped and rehabilitated.
41. Access infrastructure such as roads shall be sprinkled with water at least five times a day in settled areas, and three times in unsettled areas, to suppress dust emissions.

Blasting

42. Blasting activities shall not take place less than 2km from settlement areas, cultural sites, or wetlands without the permission of the SE.
43. Blasting activities shall be done during working hours, and local communities shall be consulted on the proposed blasting times.
44. Noise levels reaching the communities from blasting activities shall not exceed 90 decibels.

Disposal of Unusable Elements

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

46. As far as possible, abandoned pipelines shall remain in place. Where for any reason no alternative alignment for the new pipeline is possible, the old pipes shall be safely removed and stored at a safe place to be agreed upon with the SE and the local authorities concerned.
47. AC-pipes as well as broken parts thereof have to be treated as hazardous material and disposed of as specified above.
48. Unsuitable and demolished elements shall be dismantled to a size fitting on ordinary trucks for transport.

Health and Safety

49. In advance of the construction work, the Contractor shall mount an awareness and hygiene campaign. Workers and local residents shall be sensitized on health risks particularly of AIDS.
50. Adequate infrastructure such as road signs to warn pedestrians and motorists of construction activities, diversions, etc. shall be provided at appropriate points.
51. Construction vehicles shall not exceed maximum speed limit of 40km per hour.

Prohibition of Forced or Compulsory Labour

The Contractor shall not employ forced labour, which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labour, such as indentured labour, bonded labour or similar labour-contracting arrangements

Prohibition of Harmful Child Labour

The Contractor shall not employ children in a manner that is economically exploitative, or is likely to be hazardous, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. Where the relevant labour laws of the Country have provisions for employment of minors, the Contractor shall follow those laws applicable to the Contractor. Children below the age of 18 years shall not be employed in dangerous work

Repair of Private Property

52. Should the Contractor, deliberately or accidentally, damage private property, he shall repair the property to the owner's satisfaction and at his own cost. For each repair, the Contractor shall obtain from the owner a certificate that the damage has been made good satisfactorily in order to indemnify the Client from subsequent claims.
53. In cases where compensation for inconveniences, damage of crops etc. are claimed by the owner, the Client has to be informed by the Contractor through the SE. This compensation is in general settled under the responsibility of the Client before signing the Contract. In unforeseeable cases, the respective administrative entities of the Client will take care of compensation.

Contractor's Environment, Health and Safety Management Plan (EHS-MP)

54. Within 6 weeks of signing the Contract, the Contractor shall prepare an EHS-MP to ensure the adequate management of the health, safety, environmental and social aspects of the works, including implementation of the requirements of these general conditions and any specific requirements of an EMP for the works. The Contractor's EHS-MP will serve two main purposes:
 - For the Contractor, for internal purposes, to ensure that all measures are in place for adequate EHS management, and as an

- operational manual for his staff.
- For the Client, supported where necessary by a SE, to ensure that the Contractor is fully prepared for the adequate management of the EHS aspects of the project, and as a basis for monitoring of the Contractor’s EHS performance.

The Contractor shall at all times take all reasonable precautions to maintain the environment and social component of the community. In collaboration with local environment authorities, the Contractor shall ensure that mitigation measures proffered in the ESMP is complied with

The Contractor shall appoint an environment officer at the Site, responsible for implementing and reporting on the environmental and social management plan. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take action as required in the ESMP throughout the execution of the Works, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority.

The Contractor shall send, to the **Environment Officer of the Supervising Engineer**, details of **environment and social breaches** as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning the ESMP mitigation implementation on site during the construction phase. It is required that the contractor keeps and maintains the following records and made them available for inspection audits by SPMU Environment Officer:

A register of environmental complaints defining the nature of complaint, date of complaint, corrective action taken and date it was recorded, A register of incidents such as spillages and leakages including the date, nature of the incident and corrective action taken; Date on types and quantities of waste removed from the site, Records of formal consultation or communication activities, Site inspection checklist as the Engineer may reasonably require.

55. The Contractor’s EHS-MP shall provide at least:
 - a description of procedures and methods for complying with these general environmental management conditions, and any specific conditions specified in an EMP;
 - a description of specific mitigation measures that will be implemented in order to minimize adverse impacts;
 - a description of all planned monitoring activities (e.g. sediment discharges from burrow areas) and the reporting thereof; and
 - the internal organizational, management and reporting mechanisms put in place for such.
56. The Contractor’s EHS-MP will be reviewed and approved by the Client before start of the works. This review should demonstrate if the Contractor’s EHS-MP covers all of the identified impacts, and has defined appropriate measures to counteract any potential impacts.

EHS Reporting

57. The Contractor shall prepare bi-weekly progress reports to the SE on compliance with these general conditions, the project EMP if any, and his own EHS-MP. An example format for a Contractor EHS report is portrayed in Annex 6. It is expected that the Contractor’s reports will include information on:

- EHS management actions/measures taken, including approvals sought from local or national authorities;
 - Problems encountered in relation to EHS 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 EHS aspects; and
 - Observations, concerns raised and/or decisions taken with regard to EHS management during site meetings.
58. It is advisable that reporting of significant EHS incidents be done “as soon as practicable”. Such incident reporting shall therefore be done individually. Also, it is advisable that the Contractor keep his own records on health, safety and welfare of persons, and damage to property. It is advisable to include such records, as well as copies of incident reports, as Annexes to the bi-weekly reports. A sample format for an incident notification is shown below. Details of EHS performance will be reported to the Client through the SE’s reports to the Client.

Training of Contractor’s Personnel

59. The Contractor shall provide sufficient training to his own personnel to ensure that they are all aware of the relevant aspects of these general conditions, any project EMP, and his own EHS-MP, and are able to fulfil **their** expected roles and functions. Specific training should be provided to those employees that have particular responsibilities associated with the implementation of the EHS-MP. General topics should be:
 - EHS in general (working procedures);
 - emergency procedures; and
 - social and cultural aspects (awareness raising on social issues).

Cost of Compliance

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

3. Example Format: EHS Report

Contract: Period of reporting:
EHS Management Actions/Measures:

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

EHS incidents:

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

EHS compliance:

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

Changes:

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

Concerns and observations:

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

Signature (Name, Title Date):

Contractor Representative

EHS Incident Notification

Provide within 24 hrs to the Supervising Engineer

Originators Reference No:

Date of Incident: **Time:**

Location of incident:

Name of Person(s) involved:

Employing Company:

Type of Incident:

Description of Incident:

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

Immediate Action:

Immediate remedial action and actions taken to prevent reoccurrence or escalation

Signature (Name, Title, Date):

Contractor Representative

Appendix 2

TERMS OF REFERENCE(TOR) AND SCOPE OF WORK (SoW) FOR ESMP

1.1 Background Information

Environmental and Social Management plan (ESMP) means a detailed plan prepared by an organization indicating mitigating measures and monitoring action to be undertaken so as to ensure effective implementation of the environmental and social requirements of a proposed project in order not to have adverse effect on the environment and humans. ESMP also indicate actions for the maintenance of an environmental/occupational health and safety/community management system according to ISO4001/OHSAS 18001. The safeguard requirements of World Bank make ESMP mandatory for all projects being sponsored/funded by the bank.

The Nigeria Erosion and Watershed Management Project (NEWMAP) world bank assisted program is designed to support the country's transformation agenda to achieve greater environmental and economic security. The NEWMAP Project Development Main Objective is to: *reduce vulnerability to soil erosion in targeted sub-watersheds.*

The projects normally address severe gully erosion and/or storm water problems in the short term, reduce vulnerability to soil erosion and climate variability in the medium term, and promote long-term climate resilient and low carbon development. NEWMAP usually take an integrated watershed management approach to erosion/storm water that address the interlinked challenges of poverty, ecosystem services, climate change, disaster risk management, biodiversity, institutional capacity and governance. NEWMAP works to eliminate/reduce the danger posed by erosion and flooding.

In line with its policy for environmental management, protection of vulnerable and indigenous peoples and regulatory compliance, world bank projects normally require environmental and social impact assessment or management plan to ascertain and ensure the environmental and social sustainability and compatibility of such projects. NEWMAP projects are not excluded. In line with this the Nasarawa State NEWMAP (NAS-NEWMAP) project office, Ministry of Environment and Solid Minerals Lafia is poised to develop an Environmental and Social Management Plan (ESMP) for the NAS-NEWMAP project for Keffi storm water and gully erosion control projects which fulfils the requirements of *Environmental Impact Assessment Act (No. 86 of 1992)* and the world bank safety guard policies.

1.2 The Proponent

Nasarawa state is one of the 36 states in Nigeria located in the north central zone of the country with 13 Local Government Areas. It was created on 1st October 1996 and has a population of about 2,679,433. It has a total land area of about 28,735km (10,470 sq mi) and the vegetation is Guinea Savannah. The state is bounded in the north by Kaduna State, in the west by Federal Capital Territory, in the south by Kogi and Benue states and in the east by Plateau and Taraba states. It is a state blessed with abundance of solid minerals but has agriculture as her main economic stay.

Since creation, Nasarawa State has experienced phenomenal growth on account of quality of its leadership, its focus is on excellent leadership and efficiency of its human capital. Today, Nasarawa State stands tall amongst her peers and still poised to reach new heights, in every endeavour competing to better the past. Through the development of

infrastructure Nasarawa state is geared towards building capacity to generate employment and provide better living conditions for her citizenry.

1.3 Proposed Project Location

The proposed NAS-NEWMAP projects shall be in Keffi as arrowed in the map. The grand total length of all the sites put together is 15.873Km

Project Brief and Scope of work of the NAS-NEWMAP project

The project is a joint venture between Nasarawa State government and World Bank NEWMAP project through the Federal Ministry of Environment. It is aimed at ameliorating the impact of erosion and storm water in communities through reduction of soil vulnerability in the state. To allow them have access to farms and other parts of the state. The project involves medium sized civil works like construction of infrastructure and stabilization or rehabilitation in and around the erosion gullies themselves as well as small works in the small watershed where gullies form and expand.

The scope of work for the development of the erosion/storm water control generally includes the following phases:

1. Site preparation and removal of vegetation cover and other materials if any,
2. Engineering and civil construction (which include construction of the erosion/storm water control/drain channels, setbacks, etc.),
3. Management of the facility

The planned ESMP is expected to assess the impacts of the project including Gender based Violence (GBV) and recommend mitigation measures capable of reducing and or eliminating any negative environmental and social impact and also supplement the positive ones.

