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Federal Republic of Nigeria

STATE EMPLOYMENT AND EXPENDITURE FOR RESULTS (SEEFOR)

Final Report of the Environmental and Social Management Plan (ESMP) for Road Rehabilitation Project in Sapele, Delta State

May 29, 2015

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ARAR	-	Applicable or Relevant and Appropriate Requirements
BOD	-	Biochemical Oxygen Demand
COD	-	Chemical Oxygen Demand
DO	-	Dissolved Oxygen
DSMB	-	Delta State Waste Management Board
EA	-	Environmental Assessment
EIA	-	Environmental Impact Assessment
ESMP	-	Environmental and Social Management Plan
FEPA	-	Federal Environmental Protection Agency
FGD	-	Focus Group Discussion
FGN	-	Federal Government of Nigeria
FMEnv	-	Federal Ministry of Environment
GPS	-	Global Positioning System
H_2S	-	Hydrogen Sulphide
IDI	-	In-Depth Interviews
ISO	-	International Standard Organisation
IUCN	-	International Union for Conservation of Nature
LGA	-	Local Government Area
MDAs	-	Ministries, Departments and Agencies
NEWMAP	-	Nigeria Erosion and Watershed Management Programme
PMU	-	Project Management Unit
VOC	-	Volatile Organic Compounds
SMoE	-	State Ministry of Environment
SMoW	-	State Ministry of Works
SPM	-	Suspended Particulate Matter
TDS	-	Total Dissolved Solids
TSS	-	Total Suspended Solids
WHO	-	World Health Organisation

UNITS OF MEASURE

^0C	-	degree Centigrade
^0F	-	degree Fahrenheit
cfu	-	colony forming units
CO_2	-	carbon dioxide
dB	-	decibel
g	-	gram
Ha	-	Hectare
hr/h	-	hour
kg	-	kilogramme
km	-	kilometer
L	-	litre
m	-	metre
max	-	maximum
mg	-	milligram
ms^{-1}	-	metre per second

EXECUTIVE SUMMARY

The Delta State Government has received an advance on the proceeds of a credit through the World Bank and grant from the European Union (EU) Assisted Project on State Employment and Expenditure for Results (SEEFOR). This advance is to be used in improving the composition and effectiveness of public expenditure by strengthening public management systems and service delivery while also enhancing employment generation in the state. Consequent upon this, there is the need to assess the environmental and social impacts of the intervention project through the Delta SEEFOR; hence the call for Environmental and Social Management Plan (ESMP) in the proposed interventions at Sapele in Sapele Local Government Areas.

Description of Project Activities

This assessment covers the proposed project activities financed by World Bank SEEFOR at Sapele Local Government Areas, Delta State, Nigeria. The project is aimed at rehabilitating and maintenance the existing road networks while generating employment opportunities for the youths in the proposed project affected areas through civil works.

Existing Safeguard Instruments and Rationale for the ESMP

This ESMP was drafted in accordance with The World Bank Operating Policy 4 and is consistent with the Environmental and Social Management Framework (ESMF) that was prepared and disclosed by the project. The ESMP is designed to guide the process of the proposed intervention projects with a view to enhancing project benefits and introducing standards of good environmental and social practice for sustainable development in the State. The Delta SEEFOR project activities have been categorised as B.

As a consequence, the potential environmental and social impacts of activities that are eligible to fund under this project are site-specific, non-cumulative, relatively easy to mitigate to acceptable levels and thus requires mainly ESMP.

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Institutional Framework

SEEFOR project activities involve many federal and state ministries, departments and agencies (MDAs), local governments, communities, and the civil society. Effective implementation, monitoring and evaluation of the project require inter-ministerial and inter-state coordination, collaboration, and information sharing. Thus, each component, sub-component and activity of the project is to be implemented through relevant federal and state

MDAs. The various MDAs include those responsible for planning, economy and finance, works, agriculture, water resources, forests, transport, power, emergency response, as well as those focused on climate and hydrological information or watershed/ basin regulation. The investments would be accomplished through the Delta SEEFOR, as the state has the primary responsibility for land management in the state.

The National Project Coordinating Unit (NPCU) is the lead implementing agency for SEEFOR. The National Project Coordinating Unit (NPCU) is headed by a Federal Coordinator hosted by FMEnv is responsible for the overall coordination of the project. The Delta State Project Management Unit (Delta-SPCU) headed by the State Coordinator and hosted by the Delta State Ministry of Environment is responsible for project coordination in the State, thus is directly responsible for the coordinating activities of the proposed projects including the implementation of this ESMP. Both the federal and state levels coordinating units have environmental officers responsible for the mainstreaming of environmental issues into SEEFOR projects. The Delta State environmental officer is directly responsible for coordinating the implementation of this ESMP on behalf of the State Project Coordinator. At the community level, the road construction, rehabilitation and maintenance Monitoring Committee will effectively participate in ensuring full compliance during project implementation. The World Bank will provide oversight and guidance to the borrower as needed. However, it is the responsibility of the borrower/proponent (Delta SEEFOR SPCU in this instance) to ensure that World Bank safeguards policies are complied with in the implementation of the SEEFOR Project

Policy, Legal and Administrative Framework

The requirement for an Environmental Assessment and Social Management Plan is in compliance with the Federal Republic of Nigeria's laws and World Bank policies that are geared towards achieving sustainable development goals through proper and adequate care for the environment, health and social well-being of her citizens. This report is prepared in accordance with SEEFOR provision of ESMF, PAD, PIM and RPF. However, in the event of dissonance between the World Bank Safeguards Policies and the Extant laws of Nigeria, World Bank Safeguard Policies will supersede.

Biophysical Environment

The assessment of biophysical environment of the study area covers general climate and meteorology, air quality and noise level, topography, regional hydrology, water and soil

quality, geology, ecosystem, vegetation, plant physiognomy, crops, fauna and wildlife resources. In this regard, the values of all the measured parameters, with the exception of the concentrations of Zn, Cu and Ni recorded in the surface water were within FMENV acceptable limits and of other international standards, Also, none of the plant species and wildlife found is recorded in the vulnerable category of the IUCN

Socio-Economic Characteristics

The socio-economic characteristics of the project area reveal that:

- The threat posed by the proposed project is minimal and can be curtailed using proposed measures in this ESMP;
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- Over 65% of the respondents are between age 18 and 65 years. This is the working class age bracket, thus the population has a high proportion of active individuals;
- It has a high proportion of married individuals. The married individual possesses large family size, which has an average of seven (7) people;
- High proportion of literate population with over 80% having attained secondary level of education;
- High proportion of individual who are salary earners and those engaged in trading activities. There are also a reasonable level of people engaging in farming, thus the proposed project will assist in terms of accessibility;
- Income level is largely between N10,000 to N30,000; and
- Malaria and Typhoid are the predominant ailments of the people.

Potential Environmental and Socio-Economic Impact

The social impacts of the project implemented are highly positive. There was a unanimous agreement among respondents that the proposed project will enhance accessibility and encourage high productivity. It will reduce economic hardships imposed on commuters especially during rainfall and reduce travel distance to some strategic locations within the area. Other concerns associated with the project include; employment opportunities, flood control and improvements on traffic and transportation.

Appraisal of the 'No Action' Alternative and Use of Civil Works

Criteria	No Action	The Civil Work
Overall Protection of Environment and Human Health (General protection mechanisms)	This will not benefit the concerned stakeholders and community residents owing to the observed level of damages from the road networks. Unemployment will continue to increase, poor road condition will remain and this will continue to reduce accessibility to sources of livelihood	The maintenance and rehabilitation of the road will lead to improvement in the quality of life of the people. Properties will be secured, lives will be saved and resources recovered. Also transportation facilities will be enhanced and general restoration of livelihood will be facilitated. It will benefit the Project Affected People and the residents.
Short-term Effectiveness	The No-Action alternative will not add any specific input to the stated criteria.	The timeline for the civil and other construction works is long term. Nevertheless, the benefits derivable are still better than a No-Action alternative.
Long-term Effectiveness and Permanence	This alternative will not meet the long-term effectiveness and permanence criteria.	Civil works will provide long-term effectiveness for the roads.

Environmental and Social Mitigation Measures

Potential impacts, especially during the implementation phase include: flood issues, air quality issues, soil compaction, waste management traffic and transportation including diversion during construction. Measures were developed to mitigate the identified impacts. Other identifiable components of the environment, social sphere and health implications were also considered with respect to the projects implemented.

Best available control technology including; dust suspension techniques, routine watering, proper drainage alignment and leveling, community mobilisation amongst others were stated as mitigation measures. Other control measures for specific impacts include; proper waste disposal systems, speed limit indications and speed breaker, engagement of the community on health, safety and the environment amongst others. Environmental and social impacts analysis reveals that the benefits of the proposed SEEFOR project at Sapepe, Delta State, Nigeria outweigh the adverse impacts. Consequently, this ESMP hereby recommends the implementation of the proposed projects.

A cost estimate of about *Forty Three Thousand dollars* (**$43,000: 00**) was estimated for the proposed mitigation measures. It was concluded that to enhance the benefits of the proposed intervention by the Delta State SEEFOR at all phases of the projects' execution, the mitigation measures provided in the Sapele SEFFOR ESMP should be strictly followed.

Recommendations and Conclusion

It has been realized that the benefits of the proposed SEEFOR project in Sapele would outweigh the potential adverse impacts. Consequence upon this, the ESMP recommend the implementation of the proposed Sapele SEEFOR project by the Delta State SEEFOR. This would enhance effective and efficient intra and inter urban mobility in Sapele while at the same time generating employment opportunities for the youth in the area. It is also capable of eradicating road infrastructure decay in the area. Affected community should be engaged in the project prior to the commencement of the civil works on the site. This would enable the community to make their contributions towards the sustainable implementation of the project. Job opportunity should be given to qualified members of the affected communities.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

This Environmental and Social Management Plan (ESMP) aims at providing the potential impacts of the proposed State Employment and Expenditure for Results (SEEFOR) project, on both physical and human environmental components, in Sapele, Sapele Local Government Area of Delta State, Nigeria.

The objective of the proposed SEEFOR project in which Sapele LGA is one of the beneficising LGAs in Delta State is to improve the composition and effectiveness of public expenditure by strengthening public management systems and service delivery whilst enhancing employment generation in the participating states. The project is not anticipated to lead to any large scale acquisition of land or denial of access to usual means of livelihood nor to any disruption of environmental amenities. However, for due diligence, it has become necessary to prepare an Environmental and Social Management Plan (ESMP) to be used for the implementation of the proposed SEEFOR Project at Sapele in Sapele LGA of Delta State. In this regard, the proposed project is aimed at rehabilitating and maintaining the existing road networks while generating employment opportunities for the youths in the proposed project affect areas.

The SEEFOR proposed project and its activities prompted the environmental assessment policy (OP.4.01) of the World Bank. The impacts of the proposed project have been classified as a Category B for the environmental assessment of the Bank. The project also generated sections of Environmental Assessment Regulations of the Delta State Environmental Protection Agency (DELSEPA). It therefore necessitates the Environmental and Social Management Plan (ESMP). The ESMP takes into consideration the range of the project activities and institutional arrangements for project implementation to safeguard the environment.

The activities will include the use of low and medium equipment including but not limited to Loader, Grader, Vibration Roller, Bulldozer, Generator, Impact Drill, Mixer,

Concrete Pump, Pneumatic Hammer and other civil engineering activities meant for road rehabilitation.

1.2 Description of the Proposed SEEFOR Intervention Project

The proposed SEEFOR project is basically designed around two main components. These are public financial management (PFM) and service delivery. Service delivery will have three sub-components which are:

- Training and skills development;
- Youth employment and
- Community Driven Development (CDD).

The activities that SEEFOR will be carrying out in Sapele include; sweeping of surface travelled road, vegetation control on the kerbed and road corridor median as well as drains de-silting and cleaning of road sides. Detailed description of the proposed activities is in chapter three.

1.3 Rationale for the Study

The existing road networks selected for rehabilitation and maintenance in the proposed project area are located in Sapele, Sapele LGA of Delta State. These roads are strategically important in the State. For instance, Okpe road which was selected for the project is a very important road in Sapele city as it connects greater parts of Sapele. Due to the poor state of the selected roads network, lack of maintenance and high rate of unemployment in the State and Nigeria in general, the execution and implementation of the proposed project has become inevitable. All the selected roads in Sapele are a vital intra and inter transportation routes e.g. Sapele-Warri road, Okpe road, and thus required rehabilitation and adequate maintenance for efficient intra-urban and inter-urban traffic in Sepele.

The impacts of the selected roads for rehabilitation and maintenance by SEEFOR will be enormous. Lack of maintenance of these roads, including Okpe and Cemetery roads, has given way to flooding, poor drainage system, copious pot holes, narrowness of the roads and inadequate waste management approach in the area. The existing condition of the roads has negative impacts on economic activities in Sapele. The situation of the

proposed project roads have made access to residential houses, schools, churches, work place, and social amenities for the affected communities difficult most especially during the rainy season. This necessitated the need for urgent attention and the SEEFOR intervention. It is, however, estimated that the expected (indicative) labour requirements for SEEFOR activities in Sapele will be about 150 people.

1.4 Rationale for ESMP

The major developmental objective of the ESMP is to ease effective decision making and to ensure implementation processes during the execution of the proposed project activities as well as ensuring that civil and rehabilitation works are environmentally sound. It is also targeted at encouraging community consultation and participation while making sure that social wellbeing is sustainable. The ESMP deliberately seeks to provide a clear process, including action plans, to integrate environmental and social considerations into the SEEFOR.

The specific objectives of the ESMP are to:

- Assess the potential environmental and social impacts of the sub-projects (rehabilitation, extensions of or new constructions in intervention sites, livelihood adaption, etc), whether positive or negative, and propose measures and plans to reduce or mitigate adverse environmental impacts and enhance the positive impacts of the project.
- Establish clear procedures and methodologies for incorporating environmental management requirements including stake holder engagement in the implementation of the project and all sub projects;
- Ensure the project is carried out in accordance with Nigerian and World Bank guidelines and safeguards. ;
- Provide a 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 that l positive social and environmental impacts of sub-projects are enhanced and that measures are designed to avoid or minimize, a any potential adverse impacts;
- Provide measures to mitigate any potential negative impacts of the project and a detailed management plan to manage the social and environmental impacts of the project.

- Provide guidelines to appropriate roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental and social impacts of the program and sub-projects;
- Determine the training, capacity building and technical assistance needed to successfully implement the provisions of the ESMP;
- Comply with regulatory and policy requirements (local and international) that are applicable to the program and sub projects;
- Identify potential environmental policies, legal and institutional framework pertaining to the project.
- Establish clear directives and methodologies for the Environmental and Social Impact Assessment (ESIAs) as might be needed for specific sub-projects.
- Identify modalities for estimating and budgeting the costs for the implementation of the environmental Management Plan for the projects.
- Ascertain the agencies responsible for the implementation of the projects Environmental Management Plans and the projects' Monitoring & Evaluation (M&E).

Fundamentally, the ESMP report on rehabilitation and maintenance of the selected road networks in Sapele, Sapele LGA will be used by the SEEFOR in Delta State. In seeking to implement the proposed SEEFOR project, conform to legal obligations and to ensure a sustainable project, it is mandatory on the government of Nigeria to take into cognisance relevant State-owned laws, where the project will be executed and comply with all national and international environmental requirements.

1.5 Scope of Work

The task of the consulting services is to prepare an Environmental and Social Management Plan (ESMP) for the proposed SEEFOR intervention project at Sapele, in Sapele Local Government Area of Delta State.

The specific tasks include the following:

a) To depict the existing status of the selected road networks for the proposed SEEFOR project in Sapele;

b) To classify the potential environmental and social issues or risks associated with the existing conditions in Sapele;

c) To opt for and measure appropriate baseline indicators (for example, m^3/sec of runoff collected by the existing drainage systems during a heavy hour-long rainfall);

d) To generate a plan for mitigating environmental and social risks associated with rehabilitation and maintenance of the proposed project affected road networks in consultation with the relevant public and government agencies;

e) To identify realistic and cost-effective measures that may decrease potentially significant adverse environmental and social impacts to the barest minimum levels;

f) To generate a time-bound plan for mitigating environmental and social risks associated with the selected road maintenance in consultation with the relevant public and government agencies;

g) To identify monitoring objectives and specify the sort of monitoring, with linkages to the impacts assessed and the mitigation measures described above (in a-e);

h) To give a specific description of institutional arrangements: the agencies responsible for carrying out the mitigation and monitoring measures (e.g., for operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training) and the contractual arrangements for assuring the performance of each implementing agency;

i) To describe the technical assistance programs that could strengthen environmental management capability in the agencies responsible for implementation;

j) To provide an implementation schedule for measures that must be executed as part of the project, showing phasing and coordination with overall project implementation plans; and

k) To provide the expected capital and recurrent cost estimates and sources of funds for implementing the ESMP and inform, accordingly, the design consultants so that these costs are duly taken into consideration in the designs.

1.6 Assessment Methodology

The assessment methodology adopted in this SEEFOR ESMP study for the proposed project in Sapele is in accordance with the World Bank, the Federal Ministry of Environment of Nigeria and the Delta State Ministry of Environment guidelines.

1.6.1 Literature Review

Review of existing literature is concerned with reports of previous ESMP studies and other applicable studies on the environmental characteristics of the SEEFOR project area. Materials reviewed covers textbooks, reports, survey maps, aerial photographs, articles and other international journals and internet peculiar with the study.

1.6.2 Reconnaissance Survey

This was carried out for the purpose of establishing control points and collection of first-hand information of different important field data required for the proposed SEEFOR project in Sapele, Sapele LGA.

1.6.3 Field Survey

Field survey of the SEEFOR project in Sapele was implemented in order to discover the magnitude of impacts of existing scenario and potential impacts of the proposed project activities by the State SEEFOR on socio-economic of the affected residence and immediate environment and beyond. This assessment was prepared to cover the selected road network by the Delta SEEFOR and this helped in the concept design of field investigation implementation. 300 questionnaires were administered and retrieved along each of the proposed roads slated for rehabilitation and maintenance. One (1) FGD and two (2) IDI were carried out on each of the roads to extract qualitative information on the socio-economic baseline information and how the proposed project will impacts on the people. A Bio-Physical baseline study on soil, water, flora and fauna were also carried out.

1.6.4 Consultation

With respect to FMENV 1995 Procedural and Sectoral Guidelines for EIA/ESMP in Nigeria, consultations with the host communities (neighbours), and other Stakeholders were undertaken. The Stakeholders consulted include:

- Delta States Ministry of Environment
- Federal Ministry of Agriculture and Rural Development
- Delta State Ministry of Land and Survey
- Affected Local Government Areas
- Project affected persons (PAPs) and
- Community Based Organization

CHAPTER TWO

2.0 INSTITUTIONAL AND LEGAL FRAMEWORK

Environmental related issues have been identified as most topical challenges facing countries worldwide. In Nigeria, the intensifying unfavourable environmental impacts of the rapid industrial and infrastructural development have been identified as major environmental issues. Increase in the exploitation of natural resources at unprecedented rates in human history and human engagement with development projects have contributed to the worsening value of the environment. This has, however, resulted to the enforcement of relevant environmental protection laws which are meant to safeguard and restore the environment.

It is against this backdrop that an Environmental Assessment study is in compliance with World Bank policies and Federal Republic of Nigeria's laws, which are concerned with accomplishing sustainable developmental goals that are in line with appropriate and satisfactory care for both the physical and human components of the environment, as well as the health and social well-being of her citizens. *In this regard, this ESMP report was primed in reference to the provision of ESMF, RPF, PIM and PAD that were prepared and unveiled by the SEEFOR.*

The Constitution of the Federal Republic of Nigeria of 1999 grants the general driving force of the nation's environmental policy through S. 20 which states that: "*The State shall protect and improve the environment and safeguard the water, air and land, forest and wild life of Nigeria*." In view of that, supplementary laws and regulations have been made and international conventions and other instruments have been introduced into the constitution's objectives. Amongst which are:

- Laws and regulations, standards, policies, codes and recommended practices relating to the Infrastructural Development by the Nigerian Government and its Agencies such as the Federal Ministry of Environment and the Delta State Ministry of Environment,
- International guidelines and conventions in which Nigeria is a signatory,
- National Policy on Environment (1989) and equally reviewed in 1999.

2.1 World Bank Safeguard Policies

World Bank Safeguards Policies provide an avenue for the participation of stakeholders in project designs. These have been a crucial instrument for building a sense of ownership among local populations. The policies are the basis of the World Bank support to sustainable poverty reduction and, to ensure that environmental and social issues are assessed in decision making as well as to reduce and manage any proposed developmental project or programme risk. The process essentially provides mechanisms for consultations and disclosure of information to the public and relevant stakeholders.

To this end, the SEEFOR project activities in Delta State have been categorised as B. This implies that, the potential environmental impacts are predominantly site-specific, that few if any of the impacts are irremediable, and that mitigation measures can be designed comparatively ready. The environmental assessment objectives of the World Bank project under the Category B includes:

- To examine the proposed project's potential environmental impacts,
- To ideally make recommendation measures to prevent, minimise, mitigate, or compensate for adverse impacts, and
- To recommend measures to improve environmental performance.

The World Bank safeguard policies incorporated ten (10) environmental and social safeguard policies to improve the adverse effects of development projects, and to enhance decision making. The policies are shown in Table 2.1 below:

Table 2.1: World Bank Safeguard Policies

S/N	Category	Safeguard Policies
1	Environmental Policies	• OP 4.01 Environmental Assessment • OP 4.04 Conservation of Natural Habitats • OP 4.09 Pest Management • OP 4.36 Forestry • OP 4.37 Safety of Dams
2	Social Policies	• OP 4.11 Safeguarding Cultural Property • OP 4.12 Involuntary Resettlement • OP 4.10 Indigenous Peoples
3	Legal policies	• OP 7.50 Projects on International Waterways • OP 7.60 Project in Disputed Areas

In this regard, the SEEFOR proposed road project activities in Sapele, Delta State triggered the World Bank Policy OP 4.01, which is the Environmental Assessment (EA). ESMF and RPF prepared by the SEEFOR are the instruments used to address the triggered policies by the proposed project activities. As specified in the ESMF and the RPF disclosed and prepared by the SEEFOR, the proposed project triggered World Bank's Safeguard Policies such as Environmental Assessment (OP 4.01); Involuntary Resettlement (OP/BP 4.12); Conservation of Natural Habitats (OP 4.04); Management of cultural Property (OP 11.03) and the World Bank Policy on Disclosure which is under review. The Bank policies triggered by the SEEFOR activities are explained as follows:

2.1.1 Environmental Assessment (EA) OP 4.01

The assessment of the SEEFOR project activities at Sapele, Delta State classified the projects as a Category B. The Bank category B projects entail site specific and immediate project environment interactions. Thus, the projects do not significantly affect human populations, alter natural systems and resources, consume much natural resources (e.g., ground water) even though they have adverse impacts that are not sensitive, diverse, unprecedented and are mostly reversible. Category B projects will require partial EA, and environmental and social action plans.

2.1.2 Natural Habitats (OP 4.04)

This policy is triggered by the proposed project activities at Sapele Delta State in so far as the project has the potential to cause significant conversion (loss) or degradation of natural habitats, whether directly (through rehabilitation) or indirectly (through human activities induced by the project). It is crucial that, the potential adverse impacts in the natural habitat should be considered. The Bank considers the borrower's capacity to execute apt conservation and mitigation measures. The policy covers components that develop the capacity of national and local institutions for effective environmental planning and management, if there are potential institutional capacity issues. If the natural habitats would be significantly converted or degraded by the proposed project or sub-project, the project will not be qualified for financing.

2.1.3 Pest Management (OP 4.09)

As observed above, the proposed project by SEEFOR will unlikely lead to loss of natural habitats and forests. However, in the long run, the project activities may result to an occurrence of pests and thus necessitate the need for pest management. In this regard, the use of pesticides will trigger the pest management policy of the World Bank. The Bank's position is based on the idea that, rural development and health sector related projects should avoid the use of harmful pesticides. A suitable remedial solution is to apply Integrated Pest Management (IPM) techniques in the project as well as encourage their use in the entire sectors' of interest. If pesticides will be required in crop safeguard or in the struggle against vector-borne disease, World Bank-funded project is required to cover a Pest Management Plan (PMP) which should be prepared by the borrower, either as a detach document or as a part of an Environmental Assessment.

2.1.4 Forest (OP 4.36)

The proposed project activities by SEEFOR at Sapele, Delta State also triggers the forest operational policy of the World Bank. This policy further applies to the following types of the Bank financed investment projects:

a. Proposed projects with potential negative impacts on the health and quality of forests;

b. Proposed projects with adverse impacts on the rights and wellbeing of people and their level of dependence upon or interaction with forests;

c. Proposed projects that could bring about changes in the management, protection, or utilisation of natural forests or plantations owned publicly, privately, or communally.

The Bank's policy is intended to relieve deforestation, improve the environmental contribution of forested areas, support afforestation, lessen poverty, and promote economic development. This realises the role forests play in poverty mitigation, economic development, and for the indigenous people in addition to global environmental services.

2.1.5 Management of Physical Cultural Resources (OP 4.11)

The proposed project activities by SEEFOR in Sapele also triggeres the need for management of the physical cultural resources policy in the area. The management of the physical cultural resources is specified as permanent or impermanent objects, sites, structures, groups of structures, and natural features and landscapes, which encompass archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural corollary. Undoubtedly, the proposed SEEFOR project will not be executed in any culturally sensitive site. Sites of cultural significance will be significantly avoided. In any case if a chance unearths cultural resources, it will be collected and protected. Physical cultural resources are essential scientific and historical pieces of information, assets for economic and social development, as well as important parts of a people's cultural exceptionality and practices. The Bank supports the management of physical cultural resources and mitigates unfavourable impacts of development projects on the resources.