1.4 Objectives of the ESMP Study

ESMP is a tested and globally accepted environmental management tool for proactive control of anticipated project impacts on environment. The aim of the ESMP study for the proposed project is to proactively evaluate the potential environmental (including health and socio-economic) impacts of the proposed development and develop mitigation measures. This is to ensure that the planned activities exert minimal and reversible impacts on the environment and nearby communities. Therefore, the ESMP seeks to:

- identify and evaluate the potential socio-economic and gender based violent (GBV) issues of the project on the communities including impacts on cultural properties, social infrastructures and natural resources;
- Mainstreaming environmental and social concerns with the design and planning phase of project to ensure project sustainability.
- establish the baseline condition of the environment;
- assess the potential environmental, social and health impacts of the NEWMAP project on the biophysical, social and health components of the environment;
- provide appropriate mitigation measures for negative impacts and make recommendations aimed at sustaining/enhancing the beneficial impacts of the projects on the environment;
- develop a cost effective Environmental and Social Management Plan (ESMP) for the project

1.5 Scope of Work (SoW) of the ESMP Study

The ESMP work which shall be carried by the consultant shall involve a comprehensive study of the baseline environmental, health and socioeconomic components of the proposed project environment. The scope of work for this ESMP shall involve an extensive literature search in order to generate background information on the study area. Subsequently, a systematic and comprehensive field data gathering exercise shall be carried out in order to effectively characterise the existing environment. Generally, the work scope by the consultant shall entail:

- review of relevant national and international legislation as well as the project's risk management policy in order to identify compliance areas required for the development;
- environmental, socio-economic and health baseline survey to describe the environmental, socio-economic and health conditions of the area prior to project development;
- review of existing literatures to complement background information on the environmental characteristics

of the study area;

- comprehensive description of the project and its processes;
- identification and quantification of adverse impacts (magnitude, prevalence, duration, aerial extent, frequency, risk and importance);
- recommend reasonable and cost effective measures, procedures and practices to be adopted to mitigate and or eliminate the impacts;
- develop cost effective Environmental and Social Management Plan (ESMP) as well as provide recommendations for monitoring and management activities; and
- prepare an ESMP Report to be submitted to the World Bank NEWMAP office and Federal Ministry of Environment which shall meet the requirements of the World bank ESMP safe guards
- Register ESMP with the EA department at Federal Ministry of environment
- Disclosure of the final ESMP at National, State, LGA and Community levels

SECTION TWO: TERMS OF REFERENCE (TOR)

2.1 Objectives of the ToR

The ToR has been prepared to provide guidance for achieving the overall objectives of the ESMP. Upon approval of the ToR by the world bank and Federal Ministry of Environment (FMEnv), it will serve as a reference document for execution of the ESMP study. Thus the ToR shall:

- a) define the relevant legal and administrative requirements for the ESMP studies;
- b) outlines the general scope of the ESMP studies including data requirements on the proposed project and the affected environment; and
- c) define the procedures and protocols for identification and assessment of associated and potential impacts, and selecting appropriate mitigation (prevention, recovery and control) measures for such impacts, and eventually develop an effective Environmental and Social Management Plan (ESMP) for all the project activities and phases

2.2 Legal and Administrative Framework

2.2.1 National Legislation

Relevant national environmental policies, laws, regulations and guidelines will be reviewed to establish their applications and their requirements to the proposed NEWMAP project with the overall objective of ensuring regulatory compliance. Amongst the key legislation that will be reviewed are:

➤ ***Environmental Impact Assessment Act No 86 of 1992***

The Environmental Impact Assessment (EIA) Act No. 86, 1992 (now retained as Cap EI2LFN2004) stipulates that the public or private sector of the economy shall not embark on or undertake or authorise projects or activities without prior consideration of the environmental effects at early stages. Where the extent, nature or location of a proposed project or activity is such that it is likely to significantly affect the environment, EIA shall be undertaken in accordance with the provisions of the Act. *Part III Sec.64* of the Act mandates EIA study for infrastructure projects.

➤ ***National Environmental (Construction Sector) Regulations, 2010. S. I. No. 19.***

The purpose of these Regulations is to prevent and minimize pollution from Construction, Decommissioning and Demolition project activities to the Nigerian Environment.

➤ ***National Effluent Limitation Regulations, S. 1.8 of 1991***

The National Environmental Protection (Effluent Limitation) Regulations, S. 1.8 of 1991 (No. 42, Vol. 78, August, 1991) makes it mandatory for industries and facilities generating waste to install anti-pollution and pollution abatement equipment on site. The regulation is specific for each category of waste generating facility with respect to limitations of solid and liquid discharges or gaseous emissions into the ecosystem. Appropriate penalties for contravention are also prescribed. The requirements of this regulation will be considered for early setting up waste treatment facility.

➤ ***Pollution Abatement in Industries and Facilities Generating Wastes Regulations S.1.9 of 1991***

The National Environmental Protection (Pollution Abatement in Industries and Factories generating Wastes) Regulations, S.1.9 of 1991 (No. 42, Vol. 78, August, 1991) imposes restrictions on the release of toxic substances and stipulates requirements for pollution monitoring units, machinery for combating pollution and contingency plan

by industries; submission of lists and details of chemicals used by industries to Federal Ministry of Environment (FMEnv); requirement of permit by industries for the storage and transportation of harmful or toxic waste; the generator's (or the proponent's) liability; strategies for waste reduction; permissible limits of discharge into public drains; protection of workers and safety requirements; environmental audit (or environmental impact assessment for new industries) and penalty for contravention.

➤ ***Management of Hazardous and Solid Wastes Regulations, S.I.15 of 1991***

The National Environmental Protection (Management of Hazardous and Solid Waste) Regulations, S.I.15 of 1991 (No. 102, Vol. 78, August, 1991) defines the requirements for groundwater protection, surface impoundment, land treatment, waste piles, landfills, incinerators etc. It also describes the hazardous substances tracking program with a comprehensive list of acutely hazardous chemical products and dangerous waste constituent. It also states the requirements and procedure for inspection, enforcement and penalty.

➤ ***National Guidelines and Standards for Environmental Pollution Control in Nigeria (1991).***

The National Guidelines and Standards for Environmental Pollution Control in Nigeria was launched on March 12th 1991 and represents the basic instrument for monitoring and controlling industrial and urban pollution.

2.2.2 State Legislation

The ESMP will also consider relevant state environmental laws as they affect the development. The state environmental laws are administered by Nasarawa State Ministry of Environment.

Nasarawa State Ministry of Environment and Environmental Protection Agency (NASEPA) Edict.

All the states in Nigeria have power to make laws with respect to the environment under the Constitution. This is because the subjects relating to the environment are contained in the concurrent legislative list.

Nasarawa state established the state Environmental Protection Agency (NASEPA) in 1997 through edict no.1. The edict spells out clearly the functions and authority of the agency, and also imposed restrictions on the release of toxic materials into the environment as well as responsibilities of individuals or body corporate whose operations are likely to negatively impact the environment.

Specific functions of the agency include:

- Monitoring and controlling of disposal of wastes generated within the state;
- Monitoring and controlling of all forms of environmental degradation from agricultural, industrial and government operation;
- Monitoring of surface, underground and portable water, air, land and soils within the state to determine the pollution level as well as collect baseline data;
- Co-operating with federal, state and local governments on matter and facilities relating to environmental protection.

The agency is empowered to apply enforcement measures to make regulations to control water, air, soil and noise pollution; effluent discharge standard and waste management. The edict also empowers the agency to combat environmental degradations in manufacturing premises and government operations; analyse samples of any substance found in any premises searched, etc.

The Agency have the responsibility of cleaning primary and secondary drains, collection and disposal of industrial wastes, flood relief activities, and the collection and disposal of scrap and derelict vehicles.

2.2.3 International Laws, Guidelines and Conventions

In addition to the national legislation, there are also international laws, conventions and agreements to which Nigeria subscribed that will be affected by the proposed development. The proposed development will be developed to comply with the relevant international laws. Among those that will be reviewed and incorporated into the ESMP include the following:

- Convention on Long-Range Transboundary Air Pollution (LRTAP), Geneva, 1979
- United Nations Framework Convention on Climate Change (UNFCCC), New York, 1992, including the Kyoto Protocol, 1997, and the Paris Agreement, 2015
- Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985, including the Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal 1987.

2.2.4 World Bank Policies

This work triggers off World Bank Safe guard policies which includes: Environmental Assessment Op4.01, Natural Habitats Op4.04, Cultural property Op11.03, Involuntary Resettlement Op4.12, Safety of Dams Op4.37, Pest Management Safeguard Policy Op4.09, Projects on International Water Ways Op7.50 and Gender Based Violence regulations (Qasim, Farwah; Asubaro, Wumi,2019)

2.3 ESMP Study Methodology

The ESMP will be carried out in line with EIA Procedural Guideline (2005) provided by the Environmental Impact Assessment Act. The broad approach that shall be adopted in conducting the ESMP for the NEWMAP erosion/storm water control project is presented in **Figure 2** which incorporate the following tasks:

- Task 1:** Project planning and mobilization
- Task 2:** Preliminary/reconnaissance survey
- Task 3:** Literature review
- Task 4:** Stakeholder consultations
- Task 5:** Field sampling and data collection
- Task 5A:** Biophysical components survey and laboratory analyses
- Task 5B:** Socioeconomic/health/ Gender Based Violence (GBV) components survey
- Task 6:** Impact evaluation, mitigation and remediation
- Task 7:** Environment and social management plan (ESMP)
- Task 8:** ESMP Draft and Final reports preparation and submission
- Task 9:** World Bank, FMenv & stakeholder’s review of the Draft ESMP Report
- Task 10:** ESMP approval and certification by FMEnv

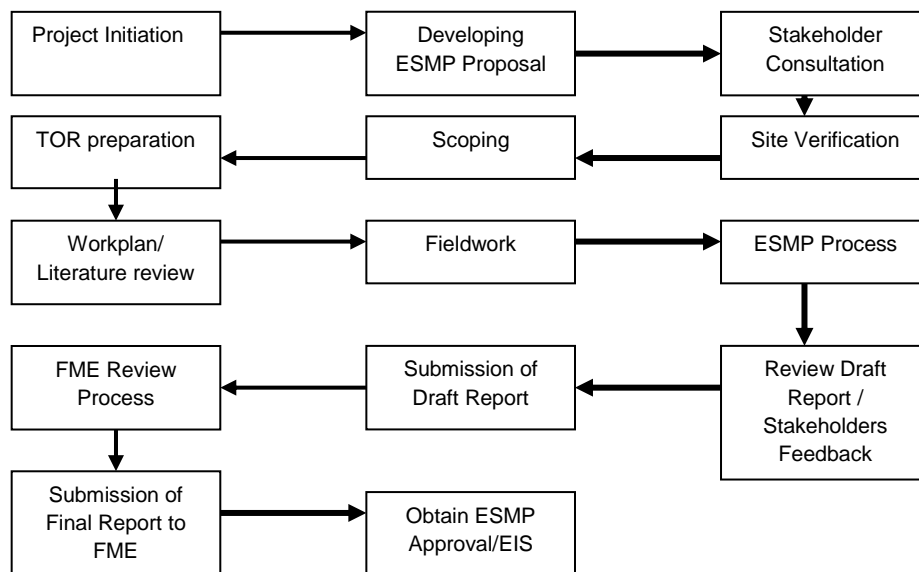


Figure 2: The World Bank/FMEnv ESMP Process

➤ **Preliminary Activities**

Preliminary activities include project initiation, developing/preparation of ESMP proposal and ToR/SoW for World Bank/FMENV approvals. Other activities are screening/scoping by the World Bank/FMEnv contractual processes and preparation of an ESMP work plan.