2.1.6 Involuntary Resettlement (OP 4.12)

It is understood that, this Bank's policy will not be triggered by the proposed SEEFOR project activities. In other words, the proposed project at Sapele will not result to involuntary resettlement of the project affected persons. The policy is meant to support displaced persons in case the policy is triggered. This policy becomes necessary when

200 people are affected by a proposed project. The summary of the related World Bank's safeguard policies is presented in Table 2.2.

Table 2.2: Some Relevant World Bank's Safeguard Policies

Policy	Focus
OP 4.01 Environmental Assessment	A Central part requirement of this Policy is that screening should be done as early as possible for potential impacts and selection of an appropriate instrument to assess, minimize and mitigate potentially adverse impacts. The policy ensures that appropriate levels of environmental and social assessment are carried out as part of project design. It also deals with the public consultation process, and ensures that the views of PAPs and local NGOs are incorporated as early as possible for Categories A and B projects. It also applies to all components of a project with financing from the World Bank, including those co-financed components by the Borrower or by other funding agencies.
OP/BP 4.36 Forestry	This considers the protection of forests through a consideration of forest-related impact of all investment operations, ensuring restrictions for operations affecting critical forest conservation areas, and improving commercial forest practice through the use of modern certification systems. In the process of forest conservation interventions, the local people in particular, the private sector and other pertinent stakeholders should be consulted. The Policy aims at minimising deforestation and enhancing the environmental and social contribution of forested areas. Experience with the Bank shows that it does not support commercial logging in primary tropical moist forest.
4.09 - *Pest Management*	This is based on the understanding that pesticides can be determined as detrimental to the environment for a long period. If pesticides must be used, the policy expects that Pest Management Plan (PMP) be prepared by the borrower, either as a stand-alone document or as part of an Environmental Assessment
OP 4.04 Natural Habitats	It ensures that World Bank-supported infrastructure and other development projects consider the conservation of biodiversity. The several environmental services and products which natural habitats give to human society should also be considered
OPN 11.03 Management of Cultural Property	This is based on examining cultural resources that are likely to be affected, including mitigation measures when there are negative impacts on physical cultural resources. The policy should be considered by consulting the proper agencies such as NGOs and academic institutions.

Policy	Focus
	The policy avoids undertakings that will considerably harm non-replicable cultural property, and will aid only those undertakings that are sited or designed so as to avert such damage.
The Bank's Policy on Disclosure	This is based on the notion that the people residing in the project areas have the right to be informed about the proposed development project(s). So, before project appraisal, the summary of the undertakings along with other relevant information should have been disclosed at the Bank's and the area's levels. The Bank policy on disclosure is presently under review, but the current proposals show that Category B, EA reports should be self-standing documents, and thus disclosure is a pre-requisite for appraisal of the project.

However, the road rehabilitation project in Warri, Delta State triggered only few of these policies as shown in table 2.3

Table 2.3: World Bank Safeguard Policies Triggered by Eku Road Rehabilitation Project

World Bank Safeguard Policies	Safeguards Policies Triggered by SEEFOR Project	Safeguards Policies Triggered by Eku Road Rehabilitation			
		Lot 1	Lot 2	Lot 3	Lot 4
Environmental Assessment (OP/BP/GP 4.01)	[x]	[X]	[X]	[X]	[X]
Natural Habitats (OP/BP 4.04)	[x]	[X]	[X]	[X]	[X]
Pest Management (OP 4.09)	[x]	[ ]	[ ]	[ ]	[ ]
Cultural Property (OPN 11.03, being revised as OP 4.11)	[ ]	[ ]	[ ]	[ ]	[ ]
Involuntary Resettlement (OP/BP 4.12)	[x]	[ ]	[ ]	[ ]	[ ]
Indigenous Peoples (OD 4.20, being revised as OP 4.10)	[ ]	[ ]	[ ]	[ ]	[ ]
Forests (OP/BP 4.36)	[x]	[ ]	[ ]	[ ]	[ ]
Safety of Dams (OP/BP 4.37)	[ ]	[ ]	[ ]	[ ]	[ ]
Projects in Disputed Areas (OP/BP/GP 7.60)	[ ]	[ ]	[ ]	[ ]	[ ]

Projects on International Waterways (OP/BP/GP 7.50)	[ ]	[ ]	[ ]	[ ]	[ ]

2.2 National Policy, Legal, Regulatory and Administrative Frameworks

This section of the ESMP report examines the Federal Government and Delta State environmental guidelines that are pertinent to the action of the proposed SEEFOR project in Sapele. A summary of these are explained as follows:

2.2.1 The Federal Ministry of Environment (FMENV)

This Act placed on the Ministry, the responsibility of making sure that all development projects such as the Sapele SEEFOR development project are within the approved limits contained in the National Guidelines and Standards. It also ensures compliance with relevant regulations for environmental pollution management in Nigeria as may be released by the Ministry. To attain this mandate a number of regulations and/or instruments are accessible. However, the main instrument in ensuring that environmental and social issues are mainstreamed into development projects is the Environmental Impact Assessment (EIA) Act No. 86 of 1992. Therefore, the FMENV makes it criminal for public and private sectors to set up major developmental projects or activities without adequate consideration, at initial stages, of environmental and social impacts. This Act considers an EIA compulsory for every development project, and orders the procedures for conducting and reporting EIA studies.

As part of effective utilisation of the EIA instrument, the Ministry has designed Sectoral guidelines indicating the obligatory requirements of the EIA process for each Sector. One of these Guidelines that applies to the proposed SEEFOR project in Sapele, Delta State is the "Sectoral Guidelines on Infrastructure Development".

Generally, it is laudable to note the procedure before the commencement of an EIA in Nigeria. By this procedure, the FMENV issues a letter of intent on notification by the advocate, grants the terms of reference, certifies public participation, reassesses and mediates. The likely technical activities expected for a proposed project include screening, full or partial EIA Study, Review of existing relevant documents, decision-making, monitoring, auditing and decommissioning and or remediatiing post-closure. The related National Legal Instruments on Environment are discussed as follows:

2.2.2 The National Policy on the Environment (NPE) of 1989

The SEEFOR proposed project in Sapele actuates the Federal, State and LGA policies on the environment. The National Policy on Environment, 1989 (revised 1999), provides for "a viable national mechanism for collaboration, organisation and typical consultation, as well as harmonious management of the policy formulation and accomplishment process which postulates the establishment of effective institutions and linkages within and among the various tiers of government (federal, state and local government)". Also, a key objective of World Bank's policy is to establish sustainable development in Nigeria in order to;

- Safeguarding a quality environment sufficient for good health and well-being,
- Safeguarding the environment and natural resources for the benefit of present and future generations,
- Hoisting public awareness and support understanding of the important linkages between the environmental resources and developments and advocates individual and community involvements in environmental enhancement efforts,
- Sustaining and improve the ecosystems and ecological processes necessary for the functioning of the biosphere to protect biological diversity, and
- Collaborating with other countries, international organizations and agencies to promote optimal use and efficient deterrence or abatement of trans-boundary environmental degradation.

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

This Act provides guidelines for the activities of developmental projects such as the proposed Sapele SEEFOR project activities in which EIA is mandatory in Nigeria. This Act also explains the least content of an EIA in addition to a schedule of projects, which demand mandatory EIAs.

2.2.4 The National Guidelines and Standards for Environmental Pollution Control in Nigeria

This Act was promulgated on March 12th 1991 and state the stages for the fundamental instrument for monitoring and controlling industrial and urban pollution. As the proposed project in Sapele by SEEFOR has the prospect to instigate pollutants (Land, Water and Air) principally at the road rehabilitation phase, the EIA has thus become indispensable.

2.2.5 The National Effluents Limitations Regulation

This as an essential instrument that makes it mandatory for the proposed SEEFOR project in Sapele to install anti-pollution equipment, makes adequate provision for additional effluent treatment, set utmost limit of effluent parameters permitted for discharge, and enact penalties for infringement. It also makes it mandatory for all industries in Nigeria, to operate on the basis of Best Available Technology (BAT).

2.2.6 The NEP Regulations

The Pollution Abatement in Industries and Facilities Generating Waste regulation (The NEP regulation) places restrictions on the proposed SEEFOR project activities such as the one in Sapele on the discharge of toxic substances and to ensure that the requirement of Stipulated Monitoring of pollution to guarantee permissible limits are not exceeded as well as that Unusual and inadvertent discharges; Contingency plans; Generator's liabilities; Strategies of waste decline and safety of workers are implemented.

2.2.7 The Management of Solid and Hazardous Wastes Regulations

These regulations' concern with the activities of the proposed SEEFOR in Sapele as it connects with the collection, treatment and disposal of solid and hazardous waste and therefore, provides a comprehensive list of chemicals and chemical waste by toxicity categories.

2.2.8 National Guidelines on Environmental Management Systems (1999)

These guidelines institute the requisite for an Environmental Management System (EMS) in all organisations and facilities in Nigeria. They also identify how the EMS should be audited annually or as considered necessary. It is for this reason that it becomes indispensable for the proposed SEEFOR project to consider periodic auditing of EMS.

2.2.9 National Guidelines for Environmental Audit

This is planned to serve as a signal for conformity with the Environmental Audit requirements of the FMEnv. It is these guidelines that make it mandatory for the Delta SEEFOR to carry out an audit every three (3) years or at the tact of the Hon. Minister of the FMEnv.

2.2.10 National Policy on Flood and Erosion Control 2006 (FMEnv)

This policy deals with the requirement to combat erosion in the country, utilising the procedures outlined in the National Action Plan for Flood and Erosion Control and Technical Guidelines, developed by the WIC Environmental Committee, which was established to plan an operational platform for these issues.

2.2.11 National Air Quality Standard Decree No. 59 of 1991

The FMEH is the regulatory agency charged with the duty of enforcing ambient air quality standards in Nigeria. The World Health Organization (WHO) air quality standards were embraced in 1991 as the national standards by the FMEH. These standards contains a description of the levels of air pollutants that should not be exceeded by the proposed SEEFOR project in Sapele in order to protect public health.

2.2.12 The National Environmental Standards and Regulations Enforcement Agency Act 2007 (NESREA Act)

Following the repealing of the Federal Environmental Protection Act of 1988, the NESREA Act, 2007 became the principal statutory regulation or instrument guiding environmental matters in Nigeria. It distinctively outlines the provision for solid waste management and its administration and specifies sanctions for offences or acts, which come contrary to proper and adequate waste disposal procedures and practices.

2.2.13 The National Oil Spill Detection and Response Agency Act 2005 (NOSDRA ACT)

This statutory regulation provides regulations on waste releasing from oil production and exploration activities and its likely consequences on the environment. The proposed activities in Sapele by the SEEFOR in respect of fuelling and servicing of machine to be deployed in the process could be regarded as falling within the regulations of the Act.

2.3 Other Relevant Acts and Legislations at Federal and State Levels

2.3.1 Land Use Act of 1978

The Nigeria Land Use Act of 1978 declares that, "it is in the public interest that the rights of all Nigerians to use and enjoy land in Nigeria and the Natural fruits thereof in sufficient quality to enable them to provide for the sustenance of themselves and their families should be assured, protected and preserved". This presumes that acts that could lead to the pollution of land, air, and waters in Nigeria are sanctioned by the degree. By implication these acts are also improper in the SEEFOR project activities. Also, the Land Use Act of 1978 (modified in 1990) vestiges the prime legal means to attain land in the country. The Act vests all land comprised in the territory of each State in the federation in the governor of the State and demands that such land shall be held in trust and administered for the use and general benefit of all Nigerians.

Under this Act, administration of land area is split into urban land directly under the control and administration of the governor of each State and rural land, which is put under the control and administration of the Local Government. State governors are also given the right to grant statutory rights of ownership to any person or any purpose; and the Local Government is empowered to grant customary rights of ownership to any person or organisation for agricultural, residential and other purposes.

2.3.2 Forestry Act of the Nation

The Forestry Act of 1958 offers for the conservation of forests and the setting up of forest reserves. By the provision of this Act, it is an offense, punishable with up to six months in prison, to cut down trees of over 2ft in girth or to set fire to the forest apart under unique circumstances. Currently, Nigeria is a wood dearth nation. In order to redeem these circumstances, the policy on forest resources management and sustainable use is aimed to achieve self-sufficiency in all facets of forest production via the use of sound forest management techniques as well as the mobilisation of human and material resources. The key objectives of forest policy are to avoid additional deforestation and to restore forest cover, either for productive or for protective purposes, on formerly deforested fragile land in every state of the federation.

The National Agricultural Policy of 1988 established the Forestry Policy to provide for:

- Integration and development of the forest estate in Nigeria and its management for persistent yield,
- Restoration of the forests at rates higher than exploitation,
- Conservation and protection of the environment which include forest, soil, water, flora, fauna and the safeguard of the forest resources from fires, cattle grazers and illegal encroachment,
- Development of Forestry industry through the reaping and exploitation of timber, its derivatives and the decreasing of wastes,
- Wildlife protection, management and development through the development and effective management of national parks, game reserves, tourist and recreational facilities, etc.

2.3.3 Criminal Code

This makes it a crime punishable by detention for up to 6 months for any person who:

- breaches the atmosphere in any place to make injurious to the health of persons in general dwelling or carrying on business in the neighbourhood, or passing along a public way: or
- engages in any action which is, and which he knows or has basis to believe to potentially spread infection of any disease hazardous to life, whether human or animal.

2.4 State Legislations

Some of the functions of the State ministries of Environment as it applicable to the proposed project State, Delta State include:

- Intermingling with the Federal Ministry of Environment (FMENV) to accomplish a healthy or better management of the environment via development of National Policy on Environment
- Cooperating with the Ministry and other National Directorates and or Agencies in the performance of environmental functions including environmental education and or awareness to the citizenry
- Taking the duty of monitoring waste management standards,
- Assuming the responsibility of general environmental matters in the State, and

- Supervising the performance of ESIA studies and other environmental studies for all development projects at State level.

The Ministry of Environment of Delta State was created in 2001 and assigned the duty to handle all matters that affect the living environment and those that generally relate to the ecology of Delta State. The assigned duties of the Ministry of Environment in the State include:

- Environmental Policies;
- Environmental Protection and Control;
- Environmental Technology including instigation of policy in relation to environmental research and technology;
- Environmental Sanitation and Urban Waste Disposal and Management;
- Planning designing and construction of ecological and environment facilities;
- Environmental Sanitation and Urban Waste Disposal and Management;
- Provision of Sanitary means of human disposal;
- Liaising with oil companies on pollution and Environmental Matters;
- Supervision of Delta State Environmental Protection Agency (DELSEPA);
- Forestry and Botanical Gardens;
- Soil and water conservation; and
- Wild life Preservation.

In conclusion, it is important to note that, Nigeria EIA laws are related to World Bank safeguard policies. However, in the event of conflict between the two, the World Bank Safeguard Policies would supersede. In like manner, the federal laws override the Delta State laws in any case of discrepancy between them.

CHAPTER THREE

3.0 ENVIRONMENTAL BASELINE CONDITION

3.1 Description of the Proposed Intervention Project Area

The proposed road networks rehabilitation and maintenance by SEEFOR is located in Sapele, Sapele Local Government Area (LGA) of Delta State (Figure 3.1). The LGA is located between latitude 05° 40' 5.48" N and 05° 52' 54.37", and longitude 05° 42' 17.21" and 05° 54' 16.74" E. The LGA is bounded in the north by Ethiope West LGA, in the east by Okpe LGA, in the south by Warri South LGA and in the west by Warri North LGA. The land use map of the LGA is shown in Figure 3.2.

The road project, which have been ascribed as 'LOT' for convenience, identify four (4) main Lots Sapele, Sepele Local Government Area, Delta State. In other words, the selected roads in Sapele for construction and rehabilitation, and maintenance activities, by the Delta SEEFOR project, have conveniently grouped into four LOTs. This is shown in Table 3.1.

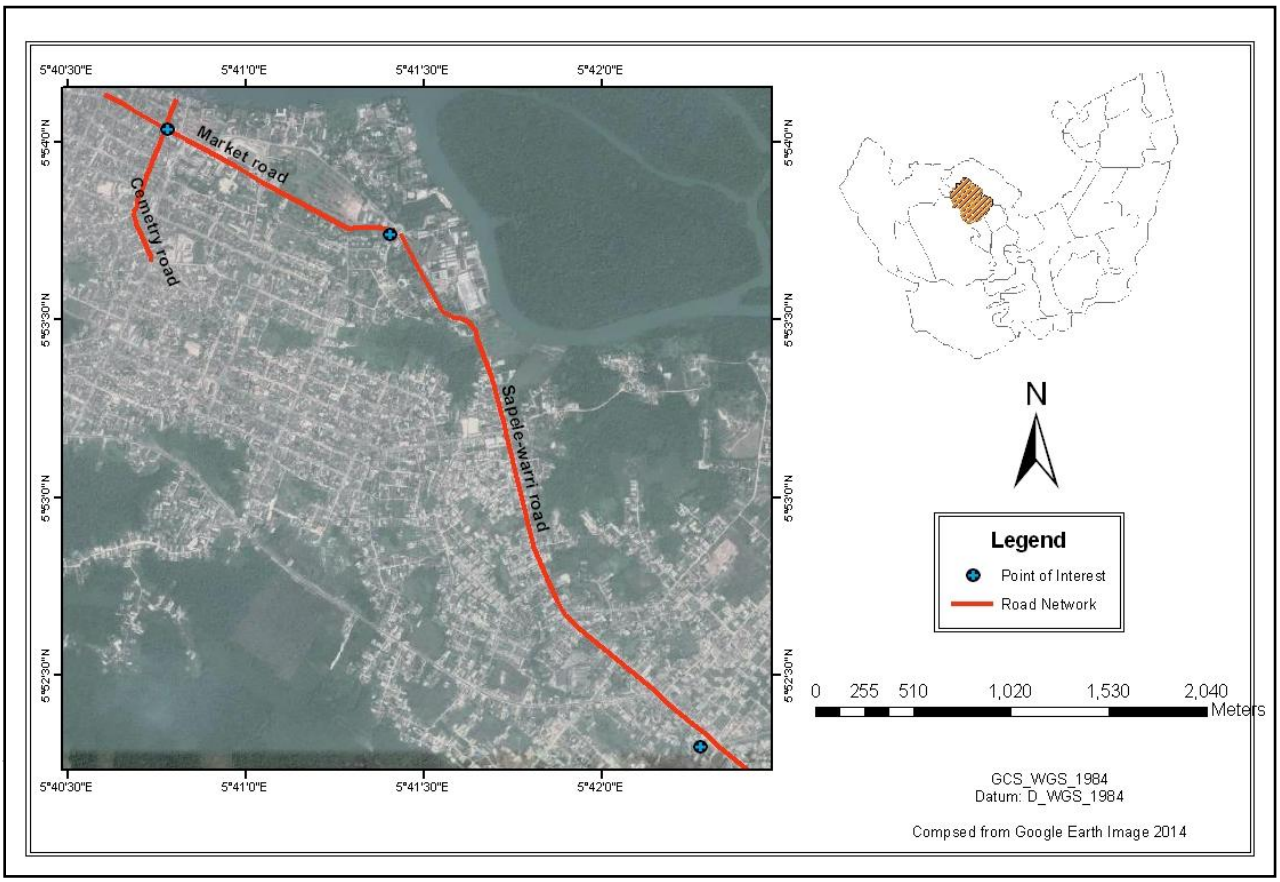
Sapele is a city and port in Delta State, which lies along the Benin River just below the convergence of the Ethiope and Jamieson rivers, 98 miles (158 km) from the Escravos Bar and entrance to the Bight of Benin. Sapele urban area lies on a road that links to Warri in the State. The town also links by ferry to an highway to Benin. The city was founded in the colonial period on the terrain conventionally occupied by the Urhobo (Isoko) people. Sapele have been a centre for sawmilling due to the availability of abundant trees such as Obeche, Abura, Sapele, and Mahogany. Since 1925, Sapele plywood and veneer manufacturing plant has been one of the largest in Western Africa. The city is also well-known for the rubber plantations. Its industry developed into more diversified businesses in the 1960s with the growth of factories for manufacturing of shoes, tiles, plastics, and chemicals. Sapele is a notable market centre in cassava (manioc), fish, palm oil and kernels, yams, and plantains, and other food stuff and it has a

flour-milling plant. This timber business and timber related products are heavily influenced by the African Timber and Plywood Company established by the Miller Brothers at the city (Sapele) in 1935. The city serves as a base for the Nigerian Navy. Finally, major communities situated in the area include Sapele, Amukpe, Elume, Ogiedi, Ughorhen and Ikeresan.

Table 3.1: Description of Activities of the Proposed Project in Sapele

S/N	Selected Roads	Total length	Description of Activity
LOT 1	Sapele/Warri Road from Okirigwe Roundabout to Ajogodo by Okpe road Junction.	----	Sweeping of surface travelled road, vegetation control on the kerbed and road corridor median.
LOT 2	Sapele/Warri road From Ajogodo by Okpe road Junction through Market road to Cemetery road Junction	----	Sweeping of surface travelled road, vegetation control on the kerbed and road corridor median.
LOT 3	Okpe Road	----	Drains de-silting and cleaning of road sides
LOT 4	Commentary/Adeola Road	----	Drains de-silting and cleaning of road sides

Figure 3.1: The Proposed Project Roads at Sapele



3.2 Geology and Hydrogeology

The project area in Sapele, Delta State is located in the Niger Delta region of Nigeria. The geology of the Niger Delta region generally arises from a succession of transgressions and regressions of the three main Tertiary subsurface of lithostratigraphic units of Akata, Agbada and Benin Formations (Short and Stauble, 1967). The geologic units of the Niger Delta are shown in Table 3.2 below.

Furthermore project area lies within the Quaternary Sombreiro of Warri deltaic plain with prominent seasonal freshwater swamps, which overlie the Benin Formation. The geomorphologic setting of the project area in Sapele is flat to sub-horizontal and slopes gently seawards. This consists of erratic deltaic sediments of between moderate to highly plastics clays that are characteristically found in the black swamps river channels, to sand and cohesive salty and clayey soils that are partially permeable.

Table 3.2: Geological Units of the Niger Delta

Geologic Unit	Lithology	Age
Alluvium (General)	Gravel, sand, clay, silt	Quaternary
Freshwater, Backswamp and meander belt	Sand, clay, some silt and gravel	
Mangrove and salt water/backswamps	Medium – fine sand, clay and some silt	
Sombreiro – warri deltaic plain	Sand, clay and some silt	
Benin Formation (coastal plain sand)	Coarse to medium sand with subordinate silt and clay lenses	Miocene
Agbada Formation	Mixture of sand, clay and silt	Eocene
Akata Formation	Clay	Paloeocene

Short and Staunble, 1967

3.3.2 Air Quality and Noise

An analysis of findings of in-situ air quality and noise measurements carried out at eight (8) different locations in the study area is shown in Table 3.3. The air quality parameters measured in the project area include carbon monoxide (CO), oxide of Nitrogen (NOx),

Sulphur dioxide (SO_2), Volatile Organic Carbon (VOC), Hydrogen sulphide (H_2S), Carbon dioxide (CO_2), Ammonia (NH_3) and Suspended Particulate Matter (SPM).

Table 3.3: Result of ambient air quality and noise measurements conducted at Sapele

Sampling Code	SPM (mg/m^3)	Noise Level dB(A)	CO_2 (%)	NO_2 (ppm)	SO_2 (ppm)	VOC (ppm)	H_2S (ppm)	CO (ppm)	NH_3 (ppm)
SA1	0.071	69.3	0.01	0.00	0.04	0.1	0.0	2.00	ND
SA2	0.034	63.5	0.02	0.02	0.01	0.2	0.0	1.00	ND
SA3	0.086	57.5	0.01	0.01	0.03	0.0	0.0	2.00	ND
SA4	0.092	68.4	0.01	0.01	0.01	0.4	0.0	3.00	ND
SA5	0.043	61.9	0.01	0.00	0.02	0.1	0.0	1.00	ND
SA6	0.065	58.2	0.01	0.00	0.05	0.1	1.0	0.50	ND
SA7	0.080	59.0	0.01	0.02	0.00	0.0	0.0	1.00	ND
SA8	0.039	61.4	0.01	0.03	0.00	0.0	0.0	1.50	ND
Min.	0.034	57.6	0.01	0.0	0.0	0.0	0.0	0.5	-
Max.	0.092	69.2	0.02	0.03	0.05	0.4	1.0	3.0	-
Mean	0.063	62.38	0.012	0.011	0.021	0.114	0.126	1.50	-
FMENV Limits	0.250	90	NS	0.04-0.06	0.1	NS	NS	10	NS

Field Survey 2014 NS = Not Specified ND = Not Detected

The concentrations of air quality parameters at the project area were generally below the Federal Ministry of Environment (FMENV) maximum permissible limits. The values attained for CO, NO_2, SO_2 and VOC ranged from 0.5-3.0 ppm; 0.0-0.03ppm; 0.0-0.05ppm; and 0.0-0.4ppm respectively. SPM concentrations ranged between 0.034mg/m^3 and 0.092mg/m^3 with an average value of 0.064mg/m^3. The SPM values fell below the FMENV permissible limit of 0.25mg/m^3, which indicate that the ambient air environment of the project area is not polluted. Ambient noise levels recorded in the area ranged between 57.6dBA to 69.3dBA with a mean value of 62.37dBA. The noise levels were below the FMENV permissible limit of 90dBA for 8 hour exposure.

3.4 Groundwater Quality

The analysis of results of physico-chemical and microbial parameters of groundwater samples, which were collected at the study are presented in Tables 3.4 and 3.5 respectively. The results were compared with the Federal Ministry of Environment

(FMENV) limits as well as the World Health Organization (WHO) standards in order to determine the groundwater suitability for domestic uses.