➤ **Environmental Baseline Data Acquisition**

A desktop/literature survey will be conducted through consultation of existing studies/survey reports, technical publications, maps, etc. to consolidate information on climate, geology, and the general physical, chemical and biological status of the environment as well as the identification of information gaps. Thereafter a field data gathering exercise that includes visual observation, in situ measurements and sample collection (air, soil, vegetation and water, etc.) for laboratory analysis, and marine fauna (plankton and benthos) characterisation as well as fisheries studies. The environmental baseline data acquisition process shall follow the integrated approach presented in **Figure 3** below.

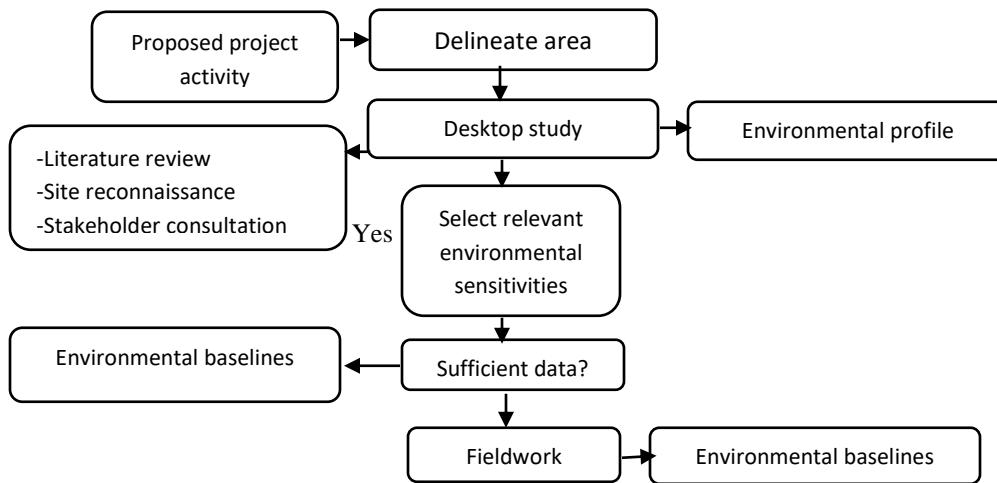


Figure 3: Baseline data acquisition process

The main purpose of the acquisition of environmental information is to collect all necessary data needed to provide as complete a picture as possible of the existing environmental baseline conditions thus allowing for accurate prediction of the effects of the proposed activity on the environment as well as to serve as a reference for future performance monitoring operations.

➤ **Impact Assessment Process**

This involves analysis of project activities and their interactions with all environmental components such as air and water. The identification of ecologically sensitive areas and important species/communities (rare, commercially significant, socioeconomic concerns) will also be carried out. Aspects of the proposed activities that may interact positively or negatively with the environment will have to be identified and classified as direct or indirect, residual and/or cumulative. The associated and potential impacts of the project will be identified based on the collected data and evaluated in-line with relevant regulatory requirements. Modified Leopold Matrix (1991) shall be utilised for impact evaluation.

➤ **Suggestion of Eliminating Minimising/Ameliorative Measures**

Impact eliminating measures will first be considered, but where it fails or impracticable, a minimizing measure will be developed. Based on the nature of the identified significant impacts of the proposed project, and the understanding of the ecosystem of the area, the mitigation measures will be developed in line with best safety, health and environment standards and codes (covering design, construction, operation and decommissioning/abandonment) as well as FMEnv and international guidelines and professional judgement. Based on the proposed eliminating/mitigation measures, an ESMP will be developed that includes a comprehensive monitoring plan.

➤ **Stakeholders' Consultation**

The ESMP SoW shall include consultation with all relevant stakeholders to ensure that their concerns and views concerning the proposed project and its associated and potential impacts are addressed and integrated into the ESMP Report. The results of such consultations shall be included as basis for potential impact assessment and shall be clearly documented in the ESMP report. Consultation shall be carried out throughout the project life.

2.4 Field Data Gathering and Description of Environmental Components

Baseline data shall be generated for environmental components via field work and laboratory analysis.

2.4.1 Baseline Study

The ESMP shall describe the environment as it presently exists prior to project development, to include resource uses, with particular emphasis on all the environmental components that are of particular significance to the planned development activities. This will provide information with regard to the “initial state” enabling the study to define the “reference state”, and to characterize any possible contamination of air, soil or waters by other existing or proximal activities or installations. On the basis of the above description, identified environmental markers (biological, chemical or physical) will enable environmental monitoring of air, benthic organisms and water (both surface and bottom) in the area. An analysis of all variables will identify those which are most likely to represent the natural conditions of the environment and allows for those most likely to be affected by any disturbances to be defined.

Baseline Study Specifications

- All sampling shall involve data representing one seasons (Rainy season)
- Dry season baseline data shall be collected from existing literature review
- All positions for sampling shall be referenced to the geodetic coordinate.
- The study methodology shall be consistent with the Federal Ministry of Environment (FMEnv) and world bank guidelines for projects of this nature.
- Field sampling methods and laboratory procedures shall be consistent with established and standard methodologies.
- Scene photographs covering environmental and social features of the sampled locations shall be captured as necessary.
- The survey campaign will be done with a specified sampling program. Adequate equipment will be available to collect all relevant samples. Adequate quality assurance procedures will be in place regarding sampling, sample preservation and storage, and internationally accepted analytical techniques will be followed. A suitable FMEnv accredited laboratory shall conduct the chemical analysis. (Soil Science Laboratory of Federal University of Agriculture Makurdi)

➤ **Proposed Field Sampling Design**

The following were considered in the design of field sampling and data gathering for the proposed NAS- NEWMAP project:

- a) The need to comprehensively characterise and document the baseline conditions of the proposed site and other areas of influence.
- b) The proposed locations of the projects with sampling points strategically located around all proposed facilities and location of sampling points outside the project’s areas of influence

➤ **Sampling Design & Distribution**

The following sampling design and distribution as presented in **Table 5** below has been adopted in order to adequately characterise the study area. A comprehensive study will be carried out for all environmental and social components as presented in the Table 1 below.

Table 5: Environmental components and sampling methodologies

S/N	Environmental component	Number of samples	Methodology
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S/N	Environmental component	Number of samples	Methodology
1.	Air Quality/ Climatology	3nos sampling stations at each gully that is 1 km and above and for any one less 2nos samples and 1no control	<ul style="list-style-type: none"> • Aeroqual Series 500 Monitor and its sensors for gaseous pollutants and greenhouse gases (GHGs). Environmental Sensor will determine the following gases (Oxides of nitrogen (NO_x), Ammonia (NH₃), Hydrogen sulphide (H₂S), Carbon monoxide (CO), Volatile Organic Compound (VOC), Methane (CH₄), etc.). • Suspended Particulate Matters (SPM₁₀) will be determined with Met One Aerocet 531 Mini volume portable Air sampler; and • Microclimatic data including ambient temperature, atmospheric pressure, Relative humidity, wind direction and wind speed). 10 years span will be sourced from NIMET
3	Groundwater (groundwater bodies within the project influence)	1 sampling wells/borehole and 1 control	HANNA HI 93414 in situ meter will be used to determine dissolved oxygen (DO), pH, electrical conductivity (EC), total dissolved solids (TDS) and water temperature (T). Other water parameters with long holding analytical time will be preserved and analysed in a laboratory.
5	Soil	3nos sampling points for gully 1 km and above and 2nos for anyone less and 1 control	Stainless steel screw-type soil auger. A composite sample shall be collected from 0-15cm and 15-30cm to represent top soil and bottom soil respectively.
8	Vegetation and wildlife	Transect area sampling	The area will be divided into transects for sampling. Both in situ identification and ex situ herbarium analysis will be carried out on the vegetation samples. Animal tissue analysis will also be carried out also.
9	Noise and other Nuisances	3nos sampling stations at each gully more than 1km and above and 2nos for gully less and 1no control	A pre-calibrated EXTECH sound level meter and vibration meter
10	Geology and Erosion	Local and regional	Field survey and desktop review
11	Socioeconomics, health survey and Gender Based Violence (GBV)	Key stakeholder communities	Semi structured interviews, focus group discussion, consultations and grievance procedures for gender based violence (GBV) and Grievance Redress Mechanism (GRM)

S/N	Environmental component	Number of samples	Methodology
12	Transport study	Access roads	Visual assessment and desktop review.

2.4.2 Analytical Requirements

Standard modern scientific methods that general results with high precisions in line with *FEPA (1991)* procedures shall be utilised for laboratory analysis of all samples collected.

➤ **Water Sampling and Analysis**

Surface water and groundwater samples shall be collected at all sampling stations and analysed for physical, chemical and biological properties. In-situ measurements shall be carried out for parameters with short holding analytical time such as pH, temperature, conductivity, dissolved oxygen. The analytes and the laboratory analysis methods is summarised in **Table 6** below.