The pH of the groundwater samples ranged between 5.83 and 6.06 (slightly acidic), typical of raw underground water samples. In-situ of water temperature measures ranged between 30.6^0C and 31.1^0C with a mean value of 30.7^oC which fell below the FMENV recommended limit of $<40^0$C. Electrical conductivity ranged from 120µS/cm to 189µS/cm while total dissolved solids (TDS) ranged from 63.0mg/l to 94.0mg/l. The electrical conductivity and TDS values recorded on the groundwater samples were within the permissible limits of 1000 µS/cm and 500mg/l respectively. BOD_5 concentrations of the ground water samples were below 1.0mg/l, which indicate low organic load. COD recorded a range of 1.34ppm to 3.20ppm.

For cations, Na^+, K^+, Ca^{2+} and Mg^{2+}; Na^+, the highest concentration were recorded within the range of 7.80mg/l to 32.0mg/l, which are below the WHO permissible limit of 200mg/l for drinking water. Among the anions of the groundwater samples, Chloride has the highest concentration with a range of 43.0mg/l to 60.8mg/l. The chloride values were within the FMENV permissible limit of 250mg/l and the WHO maximum permissible of 600mg/l.

No heavy metal pollution was recorded in the groundwater samples from the results of heavy metals analysis. Ni, As, Cd, Hg, Cr and Pb concentrations were all below 0.001mg/L while Fe, Zn and Cu were recorded in trace amounts, which fell within the permissible limits. The total hydrocarbon content in the groundwater samples were less than 0.05mg/l, which suggest no hydrocarbon pollution.

For microbial properties, total heterotrophic bacteria (THB) ranged between 50 and 100 cfu/100ml while total heterotrophic fungi (THF) ranged between 10.0 and 15.0cfu/100ml. Hydrocarbon utilizing bacteria and fungi counts as well as total coliform were not recorded in the groundwater samples.

Table 3.4: Physico-chemical properties of groundwater samples in the study area

Parameters	GW1	GW2	GW3	WHO (Max. Permissible Level) limits	FMENV Limits
Appearance	Clear	Clear	Clear	-	-
pH	5.95	5.82	6.05	6.5-9.2	6.5-8.5
Conductivity, µS/cm	120.0	148.3	189.0	1000	-
Temperature, ^{0}C	30.6	30.5	31.0	NS	<40
Turbidity, NTU	1.0	1.0	<1.0	NS	1.0
TDS, mg/L	63.1	75.0	94.0	500	500
Dissolved Oxygen, mg/L	4.3	5.0	4.9	NS	7.5
BOD_5, mg/L	0.25	0.44	0.66	NS	0
COD, mg/L	2.67	3.20	1.34	NS	-
Chloride, mg/L	57.0	43.0	60.8	600	250
Nitrate, mg/L	1.20	2.46	2.39	-	10
Sulphate, mg/L	18.79	20.3	32.6	400	500
Phosphate, mg/L	0.60	0.76	1.31	NS	5
Sodium, mg/L	7.80	32.0	14.5	NS	200
Calcium, mg/L	3.40	5.40	2.30	200	-
Magnesium, mg/L	3.40	2.50	2.00	75	-
Potassium, mg/L	4.30	3.00	1.20	NS	-
THC, mg/L	<0.05	<0.05	<0.05	0.3	-
Iron, mg/L	0.37	0.43	<0.001	1.0	1.0
Zinc, mg/L	1.20	0.67	0.057	15.0	5.0
Lead, mg/L	<0.001	<0.001	<0.001	NS	0.05
Mercury, mg/L	<0.001	<0.001	<0.001	NS	0.001
Copper, mg/L	0.034	0.032	0.009	-	0.1
Chromium, mg/L	<0.001	<0.001	<0.001	NS	0.05
Cadmium, mg/L	<0.001	<0.001	<0.001	NS	0.01
Nickel, mg/L	<0.001	<0.001	<0.001	NS	0.05
Arsenic, mg/L	<0.001	<0.001	<0.001	NS	0.2

Field Survey 2014 ND= Not Detected NS= Not Specified

Table 3.5: Microbial properties of groundwater samples in the Study Area

Parameters	GW1	GW2	GW3	FMENV Limits
Total Heterotrophic Bacteria (cfu/ml)	0.5 x 10^2	1.0 x 10^2	1.0 x 10^2	NS
Total Heterotrophic Fungi (cfu/ml)	10	10	15	NS
Hydrocarbon Utilizing Bacteria (cfu/ml)	ND	ND	ND	NS
Hydrocarbon Utilizing Fungi (cfu/ml)	ND	ND	ND	NS
Total Coliform (cfu/ml)	ND	ND	ND	0

Field Survey 2014 ND= Not Detected NS= Not Specified

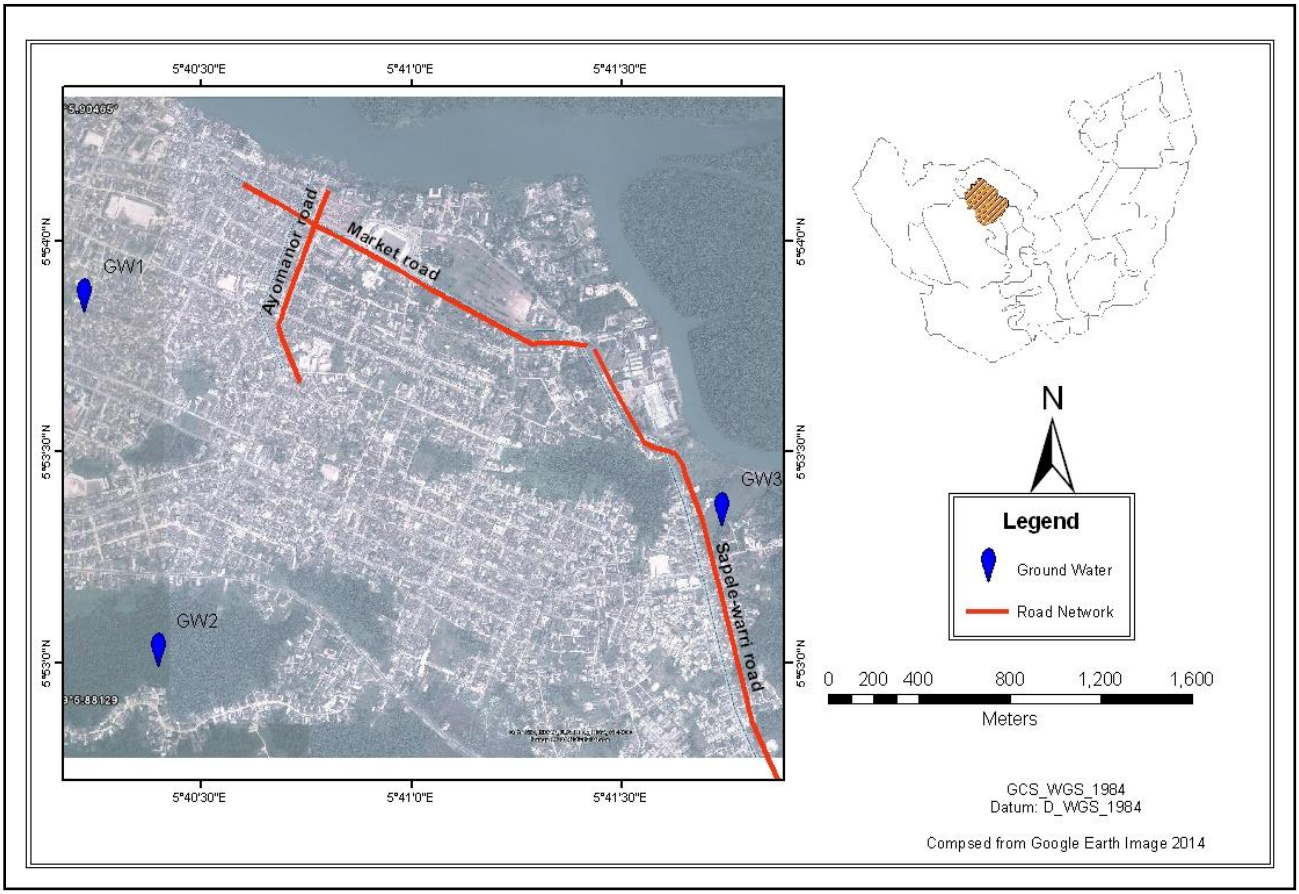


Figure 3.2: Ground Water Sample Points

3.5 Surface Water Quality

The results of findings of the physico-chemical and microbial parameters in surface water samples in the study area are presented in Tables 3.6 and 3.7. The results were compared with the FMENV water standards for aquatic life in order to establish the quality of the surface water body in the project area.

The concentrations of physico-chemical parameters of surface water samples were generally within their respective FMENV permissible limits for aquatic life. However, the concentrations of Zn (0.10-0.24mg/l), Cu (<0.001 – 0.082mg/l) and Ni (0.26 – 1.00mg/l) were higher than the FMENV permissible limits of 0.03mg/l, 0.004mg/l and 0.15mg/l respectively. The elevated concentrations of Zn, Cu and Ni of the surface water samples could be due to non-point discharge of contaminated storm run-off to the water body.

Table 3.6: Physico-chemical properties of surface water samples from the study area

Parameters	**SW (Upstream)**	**SW2 (Midstream)**	**SW3 (Downstream)**	**FMENV water quality standard for Aquatic life (permissible limit)[1]**
Odour	None	None	None	-
Appearance	Slightly Turbid	Slightly Turbid	Slightly Turbid	-
pH	7.75	7.32	7.13	6.0 -9.0
Temperature (^oC) in-situ	29.0	30.0	30.0	33
Electrical Cond. (µS/cm)	105.0	99.5	116.0	NS
TDS (mg/L)	52.0	50.8	58.3	NS
TSS (mg/L)	4.0	3.0	4.0	NS
Turbidity (NTU)	5.0	2.0	5.0	NS
DO (mg/L)	3.52	3.60	2.89	6.8
BOD_5 (mg/L)	1.56	0.98	1.60	4.0
COD (mg/L)	11.0	8.30	7.60	NS
Nitrate (mg/L)	3.40	4.00	2.30	NS
Phosphate (mg/L)	0.87	1.00	0.34	NS
Sulphate (mg/L)	2.68	2.97	3.12	NS

[1] Source: National Guidelines and Standards for Water Quality in Nigeria, 1999

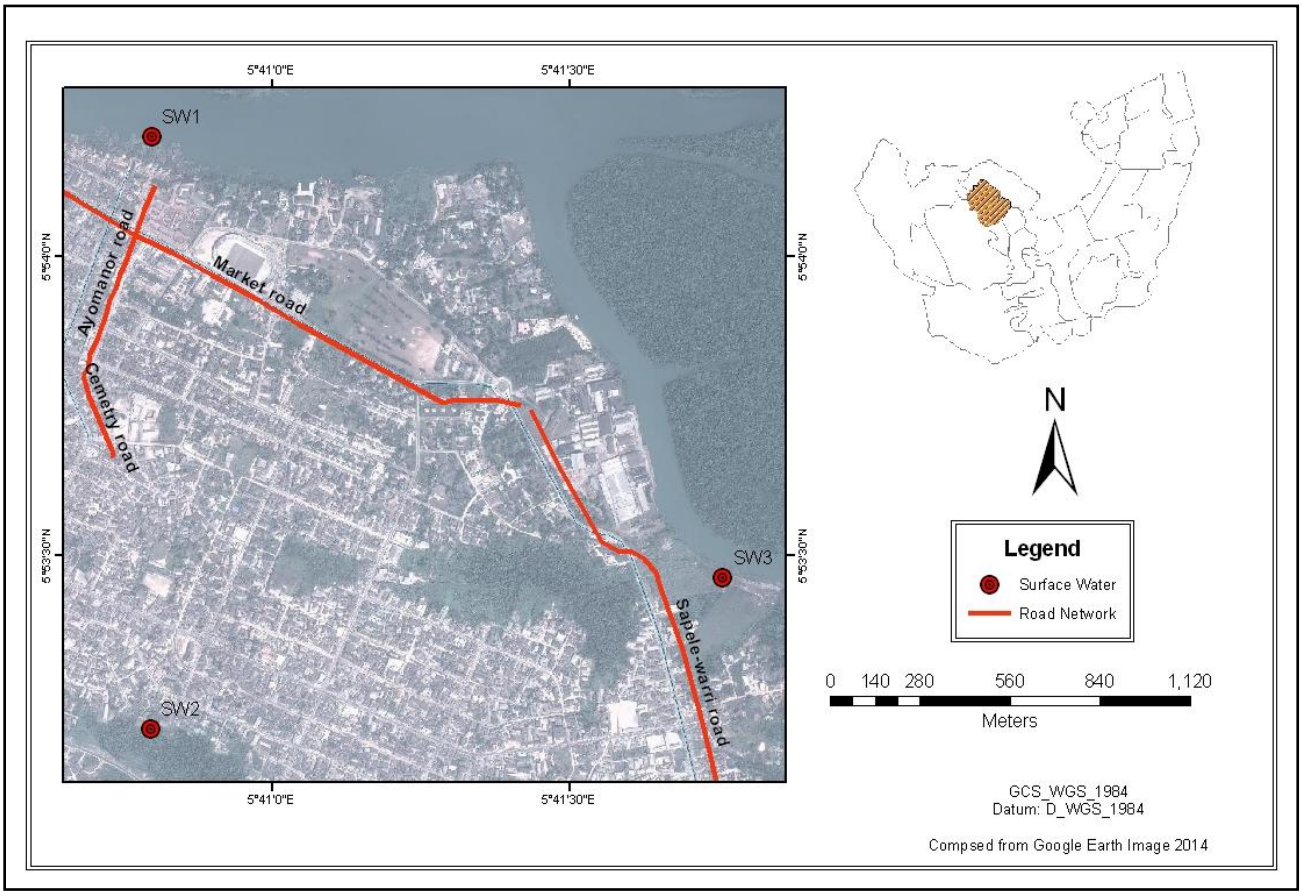
Parameters	SW (Upstream)	SW2 (Midstream)	SW3 (Downstream)	FMENV water quality standard for Aquatic life (permissible limit)[1]
Chloride (mg/L)	26.0	18.8	38.0	NS
Sodium (mg/L)	11.0	15.5	13.0	NS
Potassium (mg/L)	1.00	1.00	0.65	NS
Calcium (mg/L)	4.57	5.19	6.00	NS
Magnesium (mg/L)	2.36	3.00	1.87	NS
Iron (mg/L)	0.89	0.50	<0.001	1.0
Zinc, mg/L	0.10	0.17	0.24	0.03
Lead, mg/L	<0.001	<0.001	<0.001	0.0017
Mercury, mg/L	<0.001	<0.001	<0.001	0.001
Copper, mg/L	0.082	<0.001	0.056	0.004
Chromium, mg/L	<0.001	<0.001	<0.001	0.002
Cadmium, mg/L	<0.001	<0.001	<0.001	0.002
Nickel, mg/L	0.26	1.00	0.35	0.15
Arsenic, mg/L	<0.001	<0.001	<0.001	0.5
THC (mg/L)	0.23	0.27	1.00	NS

Field Survey 2014 ND= Not Detected NS= Not Specified

Table 3.7: Microbial properties of surface water samples in the Study Area

Parameters	SW1	SW2	SW3	FMENV Limits
Total Heterotrophic Bacteria	130.0	78.0	34.0	NS
Total Heterotrophic Fungi	10.0	4.0	4.0	NS
Hydrocarbon Utilizing Bacteria	ND	12.0	20.0	NS
Hydrocarbon Utilizing Fungi	ND	ND	ND	NS
Total Coliform	ND	2.0	ND	NS

Field Survey 2014 ND= Not Detected NS= Not Specified



Map 3.3: Surface Water Sample Points

3.6 Soil Quality in Sapele Study Area

The results of the physico-chemical parameters analyzed in soil samples from the study area in Sapele, Delta State are shown in Table 3.8 while the microbial counts recorded are presented in Table 3.9.

Table 3.8: Physico-chemical properties of soil samples from the study area

Parameters	SS1		SS2		SS3		SS4		SS5		SS6		Limits
	Top Soil	Sub Soil	Top Soil	Sub Soil	Top Soil	Sub Soil	Top Soil	Sub Soil	Top Soil	Sub Soil	Top Soil	Sub Soil	
pH	6.71	5.3	5.4	7.1	6.8	6.3	7.2	5.9	7.5	7.2	8.0	8.2	4.5-9.5
Conductivity (µS/cm)	53.78	59.23	57.12	56.23	51.01	58.21	59.62	59.26	59.10	58.26	56.66	58.12	<500
TOC (%)	1.29	1.12	1.66	2.58	2.12	2.68	2.45	2.59	2.64	1.19	2.20	1.67	NS
Cu (mg/kg)	10.23	15.55	16.39	14.29	12.12	13.89	16.56	12.89	19.21	17.69	18.12	16.25	50-100
Zn (mg/kg)	40.21	44.66	43.98	42.85	47.77	49.69	48.32	41.10	36.69	49.50	49.23	40.26	10-50
Fe (mg/kg)	158.3	156.9	210.3	165.7	98.32	114.1	162.28	119.36	88.44	187.66	112.29	78.9	NS
Cd (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.03-0.3
Pb (mg/kg)	3.20	2.10	6.70	1.40	1.89	0.87	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	5-20
Cr (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NS
Ni (mg/kg)	11.0	3.20	7.09	1.23	1.437	0.985	1.08	4.00	3.56	7.80	1.89	2.67	5-50
Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	4
As (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	20
THC	1.62	2.40	<0.001	0.8	0.82	0.46	0.34	<0.001	0.28	2.03	0.25	0.33	50
Sulphate (mg/kg)	40.12	41.21	49.58	43.26	48.48	44.12	44.32	46.20	40.12	38.29	48.12	44.21	NS
Phosphate (mg/kg)	16.32	17.32	15.31	19.18	19.21	17.97	15.59	16.29	16.66	18.28	19.89	19.27	NS
Chloride (mg/kg)	25.15	26.49	25.89	26.79	27.81	27.21	26.19	28.91	28.22	25.46	29.20	26.32	NS
Nitrate (mg/kg)	30.25	33.21	33.91	33.28	33.48	33.97	32.18	33.89	32.18	35.21	34.12	34.66	NS
Na (mg/kg)	78.31	86.45	88.12	92.26	76.23	98.05	76.56	72.12	80.39	81.96	88.89	90.64	NS
K (mg/kg)	58.34	54.21	56.99	54.68	53.19	53.18	58.27	55.58	65.39	57.11	51.11	50.59	NS

Parameters	SS1		SS2		SS3		SS4		SS5		SS6		Limits
	Top Soil	Sub Soil	Top Soil	Sub Soil	Top Soil	Sub Soil	Top Soil	Sub Soil	Top Soil	Sub Soil	Top Soil	Sub Soil	
Ca (mg/kg)	63.28	67.29	66.64	69.12	70.12	68.19	65.99	93.21	64.27	65.54	68.89	63.26	NS
Mg (mg/kg)	40.12	44.12	44.29	45.29	41.28	49.12	48.36	42.90	45.11	46.96	42.33	44.46	NS

Field Survey 2014 NS= Not Specified

Table 3.9: Physico-chemical properties of soil samples from the study area

Parameters	SS1		SS2		SS3		SS4		SS5		SS6	
	Top Soil	Sub Soil	Top Soil	Sub Soil	Top Soil	Sub Soil	Top Soil	Sub Soil	Top Soil	Sub Soil	Top Soil	Sub Soil
Total Heterotrophic Bacteria (cfu/gm)	30 x 10^6	36 x 10^6	46 x 10^6	56 x 10^6	66 x 10^6	61 x 10^6	49 x 10^6	53 x 10^6	47 x 10^6	54 x 10^6	45 x 10^6	55 x 10^6
Total Heterotrophic Fungi (cfu/gm)	4.1 x 10^4	3.9 x 10^4	5.2 x 10^4	6.3 x 10^4	4.9 x 10^4	5.5 x 10^4	5.7 x 10^4	7.2 x 10^4	6.8 x 10^4	8.6 x 10^4	5.1 x 10^4	7.6 x 10^4
Hydrocarbon Utilizing Bacteria (cfu/gm)	18.0 x 10^3	12.30 x 10^3	12.99x 10^3	11.31 x 10^3	18.15 x 10^3	10.68 x 10^3	11.98 x 10^3	13.33 x 10^3	12.36 x 10^3	14.84 x 10^3	16.16 x 10^3	14.77 x 10^3
Hydrocarbon Utilizing Fungi (cfu/gm)	2. 0 x 10^2	1.1 x 10^2	1.2 x 10^2	1.3 x 10^2	1.2 x 10^2	1.3 x 10^2	1.5 x 10^2	2.1 x 10^2	1.3 x 10^2	1.5 x 10^3	1.6 x 10^3	2.0 x 10^3

Field Survey 2014

The top soil ranged from sandy clay to clayey. The pH of the soil samples ranged from slightly acidic to slightly alkaline, that is 5.3 to 8.2, within the limit of 4.7 to 9.6. The electrical conductivity of the soil samples ranged from 51.02mg/kg to 59.24mg/kg, which indicates moderately dissolved ions content.

For heavy metals, Iron (Fe) was the most abundant within a range of 78.8mg/kg to 210.4mg/kg followed by Zinc, then Copper. Zinc ranged between 36.69mg/kg to 49.69mg/kg while Copper ranged between 10.23mg/kg and 19.21mg/kg. Mercury (Hg), Arsenic (As), and Cadmium (Cd) concentrations in the soil samples were below the detection limit of 0.001mg/kg. The heavy metals concentrations are within the naturally occurring levels; no elevated concentration beyond the prescribed limits noted.

For cations, Sodium (Na) ranged from 12.13mg/kg to 98.06mg/kg, Calcium (Ca) ranged from 63.25mg/kg to 93.22, Potassium (K) ranged from 50.58mg/kg to 65.38mg/kg while Magnesium (Mg) ranged from 40.12mg/kg to 49.12mg/kg. Among the anions, Nitrate concentrations in the soil samples from the area ranged from 30.25mg/kg to 35.22mg/kg, sulphate ranged between 38.29mg/kg and 49.59mg/kg, chloride ranged from 25.16mg/kg to 29.21mg/kg while phosphate ranged between 15.32mg/kg and 19.88mg/kg.

The concentrations of measured THC in soil samples from the project site ranged from <0.001mg/kg to 2.40mg/kg which fell below the limit of 50mg/kg for mineral oil in soil.

THB recorded ranged from 30 x 10^6 cfu/g to 66 x 10^6 cfu/g while THF ranged between 3.9 x 10^4 cfu/g and 8.660 x 10^4 cfu/g. The THB and THF counts in the soils are comparable with those happening in natural level. The mean ratio of the hydrocarbon utilizing bacteria to total heterotrophic bacteria in all the soil samples was low.

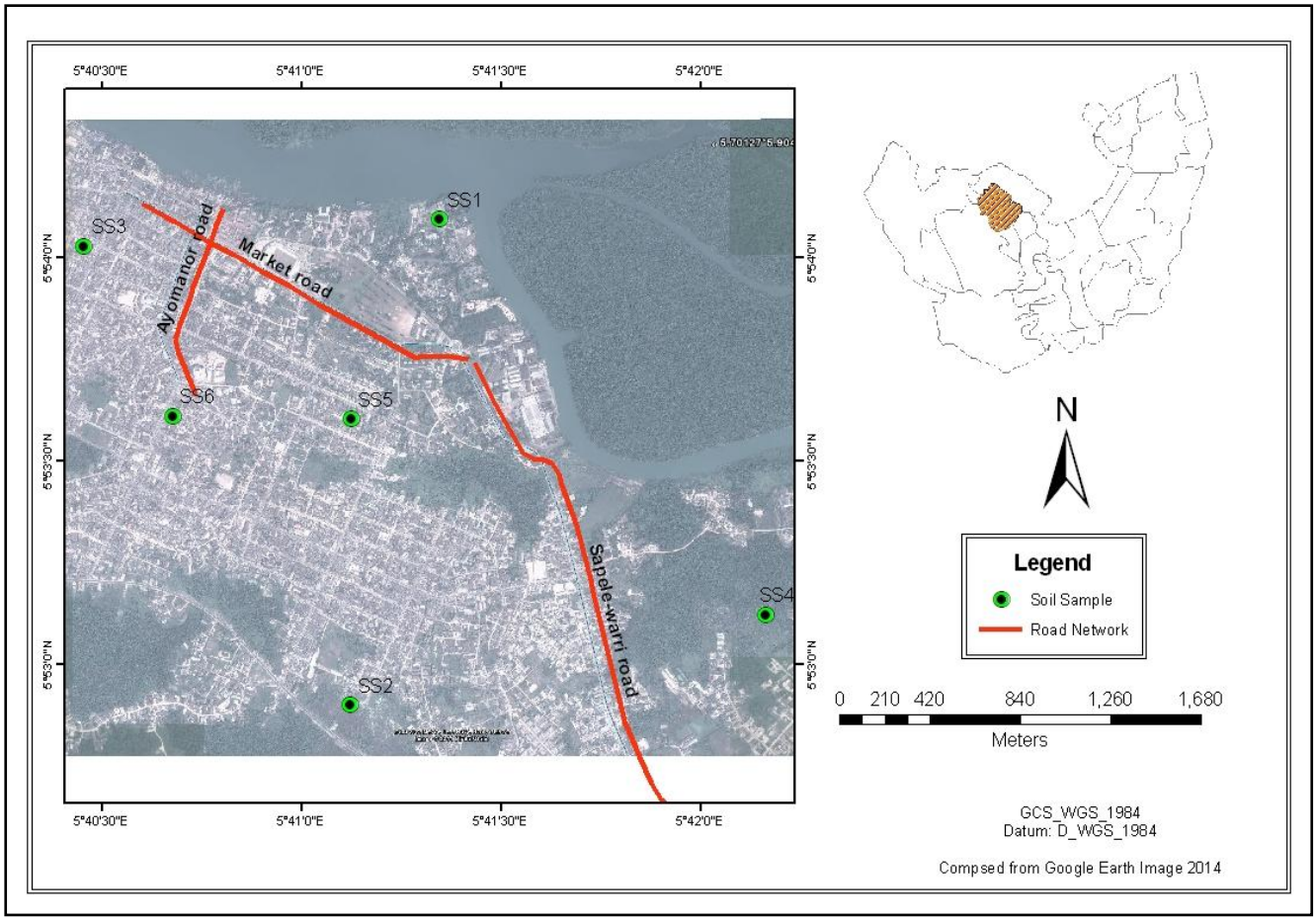


Figure 3.4: Soil Sample Points, Sapele, Sapele LGA

3.7 Terrestrial Flora (Vegetation)

The vegetation of the area is characterized by fresh water swamp forest, herbaceous plant rainforest and open herbaceous regrowth plants. The plant species found in the area are shown in Table 3.10 below.

An evaluation of vegetation of the proposed project area reveals that the study area characterized by mangrove swamp forest, herbaceous plant rainforest and open herbaceous regrowth plants. Common plant species to all part of the study area are *Alchornea cordifolia*, *Rauvolfia vomitorra*, *Elaeis guinensis*, *Baphia nitida*, *Costus afer* and *Harungana madagascarrensis.* The secondary grassland is made up of largely the forbs, grasses and sedges. Several of farmlands around the study area consist of both arable crops and fruit trees. Some of the arable crops grown in the farms include Cassava (*Manihot esculata*), bananas (*Musa sapientum*), Cocoyam (*Colocasia esculenta*), Plantain

(*Musa paradiaca*), pineapples (*Ananas sativus*) and yams (*Discorea spp*) while the fruit trees in the area include Oil palm tree (*Elaeis guinensis*), Avocado pear (*Persea americana*), Local pear (*Dacryodes edulis*), Mango (*Mangifera indica*), and Oranges (*Citrus spp*). None of the plant species recorded is in the vulnerable category of the IUCN

Table 3.10: Plant species recorded in the study area and their biodiversity status

Plant Species	Family Name	Common Name	Flora Type	Biodiversity Status
Adenia cissampeloides	Passifloraceae	Adenia	Herb	Not Threatened
Alstonia boonei	Apocynaceae	Stool wood	Tree	Not Threatened
Andropogon gayanus	Poaceae	Gamba grass	Grass	Not Threatened
Anthocleista djalonensis	Loganiaceae	Cabbage Tree	Tree	Not Threatened
Aspilia Africana	Asteraceae	Haemorrhage plant	Herb	Not Threatened
Azadirachta indica	Meliaceae	Neem tree	Tree	Not Threatened
Bambusa vulgaris	Poaceae	Bamboo	Tree	Not Threatened
Brillantasia patula	Acanthaceae	Brillantasia	Herb	Not Threatened
Carica papaya	Caricaceae	Paw Paw	Tree	Not Threatened
Chromolaena odorata	Asteraceae	Siam weed	Herb	Not Threatened
Citrullus colocynthis	Cucurbitaceae	Bitter gourd	Herb	Not Threatened
Citrus sinensis	Rutaceae	Sweet orange	Tree	Not Threatened
Colocasia esculenta	Araceae	Cocoyam/ wild taro	Herb	Not Threatened
Costus afer	Zingiberaceae	Ginger lily	Herb	Not Threatened
Cyperus esculentus	Cyperaceae	Nut grass	Grass	Not Threatened
Dacryodes edulis	Burseraceae	Native Pear	Tree	Not Threatened
Delonix regia	Leguminosae	Flame of the forest	Tree	Not Threatened
Dioscorea sp.	Dioscoriaceae	Yam	Herb/ Tuber	Not Threatened
Elaeis guineesis	Arecaceae	Oil palm	Tree	Not Threatened
Eleusine indica	Poaceae	Bermuda grass	Grass	Not Threatened
Euphorbia heterophylla	Euphorbiaceae	Egele	Herb	Not Threatened
Euphorbia hirta	Euphorbiaceae	Asthma weed	Herb	Not Threatened
Gmelina arborea	Verbenaceae	Gmelina/ Parrot's beak	Tree	Not Threatened
Mangifera indica	Anacardaceae	Mango	Tree	Not Threatened
Manihot esculenta	Euphorbiaceae	Cassava	Shrub	Not Threatened
Musa parasidiaca	Musaceae	Plantain	Tree	Not Threatened

Plant Species	Family Name	Common Name	Flora Type	Biodiversity Status
Musa sapientum	Musaceae	Banana	Tree	Not Threatened
Newbouldia laevis	Bignoniaceae	Tree of life	Tree	Not Threatened
Ocimum gratissimum	Poaceae	Lemon grass	Grass	Not Threatened
Pennisetum purpureum	Poaceae	Elephant grass	Grass	Not Threatened
Persea Americana	Lauraceae	Avocado pear	Tree	Not Threatened
Phyllantus amarus	Euphorbiaceae	Amarus plant	Herb	Not Threatened
Psidium guajava	Myrtaceae	Guava	Tree	Not Threatened
Rauvolfia vomitora	Apocynaceae	Serpent wood	Tree	Not Threatened
Sida acuta	Malvaceae	Horn bean- leaf sida	Herb	Not Threatened
Sida corymbosa	Malvaceae	Country mallow	Herb	Not Threatened
Spigelia anthelmia	Loganiaceae	Worm weed	Herb	Not Threatened
Talinum triangulare	Portulacaceae	Water leaf	Herb	Not Threatened
Tridax procumbens	Asteraceae	Tridax	Herb	Not Threatened
Vernonia amygdalina	Asteraceae	Bitter leaf	Herb	Not Threatened
Zea mays	Poaceae	Maize	Herb	Not Threatened

Field Survey 2014

3.8 Fauna (Wildlife) Classification in the Study

The recorded list of wildlife species in the study area is presented in Table 3.11 below. None of the plant wildlife recorded is in the vulnerable category of the IUCN.

Table 3.11: Fauna species in the study area

Common names	Species	Family	Class	Biodiversity status
Frog	Xenopus	Pipidae	Amphibia	Not Threatened
Toad	*Bufo bufo*	Bufonidae	Amphibia	Not Threatened
Little sparrow Hawk	*Accipiter erythropus*	Accipitridae	Aves	Not Threatened
Laughing Senegal Dove	*Streptopelia senegalensis*	Columbidae	Aves	Not Threatened
White throated Bee eater	*Merops albicollis*	Meropidae	Aves	Not Threatened
Grey plantain eater	*Crinifer piscator*	Musophagidae	Aves	Not Threatened
Striated Heron	*Butorides striatus*	Ardeidae	Aves	Not Threatened
Lizard buzzard	*Kaupifalco monogrammicus*	Accipitridae	Aves	Not Threatened
Horn bill	*Tockus sp.*	Bucerotidae	Aves	Not Threatened
Cotton stainer	*Dysdercus* sp		Insecta	Not Threatened
Rhinoceros beetle	*Oryctes sp.*	Scarabaeidae	Insecta	Not Threatened
Leaf eating beetle	*Chrysochus sp.*	Chrysomelidae	Insecta	Not Threatened
Lady birds	*Coccinella* sp.	Coccineliidae	Insecta	Not Threatened
Millipede	*Archispirostreptus gigas*	Spirostretidae	Insecta	Not Threatened
Locust	*Schistocerca gregaria*	Acrididae	Insecta	Not Threatened
Moth	*Chrysiridia rhipheus*		Insecta	Not Threatened
Tailor ants	*Cataulacus sp.*	Formicidae	Insecta	Not Threatened
Bat	*Otocyon megalotis*	Canidae	Mammalia	Not Threatened
African giant rat	*Crecetomys gambianu*	Nesomyidae	Mammalia	Not Threatened
Tree squirrel	*Heliosciurus gambianus*	Sciuridae	Mammalia	Not Threatened
Mona monkey	*Ceriopithecus mona*	Cercopithecidae	Mammalia	Not Threatened
Snail	*Archatina achatina*	Achatinidae	Mollusca	Not Threatened
Monitor lizard	*Varanus albigularis*	Varanidae	Reptilia	Not Threatened

Field Survey 2014

CHAPTER FOUR

4.0 SOCIO-ECONOMIC CHARACTERISTICS AND CONSULTATION

4.1 Background

This chapter of the Environmental and Social Management Plan (ESMP) deals with potential socio-economic impacts of the proposed State Employment and Expenditure for Results (SEEFOR) project in Sapele Local Government Area, Delta State. The socio-economic characteristics of the project affected persons and communities as well as a detail explanation of the methods through which the administration of questionnaires and in-depth interview were carried out. The proposed SEEFOR project in Sapele LGA of Delta State focuses on rehabilitation and maintenance of existing road networks.

A socio-economic assessment of the proposed project affected communities covers a list of questions for acquiring baseline information on household status, family members and sizes, standard of living, gender dimensions, sex ratio, population, occupation, income status, residential status, employment, literacy, health, education, and access to basic services and social amenities. The data collected through this approach aided significantly the assessment of the potential impacts of the proposed SEEFOR project on the affected communities. This also assists in ascertaining a baseline for monitoring and evaluation of the SEEFOR project. Sub-sections under this chapter examine the socio-demographic profile of the sampled population in the proposed project area.

4.1.1 Methodology

A blend of investigative methods was used to acquire the socio-economic data. These include the following:

- A review of secondary data relevant to the study;
- Reconnaissance survey used 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 stakeholder and project affected communities, especially women. The summary is provided as Appendix III

- Field observations by the consultants and interviewers; and
- Structured questionnaire used to collect the baseline information and the perception of the PAPs on the intervention. Simple random sampling was used for the administration of the questionnaire. Population estimation was based on the combinations of questionnaire survey and projection from 1991/2006 census figures by the National Population Commission (NPC).

4.2 History and Socio-Demographic Characteristics of the Project Affected LGA

Sapele is a city and port in Delta State, southern Nigeria. It lies along the Benin River just below the convergence of the Ethiope and Jamieson rivers, 98 miles (158 km) from the Escravos Bar and entrance to the Bight of Benin. The urban city further lies on the road that links to Warri, Sapele, and Sapele. It is also linked by ferry to the highway to Benin. The city was founded during the colonial period on the terrain conventionally occupied by the Urhobo (Isoko) people. Sapele as LGA in Delta State has been a centre for sawmilling due to the availability of abundant tree such as Obeche, Abura, Sapele, and Mahogany since 1925. Sapele plywood and veneer manufacturing plant derived from the area are some of the largest in western Africa. The city is also well-known for the rubber plantations in the environs. Its industry developed into more diversified businesses in the 1960s with factories for manufacturing shoes, tiles, plastics, and chemicals. Sapele is well known as a local market centre in cassava (manioc), fish, palm oil and kernels, yams, and plantains, and other food stuff and it has a flour-milling plant.

By the mid-19th century, Sapele had been recognised as a trading village, sporadically visited by Europeans. In 1891, the British government instituted a vice-consulate at Sapele. The population of the city grew to 33,638 by 1952, including people from many Nigerian tribes. Presently, Sapele and Sapele LGA have one of the major Nigeria's ports. Its specific industries embrace the processing of timber, rubber, and palm oil, as well as furniture, tamarind balm and footwear manufacturing. In 1995, its population was 135,800. And as of 2005/2006, the population of this advancing city was 142,652.

Sapele, as a Local Government Area in Delta State, has its headquarters at Sapele, a cosmopolitan city and a significant sea port for trade in timber and timber related

products. The business of timber and timber related products is heavily influenced by the African Timber and Plywood Company established by the Miller Brothers at the city (Sapele) in 1935. In addition, the city serves as a base for the Nigerian Navy, while at this time; it is one of the oil producing areas of Delta State. The indigenous people of the area speak Okpe, an Urhobo dialect. Finally, major communities identified in the area include Sapele, Amukpe, Elume, Ogiedi, Ughorhen and Ikeresan.

4.3 Population Projection for the Project Affected Area

4.3.1 Population Projection at State Level

The population projection and sex ratio of Delta State, the host of the proposed SEEFOR project are depicted in Figure 4.1 and Figure 4.2 respectively. The total population of Delta State was approximately 4.1 million in 2006 (NBS, 2006). Urban settings constitute major proportion of of the study area. Considering the annual growth rate of 3.0, the population projection of Delta State is expected to be approximately 6.27 million in 2020. Detail result is illustrated in Figure 4.1 below.

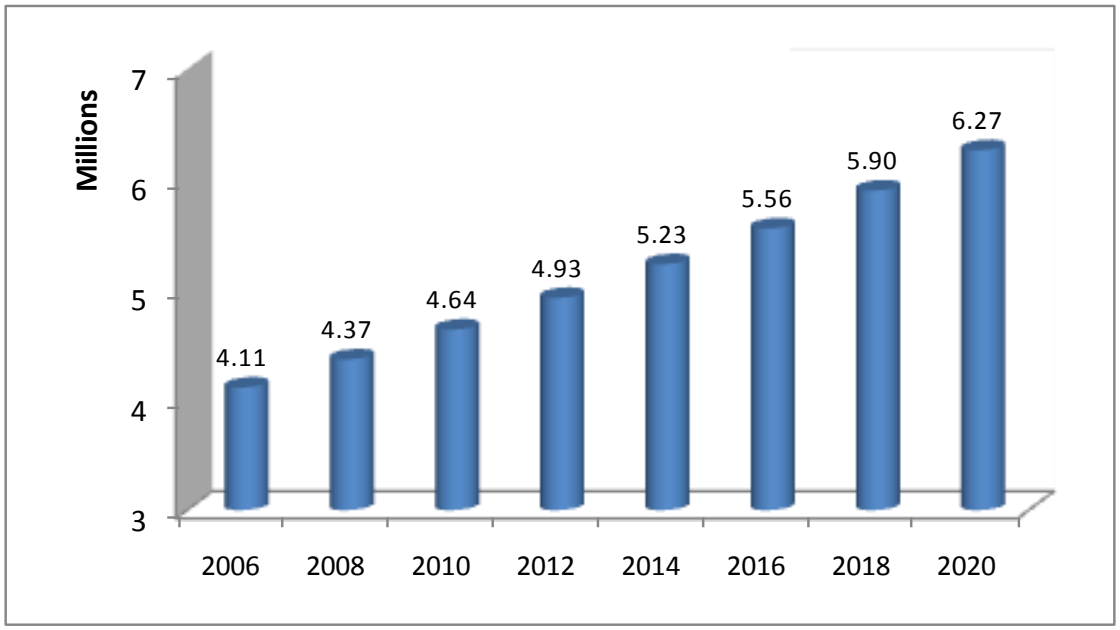


Figure 4.1: Population Projection for Delta State
Source: NBS, 2006

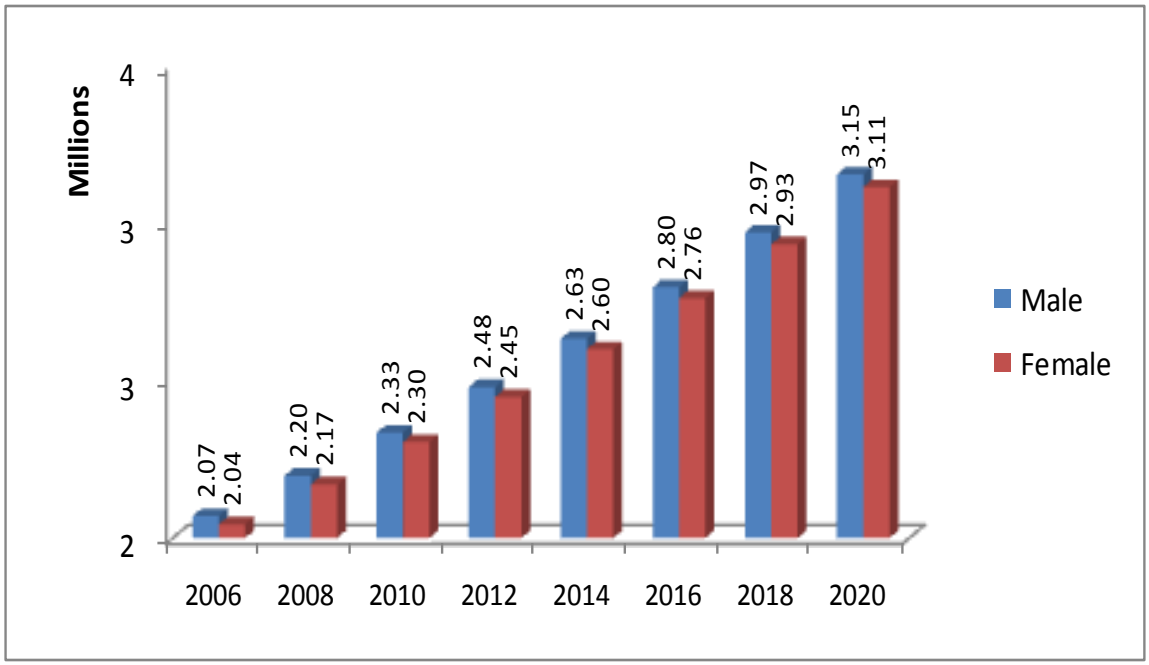


Figure 4.2: Sex Profile Estimation at the State Level
Source: NBS, 2006

Similarly, Figure 4.2 above shows the projected sex ratio for the projected population of the State over the years. The sex ratio for the State is expected to be maintained at 101.28 to 100 which is approximately 1:1 as observed in the previous census (2006). As illustrated in the Figure, sex profile projection at the State level is expected to be approximately 3.2 million and 3.1 million in 2020. A detail result of the analysis is presented in the Figure.

4.3.2 Population Projection of the Project Affected LGA

Population projection and sex ratio for the proposed project affected LGA are shown accordingly in Figure 4.3 and Figure 4.4 below. These figures depict population estimates derived from National Bureau of Statistics (NBS) in 2006 National Population Census (NBS, 2006).

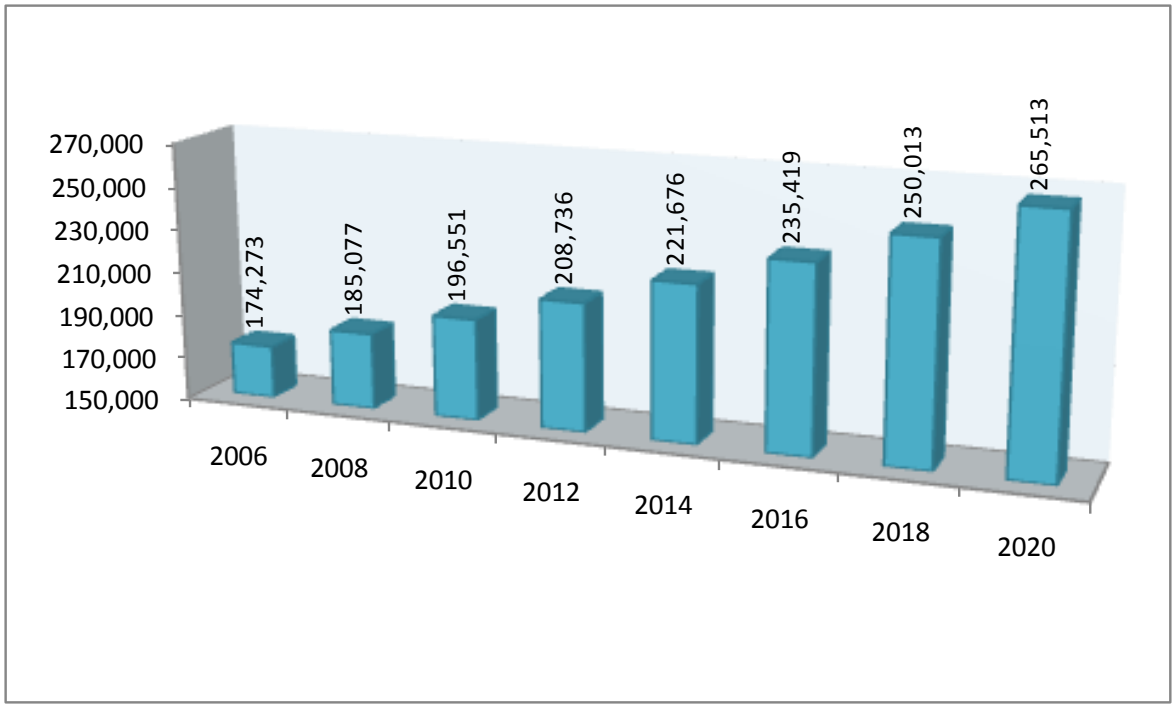


Figure 4.3: Population Projection for Sapele LGA, Delta State
Source: NBS, 2006

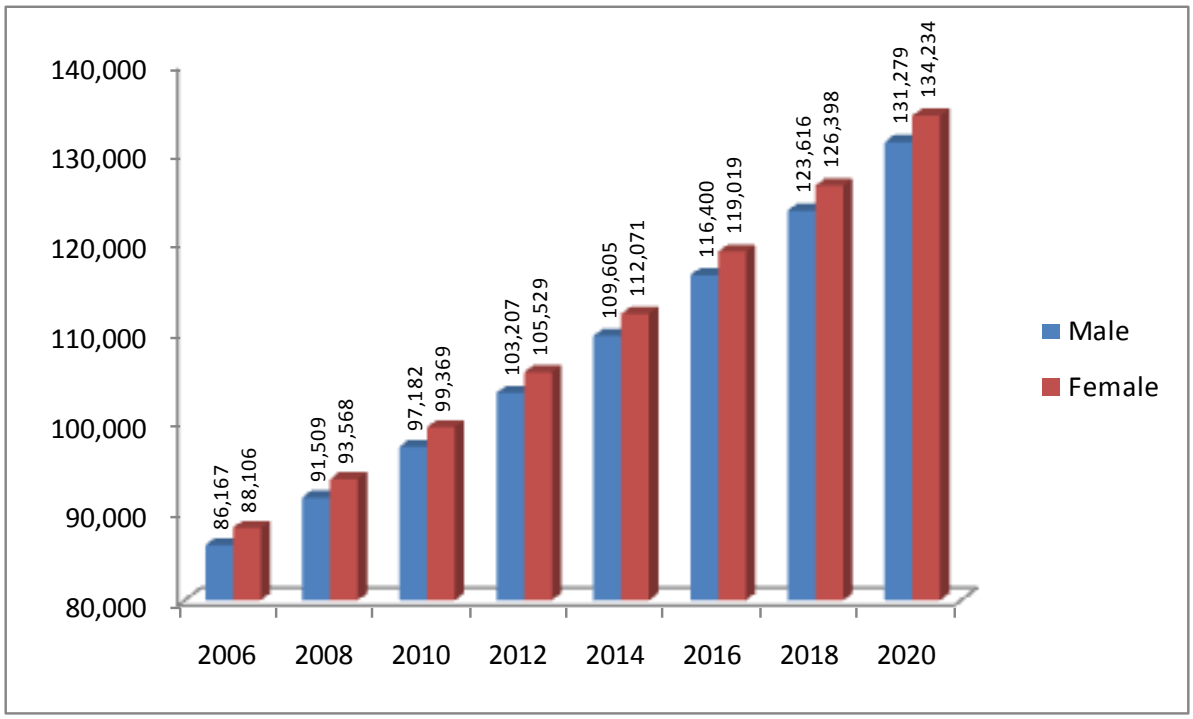


Figure 4.4: Sex Profile Estimation of Sapele LGA
Source: NBS, 2006

In view of the annual growth rate of 3.0 %, the estimated population for the proposed project affected LGA was projected up to 2020. In this regard, the population estimate of Sapele LGA is expected to be approximately 265,513 people by the year 2020 and this indicates 48% increase between 2006 and 2020. In addition, Figure 4.4 shows the sex ratio and the expected ratio between 2006 and 2020. The sex ratio for the LGA is expected to be 97.8 to 100 and this gives approximately ratio 1:1. A detailed finding of the population projection and sex ratio of Sapele LGA is shown in Figures 4.3 and 4.4.

4.4 Socio-Demographic Characteristics of Respondents

4.4.1 Age and Gender Profile

The distribution of the respondents by sex is presented in Figure 4.5. As shown in the Figure, 60.0% (180 persons) of sampled individuals are males while 40.0% (120persons) are females (see Figure 4.5).