Table 6: Laboratory analytical method summary

Parameter	Symbol	Unit	Test method
Physico-chemistry			
p ^H	p ^H		in situ
Temperature	T	°C	in situ
Conductivity	EC	S/cm	in situ
Dissolved oxygen	DO	mg/l	in situ
Salinity	S	‰	in situ
Turbidity	Turb	NTU	in situ
Total suspended solids	TSS	mg/l	APHA 2540D
Total dissolved solids	TDS	mg/l	APHA 2540C
Heavy metals			
Arsenic	As	mg/l	AAS
Cadmium	Cd	mg/l	AAS
Arsenic	As	mg/l	AAS
Chromium	Cr	mg/l	AAS
Copper	Cu	mg/l	AAS
Mercury	Hg	Mg/l	AAS
Ferric iron	Fe ³⁺	mg/l	AAS
Ferro iron	Fe ²⁺	mg/l	AAS
Lead	Pb	mg/l	AAS
Nickel	Ni	Mg/l	AAS
Manganese	Mn	Mg/l	AAS
Cations			
Magnesium	Mg	mg/l	AAS
Potassium	K	mg/l	AAS
Sodium	Na	mg/l	AAS
Zinc	Zn	mg/l	AAS
Aluminium	Al	mg/l	AAS

Parameter	Symbol	Unit	Test method
Anions			
Carbon dioxide	CO ₂	mg/l	APHA 4500-CO2
Carbonate and bicarbonate	HCO ₃	mg/l	APHA 2320B
Fluoride	F	mg/l	APHA 4500
Nitrate	NO ₃	mg/l	APHA 4500
Nitrite	NO ₂	mg/l	APHA 4500
Phosphorus total	P	mg/l	APHA 4500
Sulphate	SO ₄	mg/l	APHA 4500
Sulphide	S ²⁻	mg/l	APHA 4500
Total Organic Contents			
Total Organic Carbon (TOC)	TOC	mg/l	APHA 5310
Dissolved organic carbon	DOC	mg/l	APHA 5310
Total mineral oil		mg/l	EPA 8015
BTEX	BTEX	mg/l	EPA 8260
Phenol		mg/l	APHA 5330C
Chemical oxygen demand	COD	mg O ₂ /l	APHA 5220B
Biological oxygen demand	BOD	mg O ₂ /l	APHA 5210B
Polycyclic aromatic hydrocarbons	PAH	mg/l	EPA8260
Macro and Micro-biology			
Chlorophyll		mg/l	UV
Phytoplankton population density		number of cells / l	Coulter Counter
Bacteria count		(cfu/100ml x 103)	APHA 9215C

➤ **Soil Analysis**

Soil samples (0-15cm and 15-30cm representing top and sub soil respectively) shall be taken at appropriate intervals from pre-determined sampling locations and shall be analysed for the following:

- Soil textural description* (particle sizes, % composition, bulk density, etc.)
- Physico-chemistry* (pH, bio-oxygen demand (BOD), chemical oxygen demand (COD), electrical conductivity (EC), alkalinity, Cation exchangeable capacity (CEC), oil & grease (O&G), etc.)
- Cations and anions* (Na⁺, K⁺, Mg²⁺, Ca²⁺, CO₃²⁻, SO₄²⁻, CL⁻¹, PO₄²⁻, NO₃³⁻ etc.)
- Heavy metals concentration* (Zn, Pb, Mn, Cr, Al, Fe, Hg, etc.)
- Total organic contents* (TPH, Aliphatics, BTEX, etc.)
- Microbial composition* (HUB, HUF, Faecal coliform, etc.)

➤ **Groundwater Analysis**

Groundwater samples shall be taken at 3 points through monitoring borehole from pre-determined sampling locations and shall be analysed for the following:

- Groundwater hydrology* (water table, flow direction, seasonal fluctuations, etc.)
- Physico-chemistry* (pH, colour, appearance, temperature, turbidity, bio-oxygen demand (BOD), chemical oxygen demand (COD), electrical conductivity (EC), alkalinity, oil & grease (O&G), etc.)
- Cations and anions* (Na⁺, K⁺, Mg²⁺, Ca²⁺, CO₃²⁻, SO₄²⁻, CL⁻¹, PO₄²⁻, NO₃³⁻ etc.)
- Heavy metals concentration* (Zn, Pb, Mn, Cr, Al, Fe, Hg, etc.)
- Total organic contents* (TPH, Aliphatics, BTEX, etc.)

f) *Microbial composition* (HUB, HUF, Faecal coliform, etc.)

➤ **Surface Water Analysis**

Surface water samples shall be taken at 3 points within the existing surface water body from pre-determined sampling locations and shall be analysed for the following:

g) *Surface water hydrology* (water level, flow direction, seasonal fluctuation, source, first & final destination waters, etc.)

h) *Physico-chemistry* (pH, colour, appearance, temperature, turbidity, bio-oxygen demand (BOD), chemical oxygen demand (COD), electrical conductivity (EC), alkalinity, oil & grease (O&G), etc.)

i) *Cations and anions* (Na^+ , K^+ , Mg^{2+} , Ca^{2+} , CO_3^{2-} , SO_4^{2-} , Cl^- , PO_4^{2-} , NO_3^- etc.)

j) *Heavy metals concentration* (Zn, Pb, Mn, Cr, Al, Fe, Hg, etc.)

k) *Total organic contents* (TPH, Aliphatics, BTEX, etc.)

l) *Microbial composition* (HUB, HUF, Faecal coliform, etc.)

➤ **Air Quality, Weather and Ambient Noise Level Assessment**

The following group of study area shall be carried out:

- *Micro and macro-climatology*: Ambient temperature, relative humidity, rainfall, wind speed, wind direction, etc.
- *Toxic gases*: SO_x , NO_x , CO_x , H_2S , etc.
- *Greenhouse gases*: NO_x , CH_4 , CO_2 , O_3
- *Dust and particulates*: Dust and SPM
- *Noise and other Nuisances*: Ambient Noise level, vibration, visual impact, odour, flies, heat, etc.

➤ **Geology and Erosion**

The geology of the area shall be established for lithological composition and microstructures of the sub surface geology. The regional geology shall be established from extensive review of existing literatures while local geology shall be established via field investigations. As Nigeria steadily becomes developed and industrialised, erosion is increasingly becoming a national environmental concern that must be proactively considered in project development. Geology shall help unravel the project area topography, erosion pattern and flood control for the study area.

2.5 Socioeconomics, Gender Based Violence (GBV) and Grievance Redress Mechanism (GRM)

The ESMP shall institute a robust stakeholder consultation for the proposed development. It shall identify key stakeholders and consult them during which their concerns shall be addressed and documented. The engagements shall also be utilised to gather socio-economic baseline data. Gender Based Violence (GBV) and Grievance Redress Mechanism (GRM) issues shall be given prominence in the study. Standard methods such as focus group discussion (FGD) and questionnaire administration shall be used to further establish the community socioeconomic and health status.

2.6 Impacts Assessment

Identification, prediction and evaluation of associated and potential impacts shall be carried out in accordance with the standard methodologies including:

- Professional judgement and knowledge of the project activity
- Identification of impact sources – using check list, and Hazard & Effect Management Process (HEMP).
- Identification of impact indicators – using check list, risk matrix
- Prediction of impact magnitude – experiential worst case scenario
- Evaluation of importance of environmental components – through consensus of opinions.
- Evaluation of impacts - using Modified Leopold Matrix (1991) method; and
- Identification of mitigation measures, elimination/minimization and enhancement strategies.

All impacts identified shall be considered for mitigation and control through preventive, mitigation and amelioration measures. These measures shall be incorporated in existing and proposed project development to minimize or completely eliminate the key impacts. The associated and potential impacts of the proposed development shall be described for the various phases of the project. These shall include impacts resulting from construction, operation and abandonment/decommissioning. Offset measures shall be developed for all residual impacts to further mitigate

them to a condition that will have a minor effect on the baseline environmental components. The impacts shall be classified as:

- Direct or indirect,
- Permanent and temporary,
- Adverse or beneficial, and
- Residual or immediate.

2.7 Quality Assurance and Quality Control (QA/QC) Program

Adequate measures shall be put in place to ensure that data gathering, laboratory analysis and reporting procedures shall be carried out in accordance with FMEnv Environmental Assessment guidelines. QA/QC shall form an integral part of all aspects of the study and it will be used to address any variance associated with both the samples and analytical methods. The quality assurance program will help prevent sample contamination and deterioration, and covers all aspects of the study, including sample collection, handling, laboratory analysis, data coding and manipulation, statistical analysis, data presentation and result interpretation.

2.8 Draft ESMP Report Format

Reports shall be developed in line with the guidelines and requirements of FMEnv and consistent with relevant international standards. The report shall present:

- Comprehensive introduction presenting the ESMP objective, methodology, applicable legal/ regulatory and administrative framework as well as structure of the ESMP Draft Report,
- Justification for the planned development and an articulation of the benefits,
- Detailed description of planned development activities as well as operational philosophies,
- Documentation of the approach and results from field data gathering and samples analysis campaign as well as detailed characterisation of the existing environment of the project area, and
- Identification, evaluation and assessment of associated and potential impacts and documentation of cost-effective mitigation measures, etc.

➤ *ESMP*

In line with international best practice, the Environmental and Social Management Plan (ESMP) shall specify guidelines for ensuring conformance of project implementation with the procedures, practices and recommendations outlined in the ESMP report. The ESMP shall specify recommendations for future plans to manage, monitor and audit the project performance. These shall be based on current regulations and guidelines and include the following as a minimum:

- Environmental Surveillance and Monitoring Program: the baseline survey will enable the identification of the variables, most representative of the natural conditions of the environment and most likely to be affected by any disturbance. Effective ^(a) *construction phase surveillance* and ^(b) *operation phase monitoring* program in line with IFC's *Environmental and Social Assessment Procedures (ESAP) 2015* shall be designed for the project by the ESMP,
- Personnel resourcing and assignment of responsibilities,
- Ensuring conformance of detailed design with concept design,
- Ensuring conformance of construction/installation activities with specified standard practices and philosophies,
- Ensuring performance of operations and maintenance activities with specified standard practices and philosophies,
- Environmental management and organizational procedures,
- Auditing programs and monitoring guidelines for all phases of the project
- Decommissioning and abandonment of the facility.