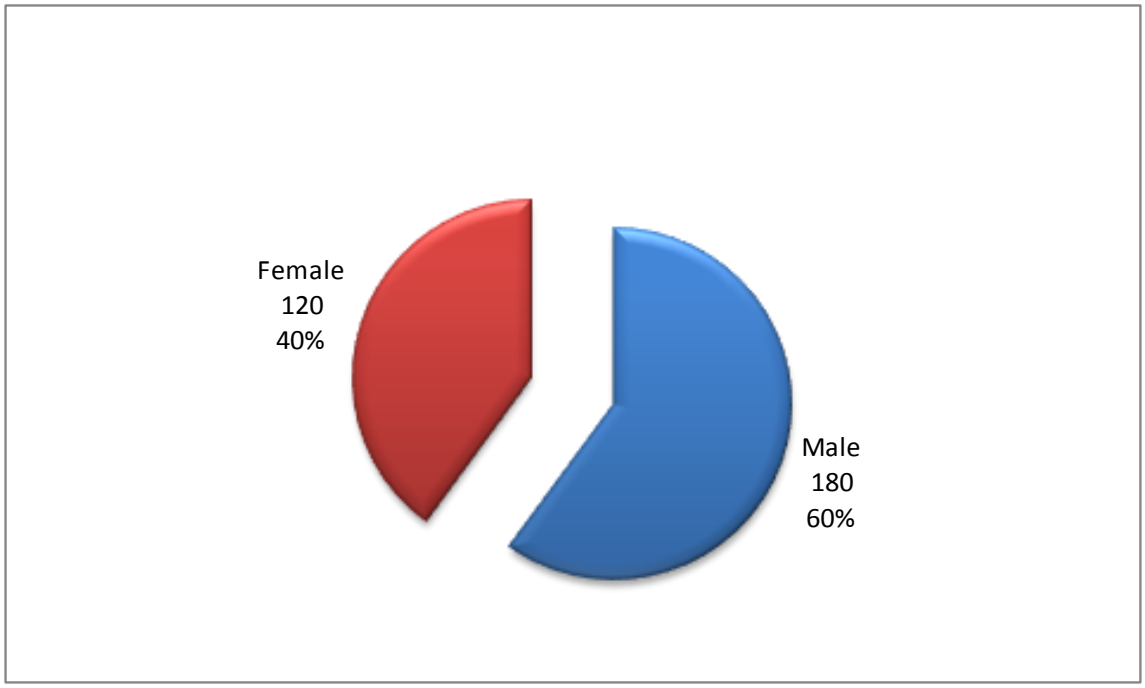


Figure 4.5: Sex Profile of Respondents

Field Survey, 2014

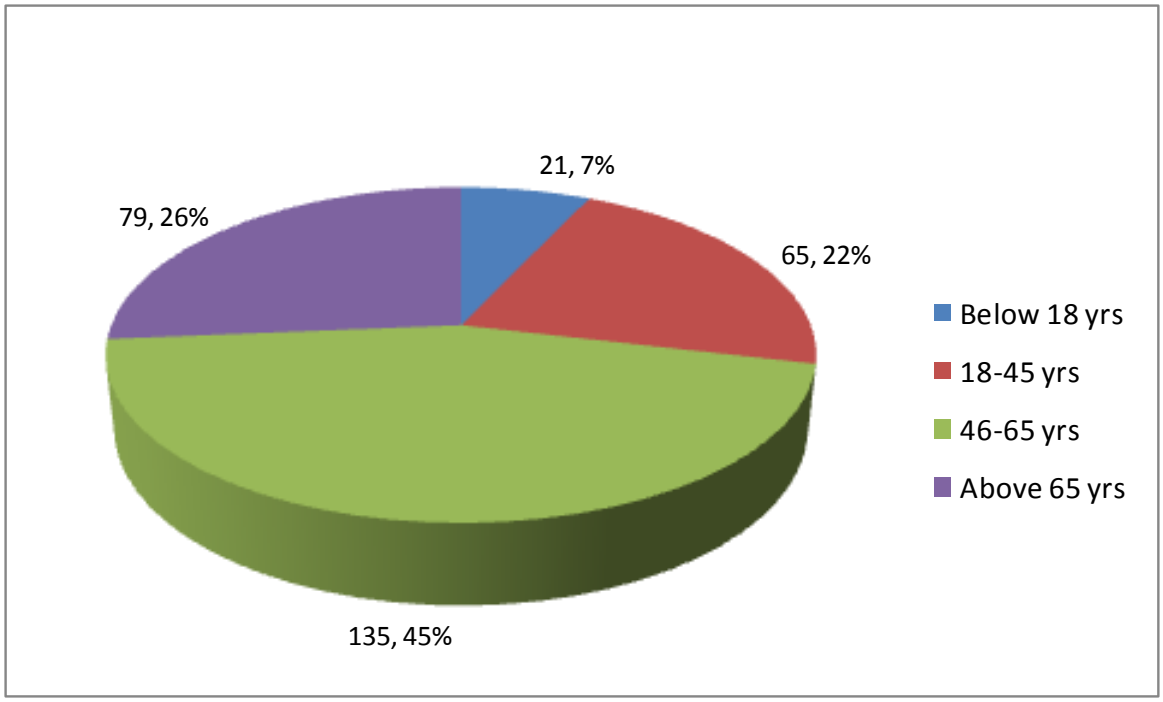


Figure 4.6: Age Profile of Respondents

Field Survey, 2014

The distribution of respondents regarding age groups is presented in Figure 4.6 above. As illustrated in the Figure, the dominant respondents, 45.0% (135 persons) are between 46 years and 65 years while the respondents below 18 years (7.0%) of age have the least. The respondents above 65 years of age return 26.0% (79 respondents) of the total sampled frame. The respondents within the age bracket of 18-45 years have 22.0% (65 respondents) of the in-scope individuals and households. This result illustrates 67.0% of the respondents between 18 and 65 years of age. The overall pictures of gender and age illustrations show admirable representations necessary in an emblematic field survey.

4.4.2 Marital Status of Respondents

The distribution of marital status of in-scope individuals and households is shown in Figure 4.7. As illustrated in the Figure, the highest proportion of respondents 66.0% (199) are married while least among the sampled individual estimated to be 3.0% (8 respondents) are divorced or separated individuals. The sampled individuals described as "single" returns 22.0% (66 persons) of the total sampled frame. The high proportion of married individuals gives an insight into the household type, the consumption power and

the infrastructure needs of the in-scope individuals and households. The assessment of marital status is crucial, in the sense that, it measures the level of responsibility as well as amount of risk an individual could undertake. Detail results are shown in Figure 4.7.

4.4.3 Household Size of Respondents

The socio-economic baseline survey of the proposed SEEFOR project in Sapele, Sapele LGA of Delta State revealed that an average household family size was 7.0 members. As presented in Figure 4.8, a high proportion of household size was between 6 and 8 members. The sampled households indicated a great dependents' proportion among the households. The sampled households with an average of 2 and 4 returned 25.7% (77 households) and 19.3% (58 households) in that order. Also, respondents with household size of more than eleven (11) had the least with 2.0% (6 households) of the sampled frame. It was observed that, the most sampled families are joint families.

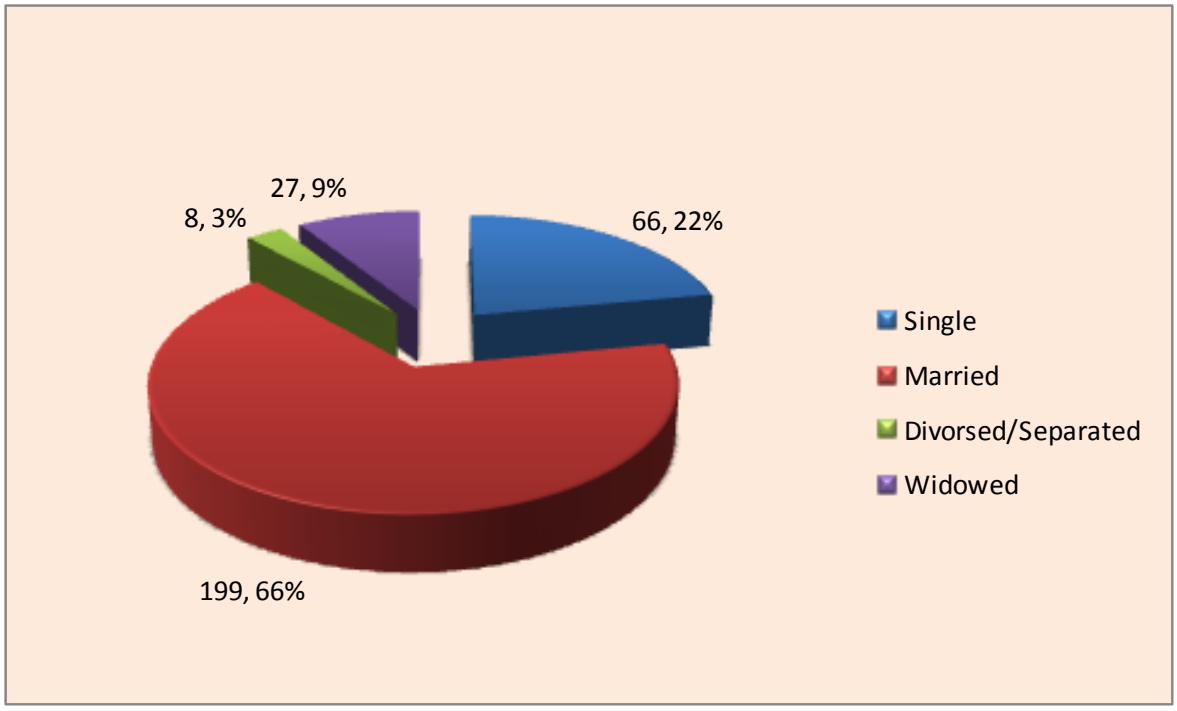


Figure 4.7: Marital Status of Sample Households

Source: Field Work, 2014

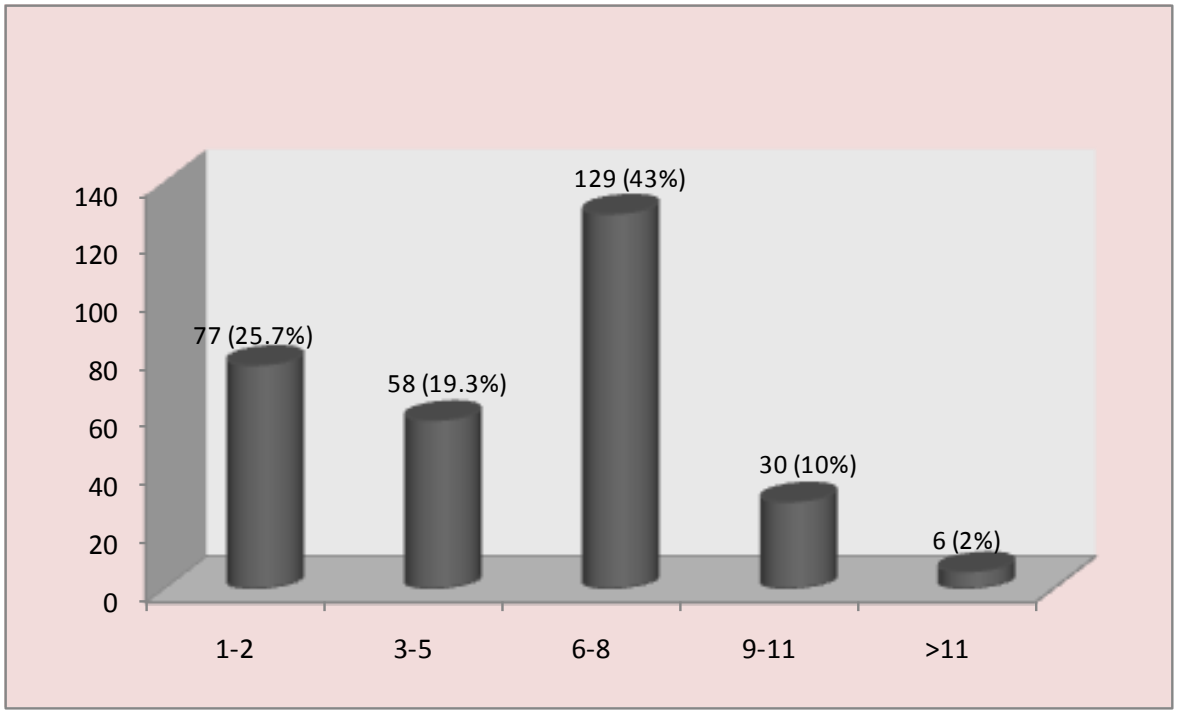


Figure 4.8: Household Size
Source: Field Work, 2014

4.4.4 Residential Status and Duration of Residence in the Project Area

The residential status and the duration of residency of respondents are presented in Figure 4.9 and 4.10. In terms of residential status, Figure 4.9 shows that, 87.0% (261) of the respondents were permanent resident in the proposed SEEFOR project area. This was followed by the respondents described as "returnee" which account for 12.0% (36 interviewees) of the sampled frame. The sampled individuals who were merely visitors recorded just 1.0% (3 interviewees) of the sampled frame. The residential status of the respondents is specifically important, this is because; it has inference on the information provided. It is understood that, permanent residents will have better information about the project area and appreciate the need for environmental mitigation measures for the proposed SEEFOR project.

Similarly, the length of time of residency by the sampled individuals and households is shown in Figure 4.10. This, essentially has implications on the validity of the information given by the respondents. As depicted in the Figure, the highest proportion of the interviewees of 52.3% (157 persons' interviewed) had lived for more than ten years in the

proposed SEEFOR project area. The respondents with an average of 8 years had 25.0% (75 persons' interviewed) of the total sampled frame. This illustrates 77.0%.of the in-scope individuals and households which is adequate enough to provide trustworthy information (see Figure 4.10).

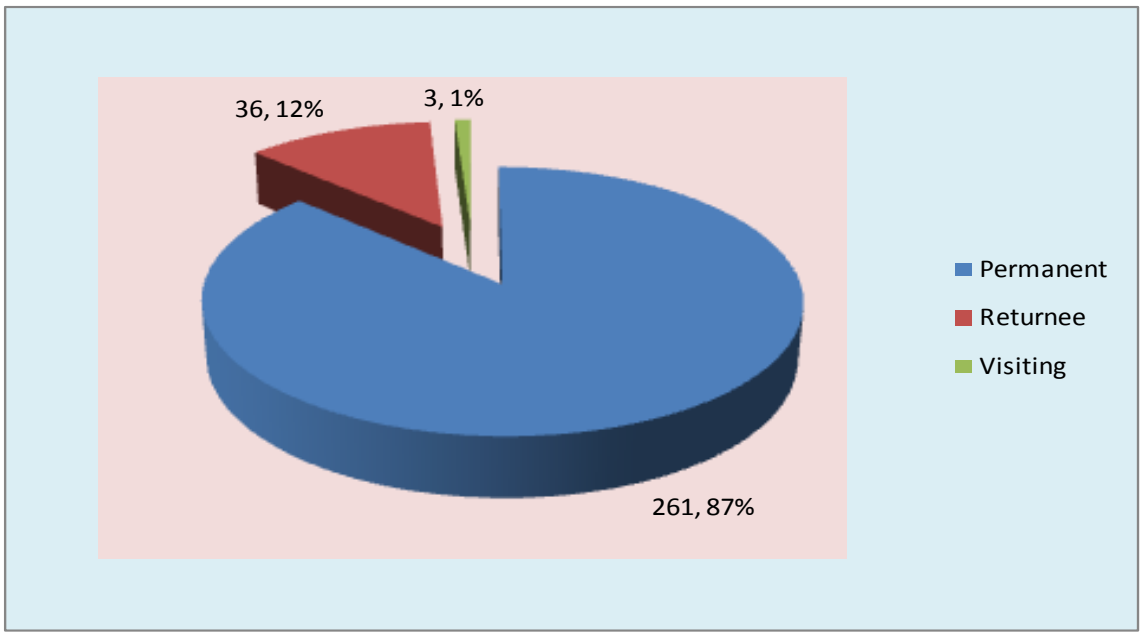


Figure 4.9: Residential Status of Respondents
Source: Field Survey, 2014

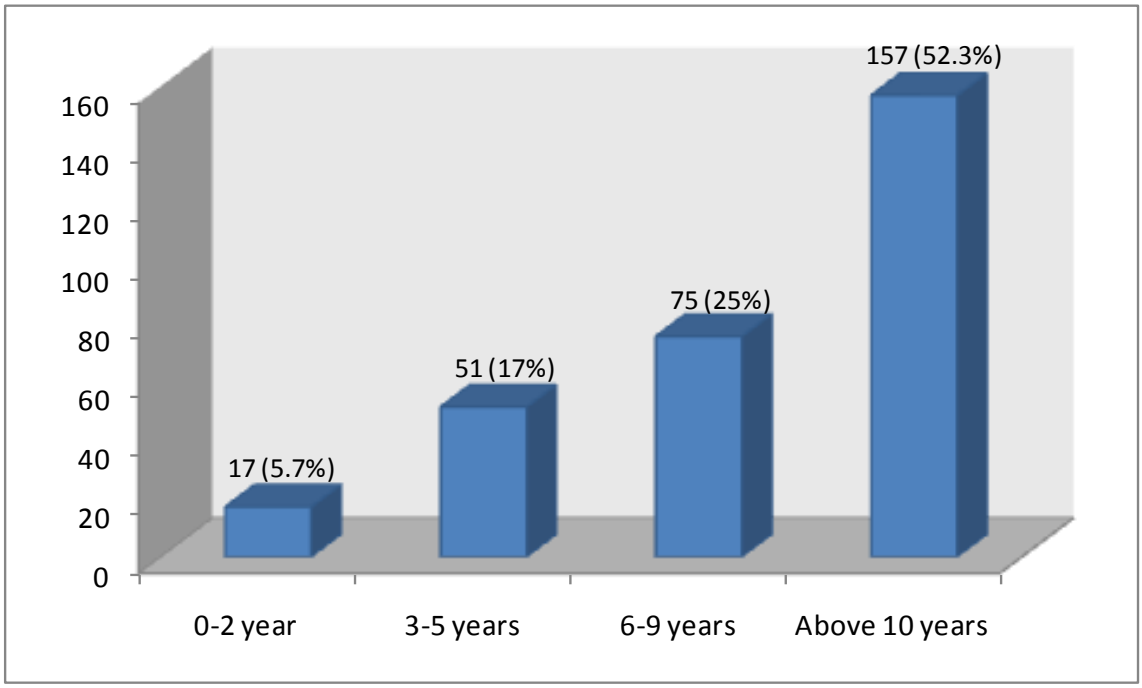


Figure 4.10: Length of Residence in the Project Area
Source: Field Survey, 2014

4.4.5 Educational Status of Respondents

The distribution of educational status of the sampled individuals and households is represented in Figure 4.11 below. As presented in the Figure, a high proportion of sampled individuals had Senior Secondary School Certificate and this accounted for 44.0% (132 individuals) of the sampled frame. This was trailed by the respondents with First Degree certificate, which returned 23.7% (72 individuals) of the sampled frame. The respondents with tertiary education (excluding university degree), university graduate, university postgraduate and primary school education recorded estimated figures of 22.0% (66 individuals), 7.0% (21 persons) and 2.7% (3 persons) respectively. The respondents with no formal education had 0.7% of the sampled frame. The high literacy level of the respondents in the proposed SEEFOR project area is a good indication of an enlightened citizen and environment.

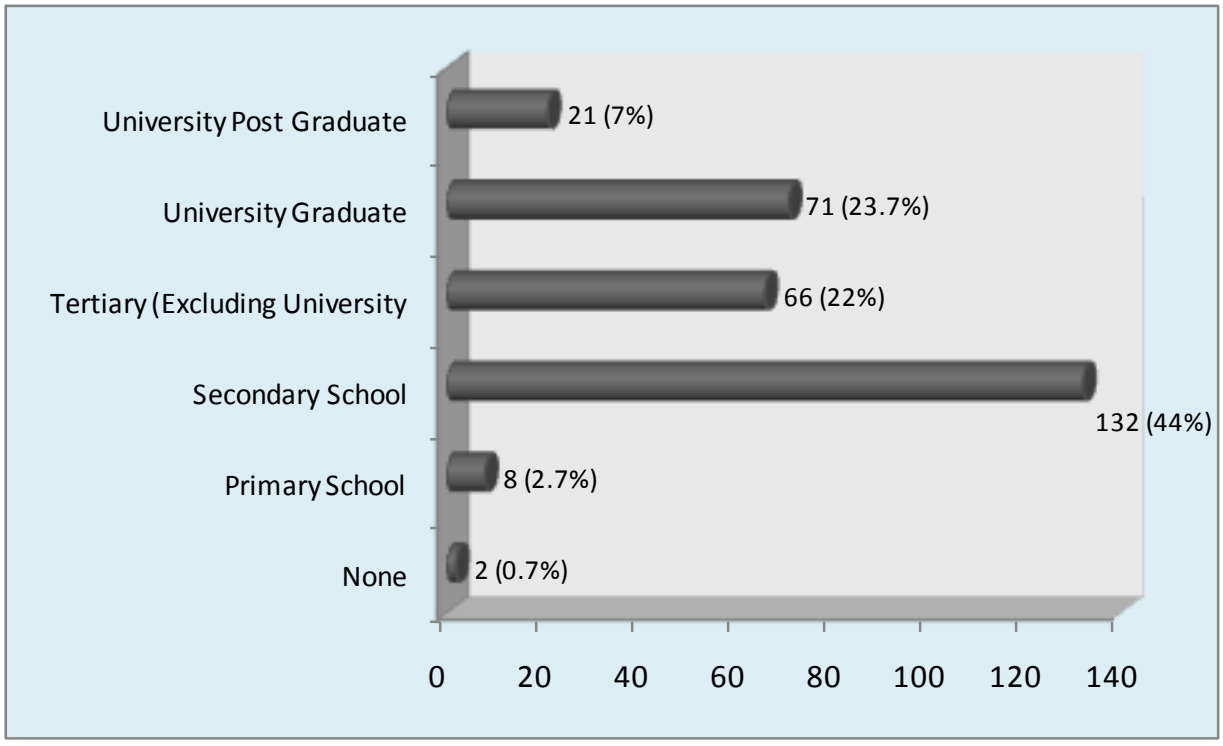


Figure 4.11: Educational Status

Source: Field Survey, 2014

4.4.6 Occupation of Respondents

Since the proposed project and the affected communities are located in urban core, the main occupations identified in the project area are classic of urban communities in Nigeria. These are characteristically of secondary and tertiary occupations. The distribution of occupation status of the sampled individuals and households presents the pervasiveness of the sampled individuals and households who are mainly engaged in trading and shop keeping and employed individuals with 25.7% (77 individuals) and 22.3% (67 interviewees) correspondingly. Respondents who are full-time farmers return 17.0% (51 interviewees), while those identified as artisans, self-employed persons, unemployed, social support and daily labourers returned 14.0% (42 individuals), 9.7% (29 individuals), 8.3% (25 persons), 2.5% (7 persons) and 0.7% (2 persons) respectively (see Figure 4.12).

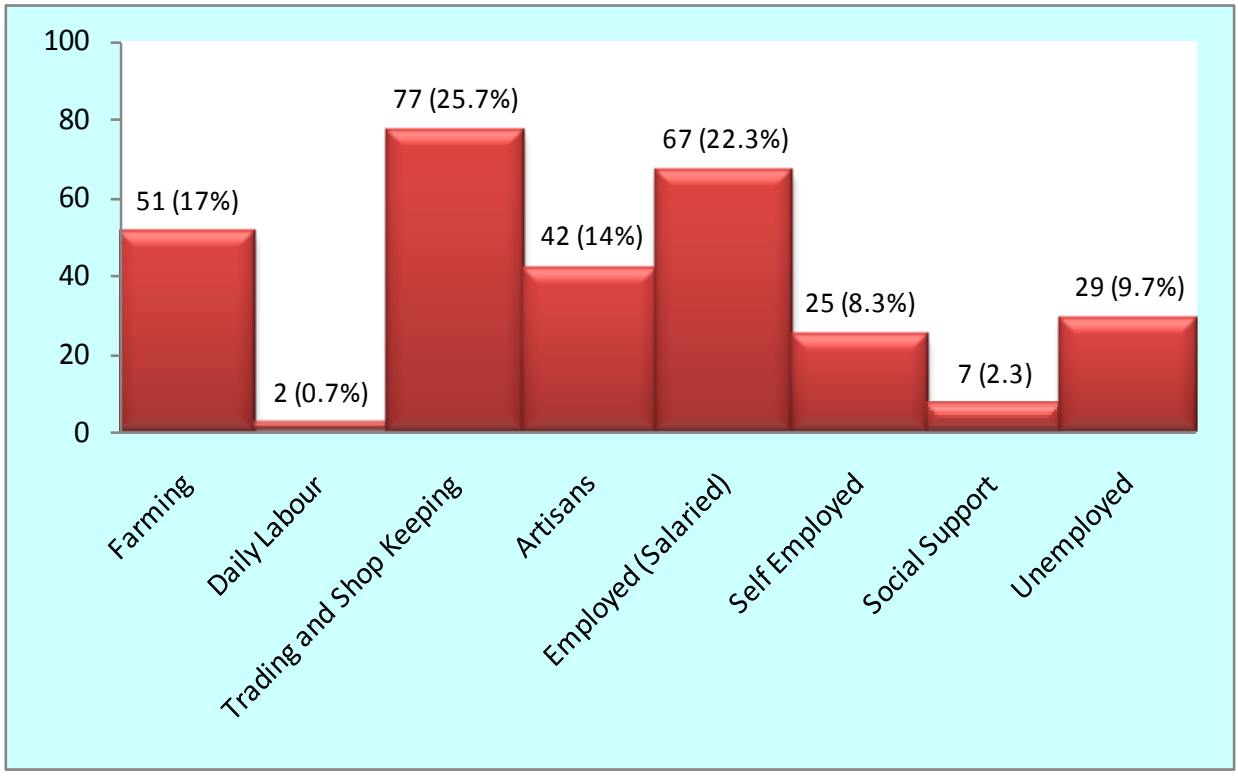


Figure 4.12: Employment Status
Field Survey, 2014

4.5 Health Management Records of Respondents

4.5.1 Health Management Strategies

Assessment of the health management style of the sampled individuals and households is shown in Figure 4.13 below. The Figure illustrates that, attending hospitals and clinics is the approach or currently implored by the interviewees for treatment of ailments/diseases in the proposed SEEFOR This assessment shows a high return of 62% (186 respondents) while the least were the sampled category using traditional approach with 12.0% (36 respondents). Some of the in-scope individuals and households also patronise local pharmaceutical shops, which records 26.0% (78 interviewees) of the sampled frame.

This gives an indication that a high proportion of sampled individuals and households in the proposed SEEFOR project area have access to modern healthcare facilities for treatment of ailments/diseases. It was also noted that, most common ailments/diseases to all age categories are malaria and typhoid.

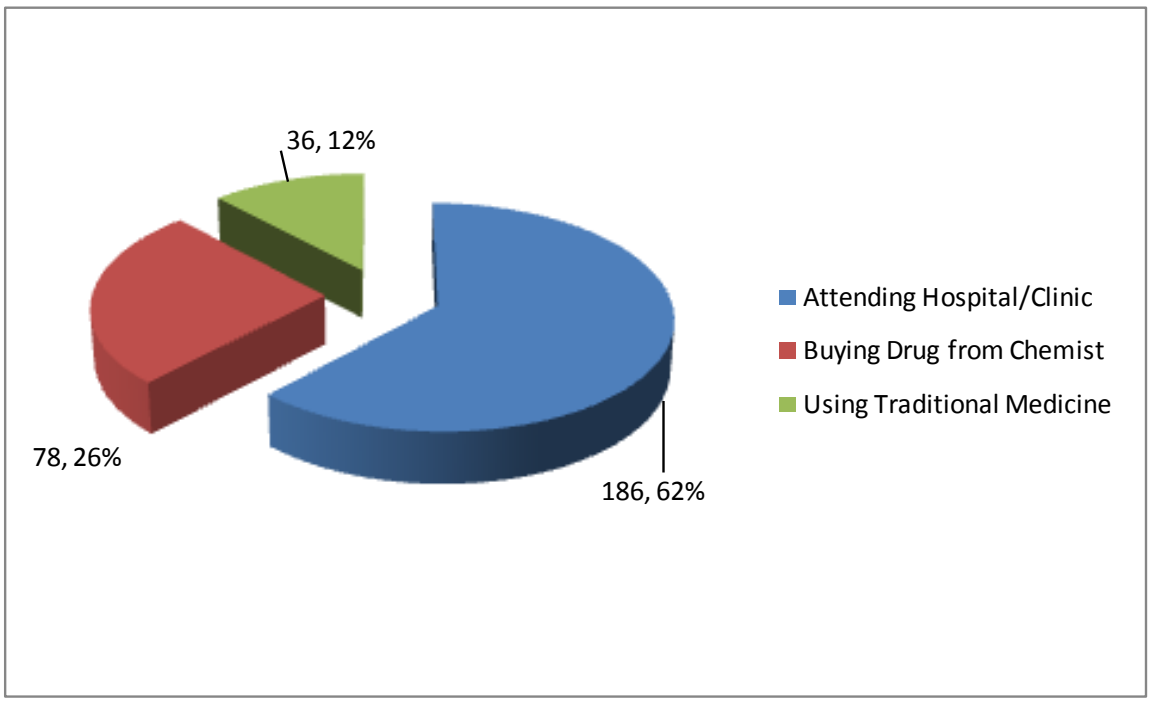


Figure 4.13: Health Management Strategies

Source: Field Survey, 2014

4.5.2 Ailments/Diseases Affecting Respondents in the Proposed Project Area

An assessment of ailments/diseases common in the proposed project affected area in Sapele, Sapele LGA of Delta State is captured in Table 4.1 below. The prevailing ailments/diseases among the sampled individuals and households were malaria and typhoid. As it is depicted in the Table, most common ailments/diseases in the proposed intervention communities were malaria (89.3%), pile (82.6%) and typhoid (50.0%). These ailments affected a great proportion of the residents and were the most commonly occurred in the project area in Sapele.

Other prominent ailments in the proposed SEEFOR project area in Sapele were rheumatism, eye problems, particularly among the aged in the project affected communities. The ailments/diseases of less significant in the area include rashes, whooping cough, hypertension, ringworm and sexual transmitted diseases. A detail finding of diseases/ailments of great concerns among residents in the proposed SEEFOR project area is shown in Table 4.1.

Table 4.1: Prominent Ailments/Diseases in the Project Area

Variables	Always (%)	Sparingly (%)	Seldom (%)	Never (%)	G. Total
Whooping Cough	0.0	16.7	31.7	51.7	100.0
Tuberculosis	0.0	0.7	49.7	49.6	100.0
Asthma	0.0	1.3	33.3	65.3	100.0
Dysentery	0.0	0.0	0.0	100.0	100.0
Diarrhea	0.0	0.0	0.0	100.0	100.0
Cholera	0.0	0.0	0.0	100.0	100.0
Pile	25.9	27.1	17.2	17.4	100.0
Hypertension	0.0	1.2	2.4	96.4	100.0
Congestive Health Problem	0.0	2.4	0.0	97.6	100.0
Pneumonia	3.0	0.3	0.0	96.7	100.0
Epilepsy	0.0	0.0	0.0	100.0	100.0

Variables	Always (%)	Sparingly (%)	Seldom (%)	Never (%)	G. Total
Rheumatism	20.0	8.0	26.7	45.3	100.0
Rashes	1.0	2.3	10.0	86.7	100.0
Eczema	0.0	0.0	0.0	100.0	100.0
Ringworm	0.0	0.6	3.3	96.1	100.0
Eye pains	5.0	2.0	10.0	83.0	100.0
Cataract	0.0	0.0	0.0	100.0	100.0
Glaucoma	0.0	0.0	0.0	100.0	100.0
Typhoid fever	20.3	22.0	7.7	50.0	100.0
Malaria	41.7	17.7	30.0	10.7	100.0
Sickle Cell Anemia	0.0	0.0	0.0	100.0	100.0
STDs	0.0	1.2	4.8	94.0	100.0

Source: Field Survey, 2014

4.6 Standard of Living of Sampled Individuals and Households

The standard of living of the sampled individuals and households measures the intensity of their material comfort in terms of the basic amenities the have access to. In other words, it assesses the accessibility of required goods and services by the sampled individuals and households in the proposed SEEFOR project area. In this regard, it is understood that individuals with high standard of living are less involved in violent acts.

4.6.1 Housing Characteristics of the Proposed Project Affected Communities

An assessment of housing characteristics of the sampled individuals and households in the proposed SEEFOR project area in Sapele, Sapele LGA of Delta State is presented in Table 4.2 below. The Table presents detail findings on the dwelling units in which the sampled households live in. The assessment of housing characteristics as depicted in Table 4.2 covers the following building parts and facilities:

- Construction materials for wall,
- Construction materials for roofing,
- Construction materials for floor,

- Tenure of housing,
- Toilet facility and
- Number of rooms occupied by the households

The main construction material for house walls in the project area was cement block, which accounts for 84.7% (254 units) of sampled residential buildings. The building walls made of mud/mud block returns an estimated proportion of 15.3% (46 units) of the surveyed residence. As regards the construction materials for the roofing of the sampled dwelling units, it was revealed that 63.0% (189 units) were made of corrugated aluminum zinc sheet. The second dominant was asbestos slate which accounts for 23.0% (69 units) of the sampled housing units. The sample of the construction materials for floor revealed cement as a dominant material with 65.3% (196 units) of the total sampled frame. Tiles flooring had 21.7% (65 units) of the sampled household units. In terms of building ownership, 58.3% (175 units) of the sampled households were rented while 33.0% were owned by the sample households. The toilet facilities were mainly water closet (76.7%). Detail findings are presented in Table 4.2.

Table 4.2 Housing Characteristics of Sampled Households

Building Parts	**Value Label**	**Frequency**	**Percentage**
Construction Material (Wall)	Plank Wall	0	0.0
	Mud	46	15.3
	Cement Block	254	84.7
	Total	**300**	**100.0**
Construction Material (Roofing)	Asbestos Slate	69	23.0
	Corrugated Aluminum zinc sheets	189	63.0
	Aluminum	42	14.0
	Thatched roof	0	0.0
	Total	**300**	**100.0**
Construction Material (Floor)	Earthen	39	13.0
	Cement	196	65.3
	Tiles	65	21.7
	Other	0	0.0

Building Parts	Value Label	Frequency	Percentage
	Total	**300**	**100.0**
Toilet Facility	Pit latrine	21	7.0
	Water closet	230	76.7
	Toilet facility outside dwelling	49	16.3
	None	0	0.0
	Pier Latrine	0	0.0
	Total	**300**	**100.0**
Tenure of Housing	Owned	99	33.0
	Rented	175	58.3
	Occupied rent free	21	7.0
	Other	5	1.7
	Total	**300**	**100.0**
Number of Room(s)	1-2	171	57.0
	3-4	85	28.3
	5 & Above	44	14.7
	Total	**300**	**100.0**

Source: Field Survey, 2014

4.6.2 Household Monthly Income

The distribution of the monthly income of the sampled individuals and households is depicted in Figure 4.14. The assessment focuses on aggregate income on monthly basis of the sampled individuals and households. The Figure depicts that a high proportion of the respondents of 33.0% (101 sampled households) had a monthly income in the range of N10,001.00 – N30,000.00. This is trailed by the sampled individuals and households with monthly income below N10,000.00. Respondents with a monthly income in the range of N50,001.00- N100,000.00 and N10,001.00-N50,000.00 had 18.3% (55 households) and 17.3% (52 households) of the total respondents. Sample individuals with more than N100,000.00 average monthly income recorded 10.3% (31 households) of the sampled frame.

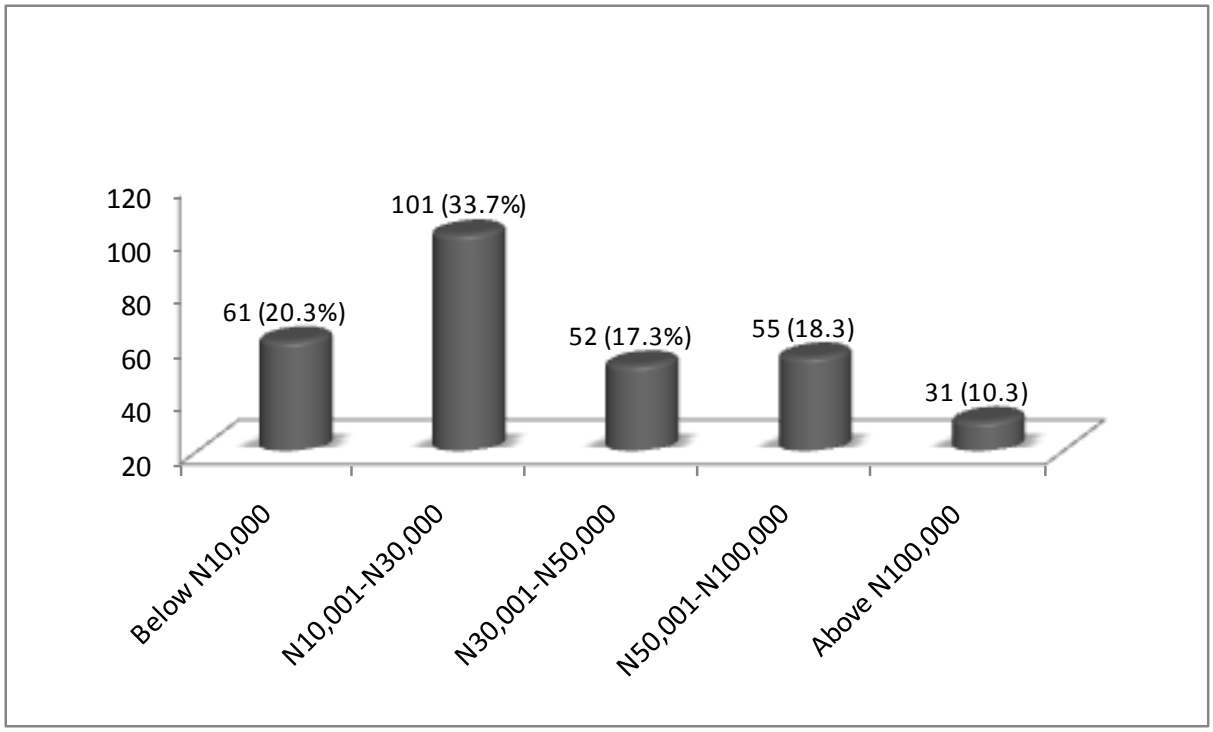


Figure 4.14: Income Status of Respondents

Source: Field Survey

4.6.3 Sources of Water to Sampled Households

An assessment of available sources of water to the proposed project affected communities is shown in Table 4.3 below. The assessment is principally to evaluate the sources of water for drinking, cooking, and bathing and washing to the affected communities by the proposed SEEFOR project.

As illustrated in Table 4.3, the proposed project affected communities depended largely on borehole as their source of domestic water supply for drinking, cooking, and bathing and washing. Sachet water (54.0%) and bore hole (18.3%) were identified as the main sources of drinking water. The high proportion of sachet water consumption among the respondents was due to the poor state of area's groundwater. Bore hole (59.0%), well (18.3), community tap water (3.7%) and river (7.0%) were all invaluable sources of water for cooking in the area. In term of sources of water for bathing and washing, bore hole (53.0%), well (22.7%) and community tab (8.7%) were identified as most valuable and

accessible means of the sampled households. Rain harvest as a source of water is seasonal.

Table 4.3: Sources of Water to Sampled Households

Value Label	Drinking Water		Cooking Water		Bathing & Washing	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Rain Harvest	21	7.0	20	6.7	21	7.0
River	3	1.0	21	7.0	17	5.7
Well	14	4.7	55	18.3	68	22.7
Bore hole	55	18.3	177	59.0	159	53.0
Pure water	162	54.0	0	0.0	0	0.0
Bottle water	31	10.3	0	0.0	0	0.0
Water Pump	3	1.0	16	5.3	9	3.0
Community Tap	11	3.7	11	3.7	26	8.7
Total Response	300	100.0	300	100.0	300	100.0

Source: Field Survey, 2014

4.6.4 Source of Energy to Sampled Households

An assessment of the accessible source of energy to the sampled individuals and households in the proposed project area is shown in Table 4.4 below. The study identified and ranked generator, electricity and kerosene as 1st, 2nd and 3rd major sources of energy for lighting in the proposed project area. The main sources of energy for cooking, which include kerosene, fire wood/residual/saw dust and electricity, were ranked 1st, 2nd and 3rd respectively. Detail findings are presented in Table 4.4 below.

Table 4.4 Source of Energy to Sampled Households

Variable	Lighting	Cooking	Lighting	Cooking
	Frequency		Ranking	
Electricity	101	41	2	3
Generator	122	20	1	6
Kerosene	95	115	3	1
Fire Wood/Residual/saw dust	3	67	5	2
Gas	2	22	6	5
Coal/Charcoal	1	35	7	4

Others	77	0	4	7
Total	300			

Source: Field Survey

4.6.5 Solid Waste Management

The waste management method adopted by the respondents in the proposed project area is shown in Table 4.5. Effective waste management approach is pertinent to the protection of human health and the environment. As noted, the communities in the proposed project area have accessibility to different waste management methods. However, most methods in use at the proposed project area were injurious to human health and unfriendly to physical environment.

The distribution of solid waste disposal methods in the proposed project area as presented in Figure 4.15 shows that, the highest proportion of the in-scope individuals and households, which returned 51.3% (154 surveyed households) falls under those who use the "community dedicated dumpsite". This was followed by sampled individuals and households whose simply dumped the domestic waste at the backyard of their respective residential buildings in which 20.0% (60 surveyed households) of total sampled frame (300 respondents) engaged in this informal approach method of waste management. The government dedicated waste collectors recorded as the third most influential waste management method returning an estimated figure of 8.3% (25 surveyed households). The result of findings implies that, the sampled households mostly adopt the informal approach to waste management. Detailed findings with respect to solid waste disposal system are shown in the Table 4.5.

Table 4.5: Waste Management Method

Variable	Frequency	Percentage
Dumping at backyard	60	20.0
Dumping in Water Body	0	0.0
Community Dedicated Dumpsite	154	51.3
Burning after Gathering	55	18.3
Waste Collector (PSP)	25	8.3

Other	6	2.0
Total	**300**	**100.0**

Source: Field Survey, 2014

4.6.6 Changes in Standard of Living

Responses to the assessment of observed changes in the standard of living of the sampled individuals and households in the proposed SEEFOR project area at Sapele, Sapele LGA of Delta State are depicted in Figure 4.15 below.

It is observed in the Figure below that, a high proportion of 48.0% (175 respondents) indicated that their standard of living was improving over the years while 18.0% noted a decline in their standard of living. So also, 34.0% (101 respondents) of the interviewees in the SEEFOR proposed project area in Sapele indicated that the standard of living had been static over the years. Detail result as regards the living standard is illustrated in Figure 3.16 below.

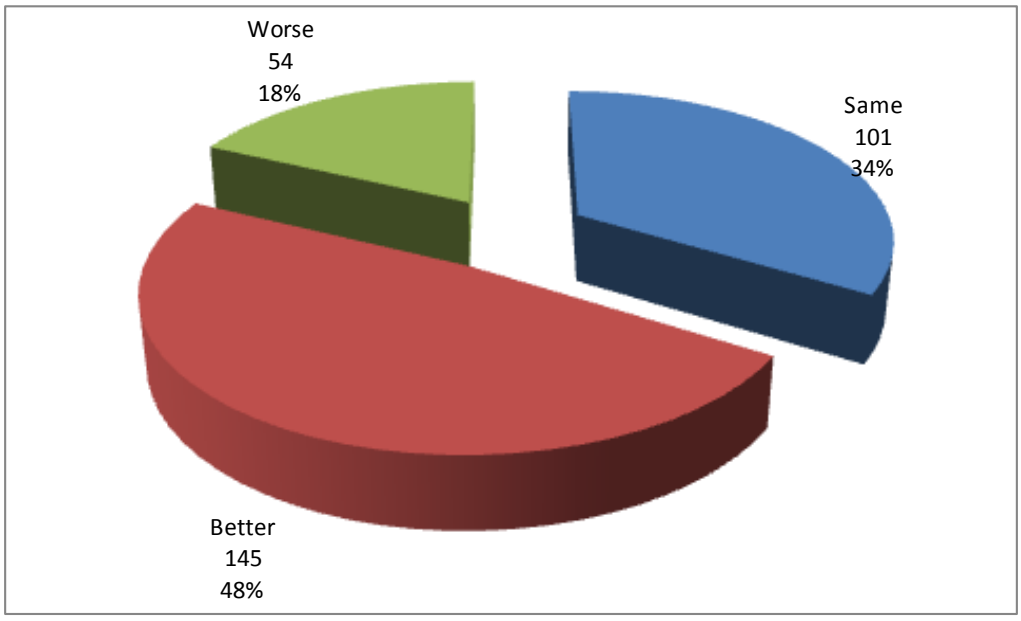


Figure 4.15: Observed Changes in Standard of Living
Source: Field Survey, 2014

4.7 Impacts of Existing Road Condition on Affected Communities

The impacts of the condition of the existing roads selected for the rehabilitation and maintenance by SEEFOR were noted to be enormous. Lack of maintenance of the existing roads such Okpe road, Cemetery road has given way to flooding, poor drainage system, copious pot holes, narrowness of the roads. The existing condition of the selected roads has negative impacts on the economic activities of the users. The proposed project roads have deterred the medium of accessibility to residential houses, schools, churches, work place, and social amenities of the affected communities, most especially during the rainy period. This therefore calls for an urgent attention. Detail impacts of the selected roads for the rehabilitation and maintenance in which flooding (48.0%), poor drainage systems (18.3%) and environment pollution (10.0%) had high proportions are presented in Table 4.6 below.

Table 4.6: Existing Road Condition

Value Label	**Existing Road Condition**	
	Freq.	%
Poor Drainage System	55	18.3
Bad Road	31	10.3
Erosion Problems	25	8.3
Flooding	144	48.0
Environmental Degradation	3	1.0
Destruction of Infrastructure	12	4.0
Encroachment of Land Properties	0	0.0
Pollution (Air, Water & Land	30	10.0
Total	300	100.0

Source: Field Survey, 2014

4.8 Potential Impacts of the Proposed Intervention Project

The potential impacts that require mitigation on the proposed road rehabilitation and maintenance project by the SEEFOR were noted to be minimal and site specific. Therefore, the potential negative impacts of the proposed activities would undoubtedly outweigh the likely negative impacts. This was quite understood by the sampled

households. On the other hand the potential positive impacts of the proposed intervention project assumed through improved access roads and employment generation, the economic activities of the affected communities will be unquestionably improved.

The potential negative impacts of the proposed project as indicated by the respondents are shown in Table 4.7. Though the observed negative impacts will be short-lived and mostly during rehabilitation phase. Table 4.6 depicts that, during the rehabilitation phase, the most concerns negative impacts are flooding (31.7%), especially if effective drainage systems are not put in place. Other of great concerns are possible encroachment on landed properties (15.3%), poor drainage system (15.3) and environmental pollution (15.0%). It is understood that during the maintenance phase, pollution which contains air, water and land, and environmental degradation will be more pronounced. A detail finding is illustrated in Table 4.7.

Table 4.7: Rehabilitation Phase

Value Label	Rehabilitation Phase	
	Freq.	%
Poor Drainage System	46	15.3
Bad Road	12	0.0
Low Visibility	15	0.0
Erosion Problems	21	7.0
Flooding	95	31.7
Environmental Degradation	0	0.0
Destruction of Infrastructure	46	6.7
Encroachment of Land Properties	20	15.3
Pollution (Air, Water & Land	45	15.0
Total	300	91.0

Source: Field Survey, 2014

4.9 Recommendations from Socio-economic Study

Obviously, the proposed project activities will have some negative socio-economic impacts. The liable negative impacts will however be of a short-term, predominantly during the rehabilitation phase and this can be minimized to acceptable levels with the implementation of recommended mitigation measures that will ensue. As stipulated above, the activities at Sapele SEEFOR project site cover mainly rehabilitation and maintenance which is shown in Plate 4.1 to Plate 4.5.

- Owing to the nature of the activities of the SEEFOR project, the potential negative impacts will certainly be less significant in rating and this can smoothly and tranquilly be moderated.
- It is understood also that, the proposed intervention project at Sapele will result in significant positive impacts to the affected people, particularly regarding quality access roads and employment generation. The principal social impact management issues revolve around adequate drainage system and acquisition of buffer zone, mostly in clumsy residential areas in which all of the selected roads are located.

Plate 4.1: Accumulated Sand on Okirigwe Roundabout, Sapele, Delta State

Plate 4.2: Accumulated Solid Waste on Drainage Channel, Okpe Road, Sapele

Plate 4.3: Stagnant Water on Okpe Road, Sapele

Plate 4.4: Vegetation Cover and Stagnant Water on Cementary/Adeola Road

Plate 4.5: Poor Drainage System, Sapele/Warri Road, Sapele, Delta State

CHAPTER FIVE

5.0 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

This chapter of the ESMP for the proposed SEEFOR project in Sapele, Delta State identifies the potential impacts of the proposed project activities during rehabilitation and maintenance phases. The project activities (rehabilitation and maintenance of the selected roads in Sapele, Sapele LGA of Delta) are analysed for their potential impacts on environmental resources and socio-economic issues. The enormity and implication of the anticipated impacts are also analyzed as necessary.

The potential impacts of the proposed SEEFOR project were assessed and are normally classified into those affecting soil, water quality, air quality, flora and fauna, community and their socio-economic activities, land acquisition and resettlement (if applicable), aesthetics and landscape, noise and human health. Proper mitigation measures would be covered in Chapter Six of this report. The potential impacts were considered for the key identified phases of the proposed project as follows:

- During rehabilitation phase of the selected corridors in Sapele, Sapele LGA of Delta State by SEEFOR; and
- During maintenance phase when the road will be used by the communities in the locality and by the SEEFOR recruited staff for the maintenance

Based on the identified potential negative impacts, it is stated in subsequent chapter after this that the mitigation measures, which are designed to reduce the magnitude of the adverse impacts and to keep them at acceptable levels, are preferred. The mitigation measures suggested will combine the goal of long term sustainable development with sound environmental and social considerations of the SEEFOR project activities. Generally, the potential impacts of the SEEFOR proposed project activities can be positive or negative, direct or indirect. The magnitude of each impact of the project activities of the selected road networks is described in terms of its being significant, minor or negligible, temporary or permanent, long term or short term. These qualities are indicated in the assessment as shown in Table 5.1.

Table 5.1: Potential Impacts Assessment Criteria

S/N	Class of Impact	Key	Class of	Key
1	Reversible	Rs	Irreversible	Irs
2	Temporary	Tr	Permanent	Pn
3	Short-Term	Stm	Long-Term	Ltm
4	Negligible	Ng	Significant	Sc
5	Zero Impact	Zi	__	No

5.1 Potential Environmental Impacts

With regards to the environment, the Environmental and Social Impact Assessment (ESMP) of the SEEFOR proposed activities is classified into two areas as follows:

- Impacts on the physical component of the environment; and
- Impacts on the ecological component of the environment (flora and fauna).

The potential impacts of the SEEFOR project activities on the physical environment cover the direct and local impacts of the selected roads rehabilitation and maintenance; such impacts include noise, land degradation, water pollution, habitat destruction and or disturbance, local air quality, landscape, soil contamination, etc.

The impacts on the ecological component of the environment cover the effects of the rehabilitation of the roads on flora and fauna. The broader impacts of the SEEFOR project activities on the ecological component of the selected roads may include long-run climate change from vehicle emissions, which is conversely not covered in this assessment due to the absence of a sound and universally accepted method for projecting such parameter.

5.2 Potential Impacts on Physical Environment

5.2.1 Potential Impacts on Micro Climate

The climate of the proposed SEEFOR project area is of the humid type. Though no major change in the macro-climatic setting (precipitation, temperature and wind) is envisaged during the proposed project, the microclimate in the immediate area of the project is likely to be affected. During the project rehabilitation phase, there will be momentary heat output wherever heavy machinery including earthmoving equipment and asphalt plants are in operation. In this regard, the SEEFOR project at Sapele is not expected to lead to any significant change in the climatic condition of the area.

During the maintenance phase of the SEEFOR project activities in Sapele, local temperature condition will be slightly modified due to the replacement of vegetation (where applicable) and natural soil and or sand with asphalt pavement surface. Certainly, there will be an increase in daytime temperature on the newly rehabilitated road surface and on the nearby soil as a result of distress of soil and loss of some shade trees, which in turn might lead to the formation of heat islands in and around the selected road for the project. In addition, the removal of vegetation along affected roads will increase the amount of direct sunlight, resulting in higher temperatures along the affected roads. Overall, these effects would be limited to the immediate area of the project activities in Sapele. These effects are not expected to cause any significant change in the micro climate of the area of influence of the selected road network in Sapele.