2.9 Documentation

The ESMP process shall be documented by the consultant in accordance with regulatory requirements and guidelines. The technical output that shall be written / produced to reflect the various stages of the process are indicated below:

- Field Report;
- Draft ESMP Report in accordance with FMEEnv Guidelines and World Bank Guide; and
- Final ESMP Report to address all comments and observations made by the regulatory authorities and stakeholders.
- The ESMP Report shall have the following sections
 - i) Cover page
 - ii) Table of Contents
 - iii) List of Acronyms
 - iv) Executive Summary
 - v) Chapter 1: Introduction
 - Description of the proposed intervention
 - Rationale for ESMP
 - Map
 - vi) Chapter 2: Institutional and Legal Framework for Environmental Management
 - Discussion of the world Bank Safeguard policies triggered by NEWMAP and the proposed activity
 - Summary of relevant local and Federal policy, legal, regulatory and administrative frameworks
 - vii) Chapter 3: Biophysical Environment
 - Description of the area of influence and environmental baseline conditions
 - viii) Chapter 4: Socio-Economic Characteristics and consultation with Stakeholders
 - Analysis of existing livelihoods opportunities, income, gender characteristics, age profile, health, transport access, existing community structures – at watershed, community household, and individual levels
 - Analysis of existing formal and informal grievance redress mechanisms in and around the intervention area
 - Presentation of consultations with relevant stakeholders and affected persons
 - Other relevant issues/topics
 - ix) Chapter 5: Assessment of potential Adverse impacts and analysis of Alternatives
 - Methods and techniques used in assessing and analysing the environmental and social impacts of the proposed projects
 - Discussion of the alternatives to the current project and reasons for their rejection, including short description of likely future scenario without intervention
 - Discussion of the potentially significant adverse environmental and social impacts of the proposed projects
 - x) Chapter 6: Environmental and Social Management Plan (ESMP), including the following
 - Discussion of the proposed mitigation measures
 - Institutional responsibilities and accountabilities
 - Capacity building
 - Public consultation
 - Description of grievance redress mechanism (GRM) and Gender Based Violence (GBV) handling mechanisms in line with the provisions of ESMF, RPF, RAP, and project implementation manual to address situations of conflicts or disagreements about some of the project activities
 - Monitoring and evaluation Plan, including suitable indicators for the proposed project
 - Costs of implementing ESMP
 - xi) Chapter 7: Summary, Recommendations and conclusion

2.10 Conclusion

This Terms of Reference/Scope of Work document prepared and submitted by NAS-NEWMAP, documents the ESMP objectives, scope of work and study methodology. This document is intended to serve as a reference material for the ESMP activities and establish the study scope of work which will be used to carry out the environmental and social Management Plan preparation process of the proposed NAS-NEWMAP erosion/storm water control project at Keffi gully sites.

To this end, NAS-NEWMAP hereby solicits approval of the Terms of Reference (ToR)/Scope of Work (SoW) to facilitate the ESMP study in good time that favours the proposed Project execution and realisation of its objectives.

NEWMAP Documents: the following project specific background documents shall be provided by the State Project Management Unit (SPMU)

- Environmental and Social Management Framework (ESMF)
- Resettlement Policy Framework (RPF)
- NEWMAP Project Appraisal Document (PAD)
- NEWMAP Project Implementation Manual (PIM)
- World Bank Safeguard Policies
- Intervention Designs
- Other relevant documents which may include such as appropriate baseline indicators e.g. M³/sec runoff collected in the sub-watershed during a heavy down pour hour-long rainfall

SECTION THREE

3.0. WORK PLAN

Below is the work plan for the assignment.

It is expected that the field work will commence latest 1st of July 2020 and final submission will be by First week of September 2020. The outline is as follows

1. Signing of Agreement etc. 1st July 2020
2. Submission of inception report – 15th July 2020
3. Submission of Draft ESMP Report for review and comments – 15th August 2020
4. Submission of Final ESMP Report- 30th August 2020
5. Submission of comprehensive Data Base of Relevant Information in excel format – 5th September 2020

Appendix #3 Minutes Keffi Meeting

Items	Description
Name of Stakeholder:	General Stakeholder Public Consultation
Date:	05/10/2010
Venue:	Behind Emir's Palace, Keffi, Nasarawa State
Language of Communication:	Pidgin-English, English, Hausa
Participants present	<ul style="list-style-type: none"> • ESMP consultants • Community Association Members • NEWMAP Intervention Site Monitoring Committee members • Community members
Opening Remarks	<p>A representative of the NEWMAP Intervention Committee welcomed the community leaders, youth, women and other participants to the General Stakeholder Public consultation meeting. The ESPM consultants and stakeholders of the community were duly introduced. Stakeholders were asked if they had any background knowledge of the NEWMAP project. Few people said yes, while many said No. Those that said Yes claimed it was an initiative of the World Bank in conjunction with Nasarawa State Government to solve challenges of gully and gully erosion across affected communities. Based on this backdrop of information, all participants were duly enlightened on the mission of the NEWMAP intervention project. The cooperation of members of the community was sought to ensure the perennial problem of gully erosion is solved. Stakeholders were informed that more consultants would be coming to engage the community, each with specific roles. In this meeting, preliminary information would be obtained to ascertain the origin, cause(s), and impacts of gully erosion on the community; perception of the community on the project and how the intervention could actualize its objectives.</p>
ESMP Consultant's Remarks and Queries	<p>ESMP Consultant thanked all stakeholders for attending the meeting and further engaged the participants on the impacts of the intervention projects on the community. He emphasized on the need to ensure safety and security of life and properties of the people. He solicited the support of all and sundry to jointly savage the ugly situation posed by gully erosion. Discussions were centred on the following areas using a collective participatory approach:</p> <ul style="list-style-type: none"> • The origin and causes of gully erosion in the area • Major environmental challenges in the area • Impacts of gully on the social and economic status of the community • NEWMAP Project and Impact on Community • Perceptions of the community of the intervention project • Likely challenges the project in the community • Factors that will determine the successful implementation of the proposed intervention
Community Response	<p>Origin and causes of gully erosion in the area</p> <p>Participants said gully erosion started some years back like a joke. Some areas initially had a bad landscape with slopes and contour that favour water runoff which end as a gully. By some doing, large gullies started emerging. Efforts to control gully erosion by the youth and elders in the community proved abortive. The youth leader blamed the ugly development on the attitude of the locals during building construction. He said people are fond of building indiscriminately even on water ways and some people do not create drainages during and after building construction. Some elders lamented shabby jobs done by construction workers during road construction. He cited a situation whereby roads are constructed by contractors without ensuring proper water channels, and nobody was held accountable for the bad constructions so far. Some of the bridges have been blocked, he said.</p> <p>Major environmental challenges in the area</p> <p>Stakeholders agreed that gully /gully erosion is the main environmental challenge in the community. The issue of waste disposal was also mentioned. The women agreed that wastes are sometimes dumped in drainages especially during raining season with the intention that such wastes are transported by runoff to end in gullies and other unknown destinations. They also said that those who dumped their wastes at home would eventually dump them at community wastes sites or in the drainages when raining or adopt the government waste management system among the few that could afford it. Controlling sanitation of the area was presented as a challenge but the most pressing challenge is the gully erosion</p>

	<p>Impacts of gully on the social and economic status of the community The community elders enumerated the negative impacts of the gully on the community as follow:</p> <ul style="list-style-type: none"> - Retardation of the development of the community - Insecurity and safety concerns of lives and properties of people - Psychological effects of the gully and its erosion on the locals especially fear, worries and sleeplessness during raining season - Migration and displacement of people to safer places - Known and unknown impacts on the health of people - Difficulty in moving from one place to another within the community especially with motorcycles and vehicles - Loss of fertile soil, farmland and livestock's
	<p>NEWMAP Project and Impact on Community Stakeholders were optimistic that the project would help reverse the negative impacts of gully erosion. The said it would greatly return the lost glory of the community in terms of growth, security and safety of the life and properties of the people. Challenges of movement would be solved and everybody would be able to sleep with two eyes closed, they said.</p> <p>Perceptions of the community of the intervention project The people perceived the project as a good move in the right direction though the intervention is coming too late. However, when finally executed, it would change the community for good. Some of them promised to be fully involved during the intervention being a community project while some said they would be partially involved because it was perceived as government project. However, acceptance was good.</p> <p>Likely challenges the project may encounter in the community The only challenge presented by one of the elders was on the issue of lack of inclusiveness or lack of involvement of members of the community in the project. Recruiting people especially the youth from outside to do some menial jobs is unacceptable. While it was noted that women are not allowed to be involved in decision making process and with limited rights within the community, the women that must be patronized by construction workers in terms of food and that any alien worker must not take advantage of women in the community</p> <p>Factors that will determine the successful implementation of the proposed intervention Participants gave the following factors as necessary for the successful implementation of the proposed intervention</p> <ul style="list-style-type: none"> - Continuous community engagement by Consultants and other officials was mentioned as a key factor, according to the elders. All stakeholders must be carried along to ensure the success of the project. - The project must not be abandoned at any stage to create more havoc to the locals - Recruitment of locals to do menial jobs - Fixing any negative impacts of the project - Provision of good roads and other basic amenities - Seriousness on the construction workers and the donors - Community participation <p>On the needs of the community, the community leader said they are many. He laid emphasis on the actualization of the goal of the intervention, youth employment, free water disposal means, by the government or other NGOs, provision of stable electricity, good road construction, hospitals and markets for the women.</p>
<p>Queries and concern</p>	<p>Queries</p> <ul style="list-style-type: none"> - When will the real construction work start? - Will the project address any negative impacts created by the intervention if there is ? - Will there be compensation if the project destroys crops and properties? <p>Concern</p> <ul style="list-style-type: none"> - Quality and durability of engineering construction - Adequate funding of project and timely release of money - Project abandonment -
<p>Closing Remark</p>	<p>The community leader was very delighted about the interaction among stakeholders regarding the intervention project that might solve the biggest environmental problem of his community. He gave his acceptance and unflinching supports in any capacity to ensure the project is executed successfully. He promised to open his doors to other consultants and that the community would gladly welcome them. The Lead ESPM thanked all participants and stakeholders for the fruitful discussion. He said all the issues and concerns raised by</p>

stakeholders are duly noted.

Appendix #4 ESMP QUESTIONAIR

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

NASARAWA STATE NEWMAP INTERVENTION PROJECT

Dear Respondent,

Thank you for taking the time to complete the following survey. The purpose of this survey is to gain valuable insight on proposed NEWMAP intervention at Gully Erosion Sites in Nasarawa State. This provides you the opportunity to contribute to the environmental and social components of the project implementation.

NOTE:

Please read each question carefully. Your answers are completely confidential and will be included only in summaries where individual answers cannot be identified. Unless otherwise instructed, please tick appropriate answer category that best describes your opinion. It will take approximately 20 minutes to complete this questionnaire.

Settlement/CommunityState.....LGA.....