5.2.2 Potential Impact on Air Quality

The air quality along the selected roads for rehabilitation and maintenance by the Delta SEEFOR will be affected due to a potential significant change that the project activities will cause. The direct influence in the affected area in Sapele, Sapele LGA, Delta State will be impacted by air pollution during the rehabilitation and maintenance stages as a result of the generation of dust and exhaust gases during the activities. During the rehabilitation stage, adverse impacts on air quality will be short-term and will affect the health of rehabilitation workers and residents in the settlements adjacent to the relative road corridor, particularly those in the windward direction. During the maintenance phase, the SEEFOR project will cause air pollution mostly by exhaust gases from moving traffic and also by road maintenance activities, especially sweeping activity by the workers, although to a much smaller extent. This will affect local residents in the close proximity of the project activities on a semi-permanent basis for as long as there is traffic on the affected road.

5.2.3 Potential Impact on Dust

The possible presence of dust is expected to have a negative temporary impact especially on the health of road rehabilitation and maintenance workers as well as those of the affected communities along the road corridor. Dust is liable to have a more severe impact than exhaust gases during the rehabilitation stage most especially during the dry season.

This will be because excavation and earth moving with heavy equipment would be in operation. Other potential dust generating rehabilitation activities that could be introduced by SEEFOR project in Sapele include stone crushing operations, handling and storage of sand and aggregates in the asphalt plants, concrete mixing plants and asphalt hot mix plants that will result from the movement of aggregates. The potential impacts of dust will mostly be concentrated within the rehabilitation sites and stone crushing sites. The impact of dust will spread windward of the site for a considerable distance of up to 1000 m on windy days. During the maintenance stage, dust will be chiefly generated as a result of sweeping and solid waste management due intense of sand accumulation and solid waste.

5.2.4 Vehicle Emissions Related Impacts

During the proposed project rehabilitation stage of the proposed SEEFOR project, generation of exhaust gases will occur in Sapele due to the operation of various types of heavy machinery with internal combustion engines, mostly for earth movement and for laying of pavement in the affected roads. This impact is conceived to be significant, but temporary during the rehabilitation stage only. Pollutants such as SO2, HC and NOx are prone to be generated from the operations of such machinery in the SEEFOR Sapele project area. Similarly, due to the heating of bitumen harmful gases will be released into the atmosphere during the operation of the asphalt mixing plant. Although the impact is normally constrained to the working area and its vicinity, exhaust gases can swell windward as the case may be.

During the maintenance stage of the SEEFOR project activities in Sapele, moving motor vehicles will generate exhaust emissions and thus produce air pollution. This could worsen the volumes of annual emission quantities of Hydrocarbons (HC); Carbon Monoixde (CO); Nitrogen Oxide (NOx); Sulphur Dioxide (SO2); Carbon Dioxide (CO2); Particulate Matter and Lead. This incident will be as a result of an increase in traffic levels, rise and fall of the affected roads, the composition of traffic, fuel quality and average traffic speed. Consequent upon the reasons given above, the potential high emission levels in the project area can be offset to a small degree by the smoother traffic flow resulting to lower fuel consumption on the selected roads.

5.2.5 Noise and Vibration

Undoubtedly, during the rehabilitation phase, there will be regular, classic and inevitable noise and vibration generation as a result of the operations of different types of equipment. Also, this could be as a result of rock blasting at predetermined locations. The classic noise levels (noise level in dB at 50 feet distance) as related with varying types of rehabilitation activities equipment are presented in Table 5.2.

Table 5.2: Noise Levels of Rehabilitation/Construction Equipment

Clearing		**Structure Construction**	
Bulldozer	80	Crane	75-77
Front End Loader	72-84	Welding Generator	71-82
Jack Hammer	81-98	Concrete Mixer	74-88
Crane with Ball	75-87	Concrete Pump	81-84
Excavation and Earth Moving		Concrete Vibrator	76
Bulldozer	80	Air Compressor	74-87
Backhoe	72-93	Pneumatic tools	81-98
Front End Loader	72-84	Bulldozer	80
Dump Truck	83-94	Cement and Dump Trucks	83-94
Jack Hammer	81-98	Front End Loader	72-84
Scraper	80-93	Dump Truck	83-94
		Paver	86-88
Grading and Compacting		Landscaping and Clean-Up	
Grader	80-93	Bulldozer	80

Source: U.S. Environmental Protection Agency

It is important to note that, during the maintenance phase of the SEEFOR project in Sapele, Sapele LGA of Delta State, noise will be typically generated mainly by the usual traffic on the selected road networks.

5.2.6 Water Resource Environment

Since the proposed project area is a highly sensitive environment (coastal area), the protection of water sources will be an important requirement during the implementation of the civil works. Local alteration of water flow and drainage is likely to occur due to de-silting of drains, and repairing of collapsed drains, disposal of cut/debris material and sand in gently sloping terrain.

During the Rehabilitation Stage:

(i) It is likely that, there will be direct and indirect potential impacts on water resources. Road rehabilitation may obstruct the free flow of water through and drain collectors and channels;

(ii) Degradation of water quality can take place due to an increase in the sediment load into watercourses near the sites. This may be aggravated by a removal of vegetation and consequent increase in soil erosion and flooding;

(iii) Degradation of water quality is also feasible and this will be due to the potential inadvertent discharges into waterways from drainage and from spillage in vehicle parking and/or fuel and lubricant storage in the selected road networks.

During the Maintenance stage:

(i) The structure of the paved surface and kerb of the roads will block the normal seepage of rain water into the ground and also generate more concentrated runoff water from pavement. There will be a locally restricted loss of ground water recharge capacity in the project road by the Delta SEEFOR;

(ii) In an event of road accidents, there is the likelihood of spills of fuel on the road which may get into water bodies and cause contamination;

(iii) The proposed SEEFOR project will also generate waste water. Generation of runoff from the petrol pumps at the predetermined service areas will also have a detrimental effect.

5.2.7 Landscape and Soil

The rehabilitation of the selected road networks will have imperative impacts on the landscape. Painting of kerbs, sweeping of surface travelled roads, de-silting of drains, patching of potholes and repair of collapsed drains will generate unnecessary materials, which will be re-used for creating the embankments, but a relatively small percentage of unsuitable or unnecessary materials will need to be deposited at sites, which are yet to be determined. The depositing of such materials can cause local drainage alterations with erosion on one side and deposits of the eroded material on the other, if the dumping areas are not properly selected and designed.

It is understood also that, soil contamination will transpire due to the following reasons, which might happen during both the rehabilitation and maintenance phases:

- Maintenance (particularly oil change) of machinery and operation of the diesel generator sets,
- Oil Spills from operation and maintenance of the mechanical workshops, diesel pumps and diesel storage, during transportation and relocation, parking spaces, and diesel generator sets,
- Operation and maintenance of the emulsion sprayer,
- Operation and maintenance of the residential facilities for the labour and staff,
- Potential accidental spill of emulsion, oil and other materials, and
- Remains of blasting chemicals.

5.3 Ecological Impacts of the Delta SEEFOR Project

The process of projection of the ecological impacts of the proposed project in Sapele, Delta State, was based on the approach, which connects sources of stress to ecological receptors discovered in the proposed SEEFOR project area in Sapele. The main project parameters and the ecosystem components carefully weighed in the ecological impact assessment are presented in Table 5.3 below.

Table 5.3: Projection of Ecological Impacts

Project Parameters	Ecosystem Components
Project uniqueness	• Location and land requirement; • Schedule of rehabilitation and maintenance; • Nature of emissions due to road; • Existing and future land use characteristics; • Excess material disposal sites.
Distinctiveness of Ecosystem Component	• Naturalness and Reliability; • Habitat quality; • Stressed species; • Extinction risk; • Change in habitat use;

Project Parameters	Ecosystem Components
	• Preservation significance.
Impact Assessment	Projection of environmental and ecological changes comparative with baseline taking into account the nature, magnitude and significance of the expected impacts.

5.3.1 Impacts of the Proposed Project Activities on Flora

- The rehabilitation of the selected road networks will have a direct impact on vegetal cover;
- There will be loss of bushes and vegetation, which will be cleared during the road rehabilitation;
- There will be an indirect impact on vegetation due to the deposition of dust on leaves of trees. The dust deposition on leaves will reduce the photosynthesis activity of the trees. However this impact will be short-term during the rehabilitation phase of the project;
- The excavation of materials may result to alterations in the soil profile, hydrology, and topography and nutrients composition of the substrate. These induced impacts could be irremediable in character.

5.3.2 Impacts of the Proposed Project Activities on Fauna

- The loss of vegetation in the proposed project area will affect the natural habitat of some wild animals in the area;
- During the rehabilitation phase of the project wild animals will migrate to some other places due to the direct impact on their habitation;
- The rehabilitation activities of the roads will create noise and disturbance in the natural habitats of animals and affect their living conditions.
- The birds in the project area will be directly affected by tampering with the habitation of these birds
- Where there will not be any direct impact on the habitat of birds, they could still be affected indirectly as a result of possible air and noise pollution during the rehabilitation and maintenance phases of the proposed project activities.

5.4 Social and Economic Impacts during Rehabilitation and Maintenance Phase

The potential social and economic impacts of the road rehabilitation and maintenance by the SEEFOR in Sapele LGA of Delta State were noted to be minimal and site specific. Therefore, the potential positive impacts of the proposed activities would undoubtedly outweigh the likely negative impacts. As regards the potential positive impacts of the proposed project, assumed through the provision of an improved access roads and employment generation, the economic activities of the affected communities will improve. These are further explained as follows:

5.4.1 Adverse Impacts on Affected Communities and Residents

The negative impacts on social lives on the communities anticipated during the rehabilitation phase are as follows:

i. Soil Erosion

The proposed project in Sapele will entail light excavation. These earthworks for the proposed activities will result in soil erosion due to the topographic and soil characteristics of the area. Inappropriate drainage of runoff from the road to lower catchments can also cause erosion issues. Incorporating soil conservation measures during rehabilitation would help to mitigate damages caused by erosion. Clearing of vegetation for the selected roads could result in an increase in runoff along the slopes and thus encourage erosion with serious adverse impacts on residential buildings in the area.

ii. Pollution

Heavy equipment and vehicles will be deployed during the rehabilitation process of the road. Exhaust and engine emissions from these vehicles and equipments may cause air pollution, which can have an impact on public health along the road, soils and water sources. Oil wastes may also become a source of pollution to the soils, water sources and vegetation along the road network if carelessly handled, stored or drained from rehabilitation vehicles and equipment.

iii. Diversions

Diversions during the rehabilitation process will only be required in some sections of the selected roads in Sapele but generally traffic will be allowed to pass during rehabilitation.

These diversions will preferably remain within the road reserve. In sections of the affected roads where this will not be possible, traffic may have to be diverted temporarily to other access roads, which, will not only prolong access to basic needs of the residents but also constitute inconvenience to the affected people. The Contractor will be required to set out traffic control measures.

iv. Material Sites

Most vital concerns relating to selected gravel sites include vegetation clearance, landscape scares, dust and general disturbance during excavation, and the need to reinstate the sites when the contractor has completed quarrying. Dust and noise during excavation will, therefore, affect some localities; thus, the Contractor will need to set out the general wind directions on the selected project roads and work accordingly. Traffic to the selected materials sites will also constitute a challenge to people living around them. It is understood that, erodibility depends largely on soil type and to some degree on the gradient of the site. Gravel pits are more vulnerable to erosion than hard stone quarries.

v. Public Health

It is understood in this study that, improvement works and traffic during maintenance will create dust, air and noise pollution, which can have an impact on public health, mostly of the nearby residents. Oil wastes from vehicles can adversely impact on public health if these get into water sources. The leaded compounds will accumulate on any roadside vegetation planted for consumption purposes. Sanitation and hygienic activities of the workmen will also constitute issues of worry, and if not suitably addressed can result to outbreaks of illness such as hepatitis, typhoid, intestinal worms, etc.

Road projects are connected to an increase in sexually transmitted diseases such as STDs and, HIV/AIDS due to the entry of workmen interacting with the indigenous people. Rehabilitation teams can also initiate social disorder among communities along the proposed project road.

5.4.2 Impacts during Maintenance Phase

5.4.2.1 Positive Impacts

The affected communities living along the selected road networks and surrounding areas will reap dividends from the rehabilitated roads. Some of these will include;

- The road network rehabilitation will lead to improvement in the living conditions in the existing trading centres and residential areas in terms of good access roads to eateries, recreation centers, housing, water and sanitation facilities etc;
- Business opportunities will, particularly in centres located along the roads, thrive due to the potential increase demand for vital commodities and services such as food, accommodation and construction materials.
- There will also be the need to sustain the road during the maintenance phase. This will enhance the lives of the affected communities as this will generate employment to the locals who will be occupied in sweeping the travelled surface, painting of kerbs, clearing of drains and culverts, repairing of pot holes, clearing of bushes along the road profile, repair of transportation vehicles etc.

5.5 Summary of Proposed Project Impacts

The summary of the potential impacts of the proposed SEEFOR road rehabilitation and maintenance activities in Sapele, Delta State is shown in Table 5.4 below.

Table 5.4: Summary of Proposed Project Impacts

Impacts	Rehabilitation		Maintenance		Remarks
Soil erosion	Ltm	Rs	Ltm	Rs	• Earthworks during upgrading works and excavation of gravel pits, poor drainage and construction of deviations will have an impact on soil erosion, which may continue after rehabilitation. • Integrating soil conservation measures and accurate drainage facilities during rehabilitation would mitigate impacts during maintenance. • During operation, maintenance of structures would also avert soil erosion.
Water resources	Sc/ Stm	Rs		Rs	• The increased demand for water during rehabilitation will be a challenge. • Conversely, during maintenance, the water challenges could be negligible if extra sources are developed for wetting, to be transferred to the community upon completion of the activities e.g. Boreholes, tap water and shallow wells established during road rehabilitation works.
Employment Opportunities	Stm/ Tr		Ltm		• The local communities will benefit from temporary employment during rehabilitation and permanent during maintenance e.g sweeping of road surface. • There will also be an increase in business ventures due to potential demand of vital commodities like food by workers and accommodation • This will have an optimistic impact on the local economy.
Vegetation	Pn	Irs	Zi		• Clearing of the vegetation will be necessary during rehabilitation in some sections of selected roads. • Clearing activities could push soil erosion. • Clearing could also devastate habits
Public Health	Stm/ Sc	Irs	Stm/P n	Irs	• Workers on road projects and truck drivers are generally allied with careless sexual behaviour that could result to the spread of sexually transmitted diseases. • Awareness campaigns in centres and at the places would assist in mitigating such a problem.

Impacts	Rehabilitation		Maintenance		Remarks
					• Increased dust, noise and air pollution during rehabilitation and maintenance containing leaded exhaust fumes levels would impact on public health.
Workmen Induced Activities	Stm/ Lmt	Rs	Zn		• There will be likely pressure on the obtainable local resources such as water, waste, and cost of living. Disposal of solid waste and sanitation problems are probable to be issues of concern. • Workers would be preferably located at appropriate urban centres. • There will be potential increase in business ventures due to the workforce along the roads in Asaba.
Forests					• Forests on the roadways will be affected by the rehabilitation of the selected roads. • This is inevitable.
Loss of Land	Tr/St m	Rn	Zn		• Deviations would be created resulting temporary loss of land in some places if it goes beyond the road reserve along the affected roads.
Material Sources	Pn	Irs			• Adverse impacts such as soil erosion, loss of crop, low productivity, hazards to children and water accumulating in the pits providing a breeding ground for mosquitoes may result in drainage, pits and quarries that are not reinstated.
Traffic Congestion	Trm	Rs	Trm/L t	Rs	• The rehabilitation of the roads will lead to traffic gridlock and, thus, would require careful management
Pollution: Air, Dust	Tr/Lt m	Irs	Pn/Lt m	Irs	• There will be air, dust and noise pollution during rehabilitation but this will be short-term in nature. Blasting of rock outcrops where necessary. Oil wastes however will have permanent effect. Debris in drains collectors and watercourses will increase due to the rehabilitation. During maintenance, air and dust pollution, and debris will be pronounced and will be a problem during maintenance phase.

Impacts	Rehabilitation		Maintenance		Remarks
Waste Generation	Tr	Rs	Tr	Rs	• Different types of waste could be generated from the rehabilitation works and the workers camps
Noise	Tr/Ltm	Irs	Pn/Ltm	Irs	• The civil works would generate noise that could be in excess of acceptable limit
Workers' Camp	Tr	Rs	Tr	Rs	• The creation of camps for the workers could lead to the generation of waste and tension with the host community
Borrow pits	Tr	Rs	Tr	Rs	• Laterite and granite that would be required for the for the rehabilitation have to be sourced and could lead to adverse environmental impacts

CHAPTER SIX

6.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This chapter deals with the Environmental and Social Management Plan (ESMP) for the Delta State SEEFOR proposed roads rehabilitation and maintenance at Sapele in Sapele Local Government Area (LGA) of the State. It presents the outlines for mitigation measures to address the adverse impacts described in the previous chapter. Furthermore, the chapter outlines the institutional responsibilities and accountabilities that will ensure that all the provisions are implemented under thorough supervision. Finally, the cost implication of all the identified approaches is also detailed as appropriate to the proposed roads works.

6.1 Mitigation Measures

To mitigate the major potential negative environmental and social impacts discussed in the previous chapter (Chapter Five), mitigation measures were examined subsequent sections of this report. The mitigation measures will therefore be analogous to the proposed SEEFOR project activities in Sapele, Delta State. These are discoursed as follows:

6.1.1 Mitigation Measures Prior to the Rehabilitation Phase

The mitigation measures for the adverse impacts of the proposed SEEFOR project in Sapele at the pre-rehabilitation phase, especially before the start of civil works, are examined in this sub-section. Basically, this phase is concerned with the groundwork that precedes the actual rehabilitation and developmental works in the selected roads for rehabilitation and maintenance in Sapele. In this regard, the key matter of logical significance is communities' awareness of the proposed project, particularly along the affected corridors. These issues are examined in this context are as follows:

6.1.1.1 Land Acquisition (Right of Way) along the Proposed Project Roads

The proposed development will not lead to potentially displacement of people within the road alignment. However, petty traders along the road alignment may need to move away

especially during construction. All affected persons must be compensated adequately, considering who may have to be relocated to different location. The following will be done;

- Appropriate identification and mapping of the PAPs (Project Affected Persons),
- logistical provision for resettling the people so that they can move on with their livelihood

(see Table 6.1).

6.1.1.2 Community Awareness of the Proposed project

It is not uncommon for the project affected communities to have diverse perceptions of a given developmental project in their communities. The different perceptions may however give the proposed project activities a negative impression if poorly managed. Negative impressions are usually as a result of peoples' apprehended indifferent approach on the part of the project officials or as a result of previous experiences by the community on similar projects. In such situations, there are applicable steps to be taken as mitigation measures to checkmate any distrust on the authenticity of such proposed project (see Table 6.1).

6.1.2 Mitigation Measures at the Rehabilitation Phase

Undoubtedly, the civil works at the proposed SEEFOR project in Sapele, Delta State will have diverse impacts environmentally and socially. These potential impacts are liable to traverse various components of the environment. This, therefore, necessitates proper mitigation measures. The mitigation measures proffered will guide the governmental MDAs (State Ministries, Departments and Agencies) appropriately. The acknowledged mitigation measures are depicted in respect of the MDAs.

6.1.2.1 Mitigation Measures for Potential Environmental Impact of the Project

Impacts on Soil: The potential soil impacts will appear from different rehabilitation activities, especially, engineering activities involving excavation, grading, compaction, filling, and others which can distress the edaphic environment negatively. The identified mitigation measures on soil impacts are depicted in Table 6.2.

Waste Management: Road rehabilitation activities usually produce solid wastes and the SEEFOR project will not be an exception. Solid waste will be treated and managed circumspectly to ensure a safe and environmentally-fitting conditions. Wastes from rehabilitation activities will be reused for other in-situ purposes. Mitigation measures for in situ waste during the rehabilitation phase of SEEFOR project in Sapele are presented in Table 6.2.

Likelihood of Resettlement Plan: This has to do with the period of resettlement, especially the need to create the 'Right of Way' at the selected roads. The potentiality of being left out, the right to use of land by local people for either economic related activities or other purposes such as Kiosk, markets, agriculture, social purposes would have to be well-managed.

Drains Collectors: This usually demands geomorphological and hydrological study and civil engineering works to ensure effective and efficient drainage system. This is necessitated by the sensitive nature of the proposed SEEFOR project area and to avoid the flooding and erosion malaise during occasional heavy downpour. Improper channelization could give way to the aforementioned environmental issues. Detailed proposed measures are given in Table 6.2 to show how the negative impacts of improper channelization can be mitigated.

Potential Air Quality Issues: Issues of air quality will transpire due to various rehabilitation activities like mobilisation of instruments, earthworks, landscaping, filling, excavations, and emission from vehicles, fumes, dust from road, etc. In this regard, the mitigation measures depicted in Table 6.2 will be considered.

Water Resources and Drainage Issues: Changes to the hydrological regime with respect to rehabilitation of drainage system and de-silting will be considered as part of the road design through the construction of culverts so that flow in the rivers and streams is unimpeded. Also, an improved drainage along the SEEFOR selected roads project through side drains will be ensured. These may be lined, and may necessitate cascades to sever the impact of water flow, especially in sections with gradients greater than 4%.

These features will be suitably designed and recurrently maintained to avert runoff from accumulating by the side of the road. It will also be designed to ensure that water that is drained off the road does not create waterlog. It must be designed so that, and that siltation of the structures does not occur. Safe final disposal and self-cleaning are indispensable components in scheming drainage structures. In some cases, the rehabilitation of lined drains may be essential to ease the safe discharge of runoff to the final receiver body. The mitigation measures for water and drainage issues are presented in Table 6.2.

Potential Deviations: It is not inconceivable that the rehabilitations may include deviations from the original alignment of the road. There might be a few section that might result in working outside the original alignment but should be within the right of way of the road. As a condition of contract, vegetation removed for the purposes of the deviation, will be replaced when the road works are accomplished and the deviation discontinues will be used instead. After upgrading of works, the deviation would be dismantled, punctured and re-vegetated.

Consideration of Visual Enhancement: A well-designed road conforms to its surrounding as it reflects the principles of regional landscape. These principles will be employed whether or not the area being deliberated is one of exceptional physical beauty (refer to Roads and the Environment book: A Handbook). Vegetation cover such as indigenous trees and shrubs will be planted along the road reserve especially. This will improve the ornamentation of the selected roads. Communities who reside next to the selected road reserve will not be discouraged from involving in this exercise to forestall the uprooting of the plants and planting them on their own farms or using the original trees as charcoal.

Once road works of the selected roads are completed, the Contractor will ensure that the landscape is reinstated as much as achievable to its original outward appearance. Restoring and re-planning gravel pits and deviations will negate or reduce the visual interruption that resulted from excavation and clearing works.