Name of Interviewer..... Date:

Coordinates: Northing.....Easting.....

Survey Location: (a) Major Urban (b) Other Urban (c) Rural

SECTION A: Household data

1. Gender of Respondent: (a) Male (b) Female
2. Age: (a) Below 18 yrs (b) 18 – 45 years (c) 46 – 65 yrs (d) Above 66 yrs
3. Marital Status: (a) Single (b) Married (c) Divorced/Separated (d) Widowed
4. Occupation: (a) Farmer (b) Daily Labourer (c) Trading & Shop Keeping (d) Artisans (e) Employed (salary) (f) Self Employed (g) Social Support (h) unemployed (i) Others specify
5. Residential Status: (a) Permanent Resident (b) Back Home (Returnee) (c) Non Resident Visiting
6. Ethnic group please specify.....
7. Religion: (a) Islam (b) Christianity (c) Traditional
8. Relationship to Household Head (HH): (a) Self (b) Spouse (c) Child (d) Parent (e) Other Specify.....
9. Size of the HH.....

No. of Adults (Above 18)	Men		Women	
No. of Adults (below 18)	Boys		Girls	

10. How long have you been living in this area? (a) 0 – 2 yrs (b) 3 – 5 yrs (c) 6 – 9 yrs (d) 10yrs and above
11. If non-resident, please state your actual location: (Location/LGA/State)
12. Education: (a) No formal education (b) Primary School (c) Secondary School (d) Tertiary (Excluding University) (e) University Graduate (f) University Post Graduate

Education of young household members

12.1 Does anyone in your household currently attend school (if no, skip to 2)	A	Yes	b	No
12.2 What level of education are they? (Place name)		School Category		Number
	a	Primary	b	Junior High
	c	Senior High/Tech/Voc	d	Post-Secondary

12.3 How long does it take to get to school? (Note response to each school accessed)	a.	<5 mins	b.	5 – 15 mins
	c.	15-30 mins	d.	30 – 60mins
	e.	60 + mins		
12.4. What method of transport is used to get to school? (Note response to each school accessed)	a.	Foot	b.	Bicycle
	c.	Mini bus	d.	Taxi
	e.	Private car	f.	Okada
	g.	Tri-cycle		

13. Are you in anyway affected by the Gully Erosion
(a) Yes (b) No
14. If question 13 is yes, how (a) damage to Agric/farmland (b) damage to building/property
(b) Economic loss due to inability to access or operate means of livelihoods (f) Others specify.....
15. Do Gully Erosion prevent children from going to school?
(a) Yes (b) No
16. If question 15 is yes, how regular is the occurrence? (a) Often (b) frequently (c) rarely

SECTION B: Health Status

1. Is your present state of health affected in any way by the Gully Erosion?
(a) Yes (b) No
2. If yes, in what way (a) Skin diseases (b) Cough (c) Catarrh (d) Malaria (d) Water-borne diseases (f) Others, Specify.....
3. Does the prevalence/Occurrence of the disease(s) become severe during flood periods (a) Yes (b) No
4. How do you manage your health conditions when sick? (a) Attend hospital/clinic (b) Buys drugs from nearby chemist (c) Traditional medicine (d) None (e) Others Specify.....
5. If you do attend hospital/clinic, when last did you visit one? (a) last six months (b) last one year (c) last five years (d) more than five years ago (e) Never visited one
6. Please tick one or more of the under-mentioned ailment/sickness, you suffer from most accordingly?

Degree Ailment	Always	Sparingly	Seldom	Never	Degree Ailment	Always	Sparingly	Seldom	Never
Whooping Cough					Rheumatism				
Tuberculosis					Rashes				
Asthma					Eczema				
Dysentery					Ringworm				
Diarrhoea					Eye pains				
Cholera					Cataract				
Pile					Glaucoma				
Hypertension					Typhoid Fever				

Congestive health problem					Malaria				
Pneumonia					Sickle cell anaemia				
Sexually transmitted diseases					Epilepsy				

7. Do you think your health condition will be affected by the proposed intervention at the Gully Erosion site?
(a) Yes (b) No
8. If yes, how? (a) Contamination of ground water (b) Contamination of surface water (c) Provide breeding site for disease vectors
(d) Noise/air pollution (e) Other specify
9. Please suggest how this can be averted during construction and implementation.....

SECTION C: Standard of Living/Socio-Economic Activities

1. Assets

1.1 Do you have any of the following items			
Item	Quantity	Item	Quantity
a. Radio/tape		k. beds	
b. television		l. furniture set	
c. DVD player		m. fan	
d. telephone (land)		n. computer	
e. mobile phone		o. generator	
f. stove		p. mosquito nets	
g. fridge		q. insect screens	
h. hunting trap		r. Other (Specify)	
1.2 What sort of transport does your family own			
Item	Quantity	Item	Quantity
b. Bicycle		f. Car	
b. Motorcycle		g. Truck	
c. Canoe		h. Taxi	
d. Boat		i. Bus	
e. Tri-cycle		j. Other (Specify)	
1.3 What Mode of transport do you frequently use			
Item	Quantity	Item	Quantity
c. Bicycle		f. Car	
b. Motorcycle		g. Truck	

c. Canoe			h. Taxi	
d. Boat			i. Bus	
e. Tri-cycle			j. Other (Specify)	
1.4 What Sort of housing does your household live in?				
a. construction material – walls		Plastic mud	c. Number of rooms	1 – 2
		Cement blocks		3 – 4
		Other (specify)		other (specify)
b. Construction material – roofing		Corrugated roofing	d. Other structures on plot	Animals Pen
		Aluminum		Granary
		Asbestos		Shops
		Tile		Kiosks
		Other (specify)		Other (specify)
e. Construction material – Floor		Earthen		
		Concretes		
		Tiles		
		Other (specify)		
f. Toilet Facility		Pit		
		Water closet		
		Toilet facility outside dwelling		
		Pier latrine		
		Other (specify)		
		None		
g. Tenure of housing		Owned		
		Rented		
		Occupied rent free		
		Other		
h. Tenure of land		owned		
		Rented		

	Occupied rent free
	Lease hold
	Other (specify)

2. Indicate household refuse disposal for solid waste? (Multiple options) (a) Depositing refuse at backyard of the house (b) Dumping in water body (c) Dumping in community refuse/garbage pit/dumpsite (d) Burning after gathering together (e) Waste collector (f) Other Specify.....

2.0 Household Services

- 2.1 Rank in order of availability and usability the source(s) of lighting for the household? (please use 1, 2,... in hierarchical order with 1 indicating the most available and used source)

(a) PHCN	(b) Generator	(c) Lantern	(d) Candle	(e) Oil Lamp	(f) Torchlight battery	(g) Wood	(h) Kerosene	(i) Gas
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- 2.2 Using the method in 2.1, indicate major source of energy for cooking

(a) Fire wood	(b) Coal	(c) Kerosene	(d) Electricity	(e) Animal dropping	(f) Gas	(g) Crop Residue/ saw dust	Others
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3.0 Sources of Water

	for drinking		for cooking		for bathing and washing	
a. Well	Yes	No	Yes	No	Yes	No
b. Borehole	Yes	No	Yes	No	Yes	No
c. Water Pump	Yes	No	Yes	No	Yes	No
d. Community tap	Yes	No	Yes	No	Yes	No
e. Piped water outside	Yes	No	Yes	No	Yes	No
f. River	Yes	No	Yes	No	Yes	No
g. Rain Water outside	Yes	No	Yes	No	Yes	No
h. Water vendor	Yes	No	Yes	No	Yes	No
I, Tanked water	Yes	No	Yes	No	Yes	No
j. Other (specify)	Yes	No	Yes	No	Yes	No

4.0 Income

State your main income per month	N
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4.1 Remittance

1. Does anyone in the family who lives elsewhere send money to you?	1	Yes	2	No
2. If yes, how much (per month)	N			

5.0 Other Income

1. Do you have other income streams	Yes	No
2. If yes, please specify the amount	N	

6. Total Income

1. What is the total household monthly income (all activities)?	N
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7. In your opinion, how has the standard of living of your household changed over the previous three years?
(a) Same (b) Better (c) Worse
8. Is the option in 7 propelled by the Gully Erosion problem (a) Yes (b) No
9. If 8 is yes, do you think the proposed intervention will improve the situation? (a) Yes (b) No
10. If 9 is yes specify how the project will improve the situation
11. How do you ensure gender equity in the community? (a) Women are elected in public office (b) Females are given equal opportunity and access to education and employment (c) Quotas on genders are ensures in leadership of community based organization (d) Others specify

SECTION D: Resources/Cultural Property

1. Please indicate the environmental problems which your settlement/community experiences and whose cause can be linked to the Gully Erosion? (a) Soil Infertility (b) Poor drainage system (c) Bad road (d) Bad lands (e) Environmental degradation (f) Degraded land (i) Destruction of infrastructures (j) Other specify
2. Please indicate the environmental problem which your settlement/community would likely experience and whose cause can be linked to the proposed intervention project during construction? (a) Soil infertility (b) Poor drainage system (c) Bad road (d) Bad lands (e) Low viability (f) Erosion problem (g) Flooding (h) Environmental Degradation (i) Destruction of infrastructure (k) Encroachment of land property (l) Pollution (air, surface water, ground water, noise (m) Other specify.....
3. Do you think the proposed intervention projects will affect any valued resource/cultural /archaeological property in your area? (a) Yes (b) No
4. If yes, mention the name(s) of the valued resource/cultural/archaeological property
5. How will valued resource/cultural/archaeological property be affected?
(a) Displacement of such valued cultural property (b) Vandalization of sacred items/locations (c) possible thief of sacred/archaeological items (d) Others, specify.....

SECTION E: Intervention Project Activities Impact Evaluations

1. Are you aware of the proposed intervention by NEWMAP (a) Yes (b) No
2. If yes, from which source (a) Community meetings (b) media (TV, Radio, Newspaper, Internet) (c) Others, specify.....
3. Do you think the projects can cause restiveness in your community? (a) Yes (b) No
4. If 3 is yes, how will the proposed intervention result in restiveness?
(a) Disrespect of norms and culture by contractors (b) Loss of farmland/property (c) possible thief of sacred/ archaeological items (d) Local people not employed during construction (e) others, specify.....
5. How will the proposed intervention project impact on your livelihood and environment?

Positive impacts	Negative impacts
(a)	
(b)	
(c)	
(d)	
(e)	

(f)	
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6. Can you name some of the animals and other habitant at the gully erosion site that may be affected by the proposed intervention projects?
7. What do you expect from the activities of NEWMAP intervention?
 - (a) Employment of Locals during construction (b) compensation for those whose properties will be affected
 - (c) capacity building for maintenance during implementation (d) Community input into final engineering design
 - (e) Others, specify.....
8. Are there any other issue(s) of concern as regards the intervention projects in your area, please state clearly

Appendices #5 FGD GUIDE

FGD GUIDE FOR NASARAWA STATE (TOOL #3)

NASARAWA STATE NEWMAP PROJECT LOCATION: LGA: SITE:
Section One: Data Collection Tool for Socioeconomic Impact Assessment Survey
Enumerator’s Name and Contact
No:

State: Nasarawa	LGA:	Name of Project Site:
Nature of the Project:	Name of Community:	Date of Interview:

Section Two: Respondent’s Background information

1. Respondent’s Name:
2. Respondent’s Sex:
3. Respondent’s Marital Status
4. Respondent’s Educational Level
5. Respondent’s Status
6. Resp+ondent’s Length of stay in the Area

Section Three: Research Questions

Interview Guide for Members of the Communities and Associations

1. **The Gullies in the Area:** Tell me about the Gullies in the Area – Major causes: natural and man-made, including the community members’ attitudes
2. **Magnitude of the damage & how it affects the communities:** a description of the people’s conditions, especially during the water storm. How are the houses in the areas affected?
3. **Members’ attitude to and aspirations for development:** In your opinion, what do you think are the community members’ attitudes in terms of the need to make meaningful change? What are the people’s efforts towards changing the situation at individual, neighbourhood, organizational, or community collective effort?
4. **The Community members’ perceptions of the Intervention/Project:** Are the people aware of the Intended project? If yes, to what extent are they interested, willing, & committed to the successful implementation of the project?
5. **Project Impact:** What are the current and potential impacts of the project on social sustainability and the community cohesion? To what extent will the project mitigate negative impacts in the area?
6. **Assessing CBOs, Support and Participation:** To what extent is the levels of participation in community based initiatives and associations? How is cultural homogeneity and diversity facilitating and/or mitigating the participation in communities’ or CBOs’ acceptance of the project?

7. **Gender Dimension – Issues & Impacts:** What do you think are the people’s views pertaining to the roles and rights of women in the communities? What are their perceptions regarding the potential impacts of the project on women and children?
8. **Health & Safety-related Views:** Tell me about how the gullies affect the health of the communities, including women’s and children? To what extent will the project improve the health and safety of the communities?
9. **Views on Social and Economic Impact of the Project:** In what ways will the project benefit the communities’ socially? To what extent will the project improve the economic conditions of the people? What other ways could the project be beneficial to the community?
10. **Project Beneficiaries’ Attitudes towards Environmental Sustainability:** What are the communities’ attitudes towards environmental sustainability? What is the community members’ willingness to change some of their attitudes towards the environment, especially waste disposal, and so on? How best could the community be engaged in devising & best practices vis-a-vis environmental-friendliness?
11. **Challenges, Perceived Problems, & Grey Areas:** What do you think are the issues, problems, or challenges that the community believe are associated with the project?
12. **Recommendations:** Please suggest ways on how to make the Project Successful & Sustainable

THANK YOU FOR AGREEING TO GRANT US THIS INTERVIEW!

Appendix 6 Attendance

NASARAWA STATE-NEWMAP PROJECTS ATTENDANCE

Environmental and Social Management Plan (ESMP)

ESMP Data Gathering exercise

Project Title: *NEWMAP - Intervention*

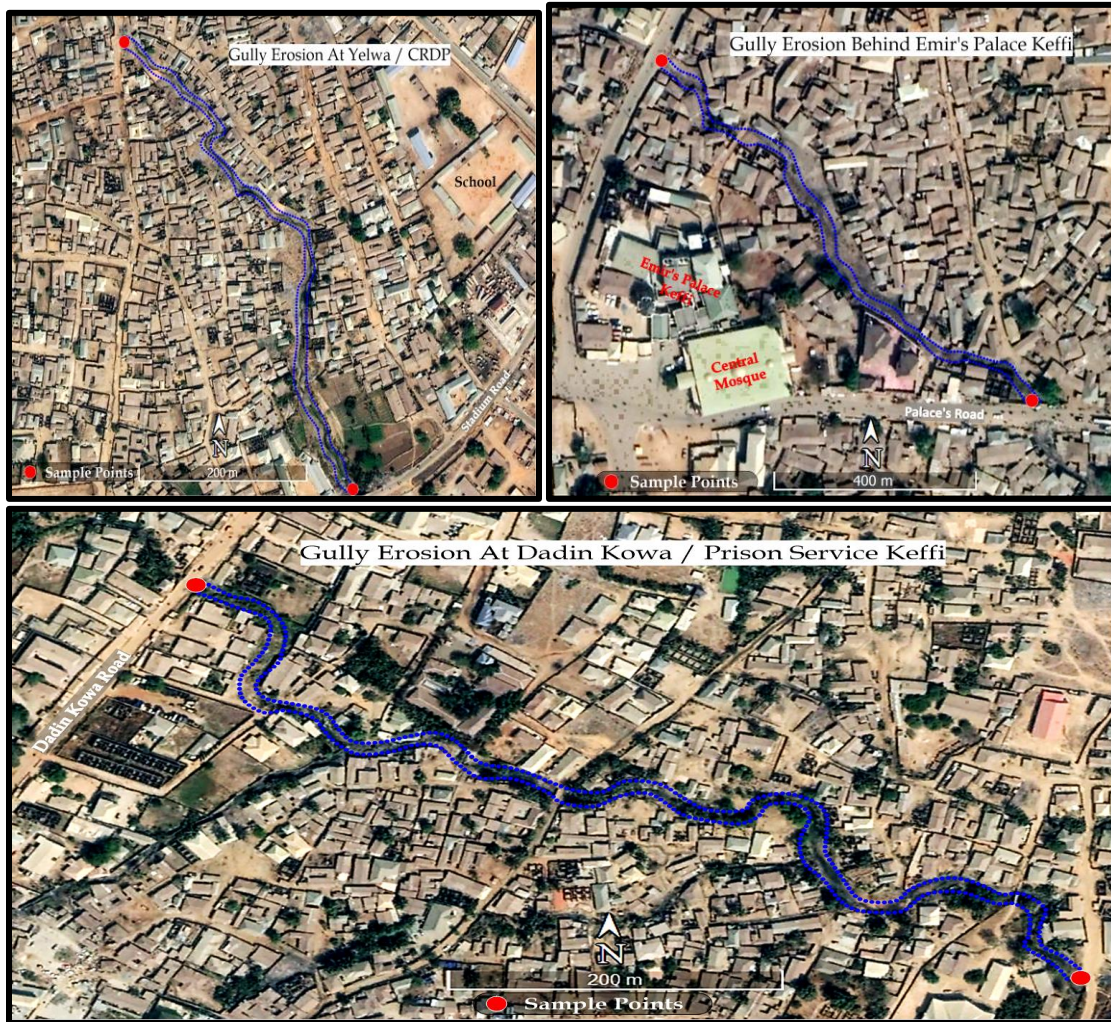
Project Location: *Keffi* LGA: *Keffi* Settlement/Site: *Behind Emir Palace*

S/NO	Name of Participant
1	<i>YAHAYA MOHAMMAD RAJIB</i>
2	<i>Ahaji Abdullahi Buhari</i>
3	<i>Adams Muhammad Muhammad</i>
4	<i>Mohammed Nasir</i>
5	<i>Abdullahi Abdullahi Alga</i>

ATTENDANCE KEFFI

	NAME	LOCATION	PHONE NO	DISGRATION
1	MUHAMMAD TORIS		08065607264	Information officer
2	Ibrahim Abubakar	NAGI OF INI	07039217577	SECRET OF SNI KEFFI
3	Hon. Akwua Aman	Tudu Angwa	08035406981	Mai-angwa
4	Mrs. Christians Paul	Tudu Amema	09034906688	women leader T/Amema
5	Mr. Ewuga Taninu	Tudu Amema	08174636947	Youth Rep-T/Amema
6	Sunday.T. Kuje	C.G.C	08061199348	C.A.N Rep.
7	Falalu ya'u	C.G.C	08035730001	S.A to c/man
8	Ah. Ibrahim Mai Keffi	Gangaren Tudu	08060818357	Mai-Angwa
9	Rakiya Ismaila	Gangaren Pado	08065863914	woman Rep.
10	Abdullahi ya'u	yalwa	08082456612	mai-Angwa yalwa Bili
11	Abdulkar A Bello	yalwa	08039212249	C.A.N Rep
12	Ahaji Sule Kudi	Karofi	07018332676	mai Angwa member
13	Yusuf maihakuti	Karofi	09059331448	member
14	Shau Ibrahim	Karofi	08059808031	
15	IANKA DANLADI	KEFFI	07039386868	YARON MAI ANGWAN
16	MUHAMMAD GATI BILATTIN	KEFFI	08069690214	ko far maza
17	Abubakar Jibrin	KEFFI	083239746	Angwan ceurg
18	Yahya medayi	KEFFI		

Appendix #7 Sampling points air quality, Noise, soil etc



Appendix #7: NEWMAP ENVIRONMENT AND SOCIAL GUIDELINES FOR ADDRESSING COVID-19 RISK

- The measures provided in this document are guidelines and not policy and not expected to cover the specificity/peculiar situation of each site/state.
- Measures already implemented need not be duplicated,
- The primary / main contractor will be responsible for ensuring these, even if one or more sub-contractors are used for completing the civil works.
- The contractor to put in place measures to avoid or minimize the spread of the transmission of Covid-19 and/or any communicable diseases that may be associated with the influx of temporary or permanent contract-related labor.

1. **General Obligations of the Contractor**

- To take all necessary precautions to maintain the health and safety of the Contractor's Personnel, including identifying a focal person to deal with and handle COVID-19 cases.
- Empower the health and safety officer at site to issue directives for maintaining the health and safety of all personnel authorized to enter and/or work on the site.

- No employees may stay on site over shutdown period without permission from the concerned authorities or unless quarantined at the site.
- Ensure that security personnel at site are provided with necessary safety gear, including for COVID-19 (masks, sanitizers etc)
- All excavations/penetrations adequately secured, covered or barricaded.
- No exposed reinforcing steel permitted to excavations –to be “Red-Capped” or otherwise protected
- All perimeter fences, gates and barricades secured and in good condition to prevent unauthorized access.
- In consultation with the SOMU establish a procedure for reporting and handling COVID-19 cases.
- Ensure coordination with relevant state/Local government agencies
- Display appropriate warning signs (local language and English) across the site; use simple graphics to convey the message.
- Have emergency contact numbers displayed across the site.
- Inform neighbours, key local body members regarding closure of works and to report to NEWMAP/ Contractor/SPMU (sharing the contact numbers) in case they spot an unauthorized entry. Local body or anyone in the neighbourhood should if possible, have any intermittent visit to the site and talk to neighbours regarding any unauthorized entry or any other activity in or near the site which is worth monitoring.
- Ensure all ditches are closed with appropriate warning signs.
- Extra security during the shutdown period in order to keep site secure (onsite security staff to be deployed if possible/CCTV/ or additional locks and alarms).
- Conduct a walkthrough of the site including site perimeter assessment to look for access points and make them secure.
- All tanks, facilities at heights, are all protected with hard fences/block any fall
- All ladders, temporary steps are removed preventing people from climbing any heights
- All permanent ladders are closed preventing any entry-with strong safety nets all along the ladders and all heights in such a way that even if there is a slip there is no danger.
- Close all labor camps, ensure food and sanitation and wash facility for any worker on site-ensure that Covid-19 guidelines shared by the bank are followed.
- Ensure sufficient lighting in all sites and that lights are switched on at dusk and switched off during the daytime.
- Disconnect all electrical devices or ensure safety
- Remove all fuels and lubricants from site and empty or safe store at convenient storage area without risk of fire.
- Inform local police and fire force regarding temporary closure of sites and their support in case they receive any calls for support. Ensure they get a contact person on these NEWMAP work sites at the Town/State office.
- Submit a report of actions taken for site closure along with photographs (with date and time) clearly indicated to PIU and NEWMAP

2. Labour

- To provide health and safety training/orientation to all workers and staff on COVID-19 awareness, including cough etiquette, hand washing hygiene and social distancing measures, using demonstrations and participatory methods.
- Additional signage's at/around the site, with images and text in local languages relating to COVID-19 symptoms and precautionary guidelines.
- Ensuring adequate hand washing facilities supplied with soap, disposable paper towels and closed waste bins exist at key places throughout site, including at entrances/exits to work areas and canteen or food distribution places.
- Given the risk of contagious COVID-19 diseases, additional PPE against potential infection to be provided (N95 or equivalent triple layered masks, face screen, hand loves, safety boots etc).
- Regular disinfecting of the work site to be undertaken at close of work every day or as may be required.
- Prepare a detailed profile of the project work force, schedule for carrying out such activities, different durations of contract and rotations, confirmed addresses of the labor and any underlying health conditions that increases the risk of severe infection, to facilitate tracking of workers in case of COVID-19 exposure.
- Redeploy workers to maintain social distancing amongst themselves and with others
- Segregate lunch hours at worksite of workers to maintain social distancing.
- All workers/labor to be regularly checked for symptoms before allowing entry to the work site, including temperature scan using an infrared thermometer (no contact).
- Paid leave to be mandatorily given if labor contact COVID-19 disease while working at the construction site or in the labor camp.
- Any medical waste produced during the care of ill workers should be collected safely in designated containers or bags and treated and disposed of following relevant requirements (e.g. Biomedical Waste Rules-2018, WHO).
- Preventing a worker from an affected area or who has been in contact with an infected person from returning to the site for 14days or(if that is not possible) isolating such worker for 14 days.
- Promote adequate awareness to guide against stigmatization among the workers and communities where required.

3. **Labor Camps**

- Adequate hand washing and sanitization facilities to be provided at labor camp.
- Monthly/weekly health check up to be organized at the camp for all labors/family.
- Organize awareness campaign for social distancing and general health and hygiene to be maintained within the labor camp.

4. **Grievance Redress Mechanism (GRM)**

- Contractor to establish and widely advertise (within labor camps and at construction site) a GRM (relying on existing GRM system). Workers to be informed of their rights for reporting a workplace condition that is not safe or healthy for them and poses imminent risk to contracting COVID-19 without any reprisal/ penalty.

5. **Consultation**

- All PIU are expected to abide by NCDC and respective state protocol on prevention of COVID-19 spread.
- Where permitted consultation and possible PAP verification should be limited to smaller groups while respecting social distancing.
- Please refer to the attached additional guidelines on public consultations.

6. **RAP Implementation**

- In the case of Resettlement Action Plan where direct contact with PAP is necessary, specific channels or a combination of online platform, dedicated phone line, SMS, email etc could be considered. However, where none of the above are adequate, the PIU should consider postponing the activity.
- In the case of ongoing resettlement implementation where postponement is likely to be more than few weeks (e.g. 2-3weeks), PIU should reach out to the Bank for further guidance.

7. **Disclosure**

- At the point of disclosure, it is expected that the affected assets and compensation amount must have been agreed with the PAP's and documented in the draft RAP. The disclosure process should follow the state established COVID-19 protocol.
 - (a) The number of people engaged during consultation/disclosure process must align with the state social distancing protocol.
 - (b) The public disclosure should follow the usual process of disclosing in the national dailies, PIU office and at the relevant strategic places in the affected community while the PIU ensures provision of hand sanitizers in each location and observance of social distance.
 - (c) It is the PIU's responsibility to ensure that information on disclosure is conveyed to all PAP's using locally applicable channels such as town crier, SMS, local radio etc.
 - (d) Finally, the PIU should ensure that they convey the evidence of in-country disclosure to the Bank for disclosure on the Bank's website.

8. **Use of Security Forces**

- It is common practice for Governments to utilize military or security personnel during public health emergencies. Although NEWMAP is not a COVID-19 Operation, giving the unprecedented situation of COVID-19, it might not be ruled out that government might want to deploy the use of military or other security forces to maintain law and order and/or to enforce lockdown guidelines. As stated before, NEWMAP operation must adhere to state and federal guidelines. However, if by any chance the State decision to use military or other security force is expected to be displayed in any around NEWMAP active site operations, state implementation Units should seek guidance from the Bank.

9. **Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH)**

- For sites where works will continue under the lockdown it is the responsibility of the PIU to ensure that the contractor adhere to the guidelines on SEA/SH prevention in line with the GBV action plan prepared for the project.

NEWMAP PRACTICAL GUIDELINE TO CONTRACTORS DURING COVID-19

1. Display appropriate warning signs (local language and English) across the site; use simple graphics to convey the message.
2. Have emergency contact numbers displayed across the site.
3. Ensure that all sites are enclosed with fence/compound walls leaving no leeway for unauthorized entry, if possible, with security personnel.
4. Inform neighbours, key local body members regarding closure of works and to report to NEWMAP/Contractor /SPMU (sharing the contact numbers) in case they spot an unauthorized entry. Local body or anyone in the neighbourhood should if possible, have an intermittent visit to the site and talk to neighbours regarding any unauthorized entry or any other activity in or near the site which is worth mentioning.
5. Ensure all ditches/trenches are fully protected with fence (bared) all around, preventing any entry.
6. Ensure all ditches are closed with appropriate warning signs
7. Extra security during the shutdown period in order to keep site secure (onsite security staff to be deployed if possible /CCTV/or additional locks and alarms).
8. Conduct a walkthrough of the site including site perimeter assessment to look for access points and make them secure.
9. Ensure all existing locks and hoardings are secure
10. All tanks, facilities at heights, are all protected with hard fences, to prevent/block any fall
11. All ladders, temporary steps are removed preventing people from climbing any heights
12. Ensure that any site scaffolding is safe and access closed off.
13. All permanent ladders are closed preventing any entry – with strong safety nets all along the ladders and all height in such a way that even if there is a slip there is no danger.
14. Close all labor camps, ensure food and sanitation and wash facility for any worker on site – ensure that Covid-19 guidelines shared by the bank are followed.
15. Ensure sufficient lighting in all sites and that lights are switched on at dusk and switched off during the daytime.

16. Disconnect all electrical devices or ensure safety
17. Remove all fuels and lubricants from site and empty or safe store at convenient storage area without risk of fire.
18. Inform local police and fire force regarding temporary closure of sites and their support in case they receive any calls for support. Ensure they get a contact person on these NEWMAP work sites at the Town / State office.
19. Submit a report of actions taken for site closure along with photographs (with date and time) clearly indicated to PIU and NEWMAP

Site Shut-down Checklist

S/N		YES	NO	N/A
A	Safety and Security			
1	No Unauthorized” access signage posted at entrance gates and perimeter fence?			
2	No employees may stay on site over shutdown period without permission from the Client.			
3	Standby persons nominated by General Contractor and Sub-Contractors to respond to emergency situations?			
4	Arrangements made for afterhours security?			
5	Security lighting / Alarms in place, checked and working?			
6	Emergency numbers clearly displayed on site information boards and at security access?			
7	All perimeter fences, gates and barricades secured and in good condition to prevent unauthorized access?			
8	Unauthorized access to crane prevented? (Board up access ladder)			
9	All plant and equipment made safe? Keys removed; doors locked etc.			
10	All material stacked / stored away from site perimeter fence?			

11	Ladders removed and stored away to prevent unauthorized usage?			
12	All material / tools safely stored away in containers / secure lockups?			
13	Hazardous chemicals / flammable material securely locked away in well ventilated bonded COSHH locker?			
14	Housekeeping on site in good order? (All trip hazards removed; combustible material removed from site)			
B	Excavations / Penetrations and Barricading			
1	All excavations / penetrations adequately secured, covered or barricaded?			
2	Edge protection in place on leading edges and drop-off points otherwise areas securely barricaded, and sign posted?			
3	No exposed reinforcing steel permitted in excavations – to be “Red-Capped” or otherwise protected			
4	All covered penetrations / excavations labelled, and warning signs posted			
5	All excavations adequately secured, covered or barricaded?			
C	Powered Industrial Vehicles/Plant			
1	All vehicles parked in safe designated areas with drip trays under engine wheels chocked?			
2	All vehicles securely locked and keys kept in a lockable safe or secure place?			
3	All batteries to vehicles kept on site disconnected			
4	Diesel / Fuel tank discharge point locked or otherwise secured to prevent discharge or unauthorized usage?			
D	Administrative			

1	All computers, copiers, scanners etc. removed from site or securely locked away?			
2	All taps securely closed and electrical outlets isolated / disconnected?			
3	All offices securely locked and checked?			
4	Emergency standby list confirmed and distributed to relevant persons.			