Table 6.1: Mitigation Measures Prior to Rehabilitation Phase

S/N	Environmental and social impacts	Implied LOT	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
1	Communities' perceptions of the SEEFOR project	LOT 1	Not Applicable		
		LOT 2	Not Applicable		
		LOT 3	1. Apt awareness of the all communities and Executive monitoring committees on the decisive vistas of the Sapele SEEFOR project. 2. Residents and communities' members will also be enlightened and informed on the need to support the project as well as the virtues of the road project activities. 3. The affected communities will be enlisted using English and preferably local languages ease understanding as well as to cover all areas as much as possible. 4. Prospects and challenges of the SEEFOR road project will be covered so as to establish a common ground for settling issues.	1. Sensitization strategies will include primal members of the affected communities with adeptness in social communication. 2. The point of information dissemination will be made public with ease access by the affected members. 3. Posters, notices and signboards will be reared at strategic places to disseminate information to locals.	• The Contractor • Delta State SEEFOR-SPCU • Delta State Ministries, Departments and Agencies (Information, Physical Planning and Urban Development) • Community Based Monitoring Committee
		LOT 4	1. Apt awareness of the all communities and Executive monitoring committees on the decisive vistas of the Sapele SEEFOR project. 2. Residents and communities' members will also be enlightened and informed on the need to support the project as well as the virtues of the road project activities. 3. The affected communities will be enlisted using English and preferably local languages ease understanding as well as to cover all areas as much as possible. 4. Prospects and challenges of the SEEFOR road project will be covered so as to establish	1. Sensitization strategies will include primal members of the affected communities with adeptness in social communication. 2. The point of information dissemination will be made public with ease access by the affected members. 3. Posters, notices and signboards will be reared at strategic places to disseminate information to locals.	• The Contractor • Delta State SEEFOR-SPCU • Delta State Ministries, Departments and Agencies (Information, Physical Planning and Urban Development) • Community Based Monitoring

S/N	Environmental and social impacts	Implied LOT	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			a common ground for settling issues.		Committee

Table 6.2: Mitigation Measures for the Environmental Impacts during the Rehabilitation Phase

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
1	LOT 1	Not Applicable			
	LOT 2	Not Applicable			
	LOT 3	Proposed SEEFOR project impacts on Soil during various rehabilitation activities such as patching of potholes, de-silting, etc.	1. Where applicable, erosion control measures such as water bars, gabions, straw bales, and re-vegetation will be implemented in affected roads side sections. 2. Appropriate environmental designs that recognise adverse soil impacts will be considered and implemented to deflected damages that may arise during de-silting. 3. Proper channelization to avoid erosion and flooding.	1. Ensure that erosion control measures for the Sapele SEEFOR project are put in place at the proper time at the rehabilitation phase. 2. Planting of native trees will be encouraged along the road. 3. Focalised environmental designs will be implemented.	• The Engineer, • The Contractor, • Federal SEEFOR-NPCU, Relevant Delta State Ministries, • Departments and Agencies, Safeguards Officers of Delta State SEEFOR, • Federal Ministry of Environment (FEnv), • NESREA
	LOT 4	Proposed SEEFOR project impacts on Soil during various rehabilitation activities such as patching of potholes, de-	1. Where applicable, erosion control measures such as water bars, gabions, straw bales, and re-vegetation will be implemented in affected roads side sections. 2. Appropriate environmental designs that recognise adverse soil impacts will be considered and implemented to deflected damages that may arise during de-silting.	1. Ensure that erosion control measures for the Sapele SEEFOR project are put in place at the proper time at the rehabilitation phase. 2. Planting of native trees will be encouraged along the road. 3. Focalised environmental	• The Engineer, • The Contractor, • Federal SEEFOR-NPCU, Relevant Delta State Ministries, • Departments and

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
		silting, etc.	3. Proper channelization to avoid erosion and flooding.	designs will be implemented.	Agencies, Safeguards Officers of Delta State SEEFOR, • Federal Ministry of Environment (FEnv), • NESREA
2	LOT 1	Not Applicable			
	LOT 2	Not Applicable			
	LOT 3	Waste Management	1. Waste generated at project sites and camps are the responsibility of the contractors. Wastes generated will be segregated, kept in bins with lids, evacuated and disposed of at government approved sites for such wastes 2. Proper measures will be considered to guarantee adequate waste management manner. 3. Windblown materials will be cautioned from the waste disposal site. 4. Solid waste dumped site will be covered as quickly as possible 5. With top priority given, waste from construction and rehabilitation activities will recycled and reused 6. Wastewater from cleaning of equipment and other civil works will not be discharged into water bodies, instead, will be collected and treated.	1. The waste management officers will be invested to verify suitable management approach of solid waste. 2. Adequately and sustainably, predetermined waste sites will be managed. 3. The use of recyclable products for either individual or general construction or rehabilitation purposes will be considered. 4. The environment will be kept clean all the time.	• The Engineer • The Contractor • Delta State SEEFOR-SPCU • Federal SEEFOR-NPCU, • Delta State Ministries, Departments and Agencies (Environment and Forestry) • Safeguards Officers of Delta State SEEFOR
	LOT 4	Waste Management	1. Waste generated at project sites and camps are the responsibility of the contractors. Wastes generated will be segregated, kept in	1. The waste management officers will be invested to verify suitable management	• The Engineer • The Contractor • Delta State

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			bins with lids, evacuated and disposed of at government approved sites for such wastes 2. Proper measures will be considered to guarantee adequate waste management manner. 3. Windblown materials will be cautioned from the waste disposal site. 4. Solid waste dumped site will be covered as quickly as possible 5. With top priority given, waste from construction and rehabilitation activities will recycled and reused 6. Wastewater from cleaning of equipment and other civil works will not be discharged into water bodies, instead, will be collected and treated.	approach of solid waste. 2. Adequately and sustainably, predetermined waste sites will be managed. 3. The use of recyclable products for either individual or general construction or rehabilitation purposes will be considered. 4. The environment will be kept clean all the time.	SEEFOR-SPCU • Federal SEEFOR-NPCU, • Delta State Ministries, Departments and Agencies (Environment and Forestry) • Safeguards Officers of Delta State SEEFOR
3	LOT 1 Land use challenges	Not Applicable			
	LOT 2	Not Applicable			
	LOT 3	Not Applicable			•
	LOT 4	Not Applicable			•
4	LOT 1	Channelization of floodwaters (Drains Collectors)	1. Good drainage system practices will be adopted and implemented. 2. Definition and delineation of the drainage system based on hydrological characteristics of the area will be conducted. 3. Adequate provision of drainage system and	1. Drainage system will be constructed according to the specifications. 2. Ensure the defined boundaries are identified and marked out for easy	• The Engineer • The Contractor • Delta State SEEFOR-SPCU • Federal SEEFOR-NPCU,

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			bio-engineering techniques of using trees as ecological buffer will be implemented to minimize the incidents of flooding and erosion problems along the selected road network.	classification. 3. Easy and ecologically engineering techniques are adopted along all selected roads in Sapele by SEEFOR.	• Delta State Ministry of Environment, • Delta State SEEFOR-SPCU
	LOT 2	Channelization of floodwaters (Drains Collectors)	1. Good drainage system practices will be adopted and implemented. 2. Definition and delineation of the drainage system based on hydrological characteristics of the area will be conducted. 3. Adequate provision of drainage system and bio-engineering techniques of using trees as ecological buffer will be implemented to minimize the incidents of flooding and erosion problems along the selected road network.	1. Drainage system will be constructed according to the specifications. 2. Ensure the defined boundaries are identified and marked out for easy classification. 3. Easy and ecologically engineering techniques are adopted along all selected roads in Sapele by SEEFOR.	• The Engineer • The Contractor • Delta State SEEFOR-SPCU • Federal SEEFOR-NPCU, • Delta State Ministry of Environment, • Delta State SEEFOR-SPCU
	LOT 3	Channelization of floodwaters (Drains Collectors)	1. Good drainage system practices will be adopted and implemented. 2. Definition and delineation of the drainage system based on hydrological characteristics of the area will be conducted. 3. Adequate provision of drainage system and bio-engineering techniques of using trees as ecological buffer will be implemented to minimize the incidents of flooding and erosion problems along the selected road network.	1. Drainage system will be constructed according to the specifications. 2. Ensure the defined boundaries are identified and marked out for easy classification. 3. Easy and ecologically engineering techniques are adopted along all selected roads in Sapele by SEEFOR.	• The Engineer • The Contractor • Delta State SEEFOR-SPCU • Federal SEEFOR-NPCU, • Delta State Ministry of Environment, • Delta State SEEFOR-SPCU
	LOT 4	Channelization of floodwaters (Drains	1. Good drainage system practices will be adopted and implemented. 2. Definition and delineation of the drainage	1. Drainage system will be constructed according to the specifications.	• The Engineer • The Contractor • Delta State

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
		Collectors)	system based on hydrological characteristics of the area will be conducted. 3. Adequate provision of drainage system and bio-engineering techniques of using trees as ecological buffer will be implemented to minimize the incidents of flooding and erosion problems along the selected road network.	2. Ensure the defined boundaries are identified and marked out for easy classification. 3. Easy and ecologically engineering techniques are adopted along all selected roads in Sapele by SEEFOR.	SEEFOR-SPCU • Federal SEEFOR-NPCU, • Delta State Ministry of Environment, • Delta State SEEFOR-SPCU
6	LOT 1	Air quality Challenges	1. Dust suppression technique will be considered to reduce airborne particulate matter emanate from the construction activities. 2. Routine watering of the construction sites and access roads, especially Earth roads will keep the dust level down. 3. Provision of breathing protection masks for employees and other task-specific Personal Protective Equipment (PPE) will be prioritised. 4. Reduce travel distances by ensuring that workers reside close to the project sites 5. Also, vehicles and machineries will comply with international standards for exhaust emission.	1. Adequate inspection for adherence to safety issues. 2. Guarantee that all selected roads have trees planted along the corridors. 3. Guarantee that road signs are properly placed along the road corridors. 4. Ensure that speed limits are rigorously adhered by. 5. Ensure that vehicles are road worthy to reduce emission when driven along the roads. 6. Ensure that drivers comply with predetermined speed limits.	• The Engineer • The Contractor • Delta State SEEFOR-SPCU • Federal SEEFOR-NPCU, • Delta State Ministry of Environment, • Delta State SEEFOR-SPCU
	LOT 2	Air quality Challenges	1. Dust suppression technique will be considered to reduce airborne particulate matter emanate from the construction activities. 2. Routine watering of the construction sites	1. Adequate inspection for adherence to safety issues. 2. Guarantee that all selected roads have trees planted along the corridors.	• The Engineer • The Contractor • Delta State SEEFOR-SPCU • Federal SEEFOR-

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			and access roads, especially Earth roads will keep the dust level down. 3. Provision of breathing protection masks for employees and other task-specific Personal Protective Equipment (PPE) will be prioritised. 4. Reduce travel distances by ensuring that workers reside close to the project sites 5. Also, vehicles and machineries will comply with international standards for exhaust emission.	3. Guarantee that road signs are properly placed along the road corridors. 4. Ensure that speed limits are rigorously adhered by. 5. Ensure that vehicles are road worthy to reduce emission when driven along the roads. 6. Ensure that drivers comply with predetermined speed limits.	NPCU, • Delta State Ministry of Environment, • Delta State SEEFOR-SPCU
	LOT 3	Air quality Challenges	1. Dust suppression technique will be considered to reduce airborne particulate matter emanate from the construction activities. 2. Routine watering of the construction sites and access roads, especially Earth roads will keep the dust level down. 3. Provision of breathing protection masks for employees and other task-specific Personal Protective Equipment (PPE) will be prioritised. 4. Reduce travel distances by ensuring that workers reside close to the project sites 5. Also, vehicles and machineries will comply with international standards for exhaust emission.	1. Adequate inspection for adherence to safety issues. 2. Guarantee that all selected roads have trees planted along the corridors. 3. Guarantee that road signs are properly placed along the road corridors. 4. Ensure that speed limits are rigorously adhered by. 5. Ensure that vehicles are road worthy to reduce emission when driven along the roads. 6. Ensure that drivers comply with predetermined speed limits.	• The Engineer • The Contractor • Delta State SEEFOR- SPCU • Federal SEEFOR-NPCU, • Delta State Ministry of Environment, • Delta State SEEFOR-SPCU
	LOT 4	Air quality	1. Dust suppression technique will be	1. Adequate inspection for	• The Engineer

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
		Challenges	considered to reduce airborne particulate matter emanate from the construction activities. 2. Routine watering of the construction sites and access roads, especially Earth roads will keep the dust level down. 3. Provision of breathing protection masks for employees and other task-specific Personal Protective Equipment (PPE) will be prioritised. 4. Reduce travel distances by ensuring that workers reside close to the project sites 5. Also, vehicles and machineries will comply with international standards for exhaust emission.	adherence to safety issues. 2. Guarantee that all selected roads have trees planted along the corridors. 3. Guarantee that road signs are properly placed along the road corridors. 4. Ensure that speed limits are rigorously adhered by. 5. Ensure that vehicles are road worthy to reduce emission when driven along the roads. 6. Ensure that drivers comply with predetermined speed limits.	• The Contractor • Delta State SEEFOR- SPCU • Federal SEEFOR-NPCU, • Delta State Ministry of Environment, • Delta State SEEFOR-SPCU
7	LOT 1	Water Resources Management	1. Provision of mobile toilet facilities for the workforce will be maintained, emptied daily and disposed of at approved sites regularly. 2. Sewage will be composted in compost bin (mixtures of sewage, straws and hays), which will be utilised as source of fertilizer for the community, by recycling of sewage waste. 3. The Contractor will make sure that suitable storage facilities are supplied at worksites. They will be provided with leak proof and fitted round with bunds to avert seepage. 4. Development and accomplishment of appropriate Waste Management Plans (WMPs) by the Contractor (s) will be	1. Ensure that suitable waste management practices are adopted. 2. Obedience to the values of safe and clean environment should be considered. 3. Road users will be prepared to study the mitigation measures. 4. A clean and safe environment standard will be the guideline for all workers.	• The Engineer • The Contractor • Delta State SEEFOR-SPCU, Federal SEEFOR-NPCU, Delta State Ministry of Environment • Safeguards Officers.

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			prioritised.		
	LOT 2	Water Resources Management	1. Provision of mobile toilet facilities for the workforce will be maintained, emptied daily and disposed of at approved sites regularly. 2. Sewage will be composted in compost bin (mixtures of sewage, straws and hays), which will be utilised as source of fertilizer for the community, by recycling of sewage waste. 3. The Contractor will make sure that suitable storage facilities are supplied at worksites. They will be provided with leak proof and fitted round with bunds to avert seepage. 4. Development and accomplishment of appropriate Waste Management Plans (WMPs) by the Contractor (s) will be prioritised.	1. Ensure that suitable waste management practices are adopted. 2. Obedience to the values of safe and clean environment should be considered. 3. Road users will be prepared to study the mitigation measures. 4. A clean and safe environment standard will be the guideline for all workers.	• The Engineer • The Contractor • Delta State SEEFOR-SPCU, Federal SEEFOR-NPCU, Delta State Ministry of Environment • Safeguards Officers.
	LOT 3	Water Resources Management	1. Provision of mobile toilet facilities for the workforce will be maintained, emptied daily and disposed of at approved sites regularly. 2. Sewage will be composted in compost bin (mixtures of sewage, straws and hays), which will be utilised as source of fertilizer for the community, by recycling of sewage waste. 3. The Contractor will make sure that suitable storage facilities are supplied at worksites. They will be provided with leak proof and fitted round with bunds to avert seepage. 4. Development and accomplishment of appropriate Waste Management Plans (WMPs) by the Contractor (s) will be	1. Ensure that suitable waste management practices are adopted. 2. Obedience to the values of safe and clean environment should be considered. 3. Road users will be prepared to study the mitigation measures. 4. A clean and safe environment standard will be the guideline for all workers.	• The Engineer • The Contractor • Delta State SEEFOR-SPCU, Federal SEEFOR-NPCU, Delta State Ministry of Environment • Safeguards Officers.

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			prioritised.		
	LOT 4	Water Resources Management	1. Provision of mobile toilet facilities for the workforce will be maintained, emptied daily and disposed of at approved sites regularly. 2. Sewage will be composted in compost bin (mixtures of sewage, straws and hays), which will be utilised as source of fertilizer for the community, by recycling of sewage waste. 3. The Contractor will make sure that suitable storage facilities are supplied at worksites. They will be provided with leak proof and fitted round with bunds to avert seepage. 4. Development and accomplishment of appropriate Waste Management Plans (WMPs) by the Contractor (s) will be prioritised.	1. Ensure that suitable waste management practices are adopted. 2. Obedience to the values of safe and clean environment should be considered. 3. Road users will be prepared to study the mitigation measures. 4. A clean and safe environment standard will be the guideline for all workers.	• The Engineer • The Contractor • Delta State SEEFOR-SPCU, Federal SEEFOR-NPCU, Delta State Ministry of Environment • Safeguards Officers.
8	LOT 1	Enhanced sedimentation and runoff	1. Adequate examination of the project sites will be required. 2. Constructions such as like dykes, sediments basins will be conceived in order to redirect the flow of sediments. 3. Define drainage system and pollutants of concern, and carry out resource inventory and information analysis. 4. Classify susceptible areas in order to guard surface water and check non-point source pollution along the affected selected roads by SEEFOR.	1. Ensure that the predetermined water flow and safe environment intents are bonded to in the construction phases. 2. Heavy flow of water during rain will be proscribed using the specified construction guidelines. 3. Drainage system and categories as designed will form the basis of construction to ease the velocity of water flow.	• The Engineer • The Contractor • Delta State SEEFOR-SPCU, Federal SEEFOR-NPCU, Delta State Ministry of Environment • Safeguards Officers of Delta State SEEFOR, • Federal Ministry of Environment (FEnv), NESREA

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
				4. Ensure that susceptible areas along the selected corridors mostly downslope are given top precedence	
	LOT 2	Enhanced sedimentation and runoff	1. Adequate examination of the project sites will be required. 2. Constructions such as like dykes, sediments basins will be conceived in order to redirect the flow of sediments. 3. Define drainage system and pollutants of concern, and carry out resource inventory and information analysis. 4. Classify susceptible areas in order to guard surface water and check non-point source pollution along the affected selected roads by SEEFOR.	1. Ensure that the predetermined water flow and safe environment intents are bonded to in the construction phases. 2. Heavy flow of water during rain will be proscribed using the specified construction guidelines. 3. Drainage system and categories as designed will form the basis of construction to ease the velocity of water flow. 4. Ensure that susceptible areas along the selected corridors mostly downslope are given top precedence	• The Engineer • The Contractor • Delta State SEEFOR-SPCU, Federal SEEFOR-NPCU, Delta State Ministry of Environment • Safeguards Officers of Delta State SEEFOR, • Federal Ministry of Environment (FEnv), NESREA
	LOT 3	Enhanced sedimentation and runoff	1. Adequate examination of the project sites will be required. 2. Constructions such as like dykes, sediments basins will be conceived in order to redirect the flow of sediments. 3. Define drainage system and pollutants of concern, and carry out resource inventory and information analysis.	1. Ensure that the predetermined water flow and safe environment intents are bonded to in the construction phases. 2. Heavy flow of water during rain will be proscribed using the specified construction	• The Engineer • The Contractor • Delta State SEEFOR-SPCU, Federal SEEFOR-NPCU, Delta State Ministry of Environment

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			4. Classify susceptible areas in order to guard surface water and check non-point source pollution along the affected selected roads by SEEFOR.	guidelines. 3. Drainage system and categories as designed will form the basis of construction to ease the velocity of water flow. 4. Ensure that susceptible areas along the selected corridors mostly downslope are given top precedence	• Safeguards Officers of Delta State SEEFOR, • Federal Ministry of Environment (FEnv), NESREA
	LOT 4	Enhanced sedimentation and runoff	1. Adequate examination of the project sites will be required. 2. Constructions such as like dykes, sediments basins will be conceived in order to redirect the flow of sediments. 3. Define drainage system and pollutants of concern, and carry out resource inventory and information analysis. 4. Classify susceptible areas in order to guard surface water and check non-point source pollution along the affected selected roads by SEEFOR.	1. Ensure that the predetermined water flow and safe environment intents are bonded to in the construction phases. 2. Heavy flow of water during rain proscribe using the specified construction guidelines. 3. Drainage system and categories as designed will form the basis of construction to ease the velocity of water flow. 4. Ensure that susceptible areas along the selected corridors mostly downslope are given top precedence	• The Engineer • The Contractor • Delta State SEEFOR-SPCU, Federal SEEFOR-NPCU, Delta State Ministry of Environment • Safeguards Officers of Delta State SEEFOR, • Federal Ministry of Environment (FEnv), NESREA

6.1.2.2 Mitigation Measures for Potential Biological Impacts

Potential Impact on Flora and Fauna: This issue turns up during the procedure of vegetation clearance and other rehabilitation activities. Vulnerability of the plant surfaces to dust mostly during the transportation of materials, sweeping of travelled surface of the road, patching of potholes and movement of vehicles could harm the capability of the plants to produce their foods by obstructing the photosynthesis process.

Besides, most faunas which might have adapted to the ecological niches will be disturbed, particularly barrowing animals such as mammals, reptiles, amphibians and insects. This may possibly result in the development of invasive flora such as weeds coupled with propagation of opportunist species. This feature ought to be treated in collaboration with the Ministry of Forest Resources and SEEFOR officials. Identified mitigation measures in relation to this issue are shown in Table 6.3.

6.1.2.3 Mitigation Measures for Socio-economic Impacts

Road Safety Issues: The selected roads by SEEFOR in Sapele for rehabilitation traversed very high traffic roads. It is therefore important to observe road safety through the use of signs, especially near market centres. The potential dangers this may pose to locals as a result of increase in traffic volumes can be mitigated by installing clear and imposing road signs. This is shown in Table 6.3.

Consideration of Trade Centres: Activities at major market centres as noted along some affected roads and other settlements along the selected project road in Sapele will, as far as this is possible, not be disturbed. People will be aware of anticipated roadwork activities, including the potential dates for commencement and completion of the works. Warning signs where applicable will also be innovated on the approach to markets and settlement areas (See Table 6.4).

Public Health and Occupational Safety: A central canteen for the workforce at nearby the rehabilitation sites is recommended as it would contribute towards the general good health of the workers. Kitchen wastes will be disposed of in an organized manner, at the same time as hygiene will be monitored simultaneously.

Workmen in all the selected roads in Sapele will be furnished with proper protective gear such as nose masks, ear muffs, helmets, overalls, industrial boots, etc., especially during the main rehabilitation activities including blasting and drilling at all the selected roads, while working on the asphalt, and handling tar. These activities will also be extended to the maintenance phase for road maintenance workers. There will be a completely operational First Aid kit and a Health Safety and Environment Officer who has First Aid education and knowledge of safety regulations will be on standby to handle its operations. Likewise, the Contractor will be required to have a workmen's compensation cover.

Moveable toilet facilities will also be provided in all the sites, which will preferably be located erected downslope of potable water sources, and 50 m to 100m from any water body. Communal bathrooms with soak away pits are less polluting alternative, but would be a little more costly.

STDs awareness, that is, Sexually Transmitted Diseases awareness campaigns will be imparted to all workers as well as in the settlements and trading centers in the SEEFOR project area in the affected LGA. Generally, unplanned structures along the project roads will be strictly discouraged, so as to restrain the spread of STDs. This issue will be incorporated in the terms of contract (that is Standard Specification) (see Table 6.5). Also, the contractor will conduct a risk-based assessment of all construction and operations tasks, and provide appropriate safety measures. Also, the Contractor should register with any government hospital or certified private hospital and provide a plan route for emergency situation

6.1.3 Mitigation Measures at Maintenance Phase

This phase will feature air quality issues, noise and vibration, water quality issues, traffic and transportation, health and safety issues etc. and these would be of concerns to the affected residents and maintenance workers during their routine activities. For each of these, as discussed above under public health and occupational safety, there are precise mitigation measures which will curb the identified adverse impacts. These mitigation measures are illustrated in Table 6.6.

- Roadside plants that will be planted in some areas along the selected roads in Sapele with adequate water will act as pollution sink.
- The reduction of emissions that can be accomplished by enhanced engines and quality of vehicular fuel is beyond the scope of this project.
- The design of roads like Sapele/Warri expressway includes noise barriers at locations where the highway passes within a short distance of settlements or sensible receptors (schools/hospitals/churches/mosques).
- Amendment of embankment slopes to prevent entry of polluted water into watercourses.
- Drilling of alternative boreholes, to replace those boreholes to which access by local populations has been effectively blocked, after consultation with affected local communities.
- Water harvesting should be applied as much as probable. As water harvesting involves elaborated knowledge of local micro-conditions, the feasibility of water harvesting at likely locations will be assessed jointly between the supervising engineer and the local communities. Where it is feasible, the indispensable physical works will be integrated in the Contractor's program of works through change orders.

Table 6.3: Mitigation Measures for the Potential Biological Impacts during the Rehabilitation Phase

S/N		Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
1	LOT 1	Potential Impacts on flora and fauna	1. Outline every Site of Special Scientific Interest. 2. Collaborate with relevant MDAs such as the Federal Department of Livestock, Privately-owned wildlife conservation parks, Zoos and Zoological Departments of Universities, for the covering of feasible animals that may be relocated as a result of the rehabilitation. 3. Guarantee that impacted flora species are transferred and raised in available nurseries.	1. Consider an Environmental assessment with interest on the flora and fauna regularly in the areas. 2. Ensure reliable checks on the management of waste. 3. Deter from/avoid the use of chemicals that can harmfully affect the localised flora and fauna	• The Engineer • The Contractor • Delta State SEEFOR-SPCU, • Federal SEEFOR-NPCU, • Delta State Ministry of Environment, • Delta SEEFOR Safeguard Officers, • Federal Ministry of Environment (FEnv), • NESREA
	LOT 2	Potential Impacts on flora and fauna	1. Outline every Site of Special Scientific Interest. 2. Collaborate with relevant MDAs such as the Federal Department of Livestock, Privately-owned wildlife conservation parks, Zoos and Zoological Departments of Universities, for the covering of feasible animals that may be relocated as a result of the rehabilitation. 3. Guarantee that impacted flora species are transferred and raised in available nurseries.	1. Consider an Environmental assessment with interest on the flora and fauna regularly in the areas. 2. Ensure reliable checks on the management of waste. 3. Deter from/avoid the use of chemicals that can harmfully affect the localised flora and fauna	• The Engineer • The Contractor • Delta State SEEFOR-SPCU, • Federal SEEFOR-SPCU, • Delta State Ministry of Environment, • Delta SEEFOR Safeguard Officers, • Federal Ministry of Environment (FEnv), • NESREA

S/N		Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
	LOT 3	Potential Impacts on flora and fauna	1. Outline every Site of Special Scientific Interest. 2. Collaborate with relevant MDAs such as the Federal Department of Livestock, Privately-owned wildlife conservation parks, Zoos and Zoological Departments of Universities, for the covering of feasible animals that may be relocated as a result of the rehabilitation. 3. Guarantee that impacted flora species are transferred and raised in available nurseries.	1. Consider an Environmental assessment with interest on the flora and fauna regularly in the areas. 2. Ensure reliable checks on the management of waste. 3. Deter from/avoid the use of chemicals that can harmfully affect the localised flora and fauna	• The Engineer • The Contractor • Delta State SEEFOR-SPCU, • Federal SEEFOR-NPCU, • Delta State Ministry of Environment, • Delta SEEFOR Safeguard Officers, • Federal Ministry of Environment (FEnv), • NESREA
	LOT 4	Potential Impacts on flora and fauna	1. Outline every Site of Special Scientific Interest. 2. Collaborate with relevant MDAs such as the Federal Department of Livestock, Privately-owned wildlife conservation parks, Zoos and Zoological Departments of Universities, for the covering of feasible animals that may be relocated as a result of the rehabilitation. 3. Guarantee that impacted flora species are transferred and raised in available nurseries.	1. Consider an Environmental assessment with interest on the flora and fauna regularly in the areas. 2. Ensure reliable checks on the management of waste. 3. Deter from/avoid the use of chemicals that can harmfully affect the localised flora and fauna	• The Engineer • The Contractor • Delta State SEEFOR-NPCU, • Federal SEEFOR-NPCU, • Delta State Ministry of Environment, • Delta SEEFOR Safeguard Officers, • Federal Ministry of Environment (FEnv), • NESREA

Table 6.4: Mitigation Measures for the socioeconomic impacts in the Rehabilitation phase

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
1.	LOT 1	Potential Traffic and transportation impact	1. Consider an ideal traffic management plan and apply with regard to safety rules, speed limits, use of road signs and traffic warnings, guidance on driving within speed limits as rehabilitation activities are continuing and equipment are moving, etc. 2. Sensitse the local people and motorists on the need to concur to these rules. 3. A selected area for storages, work depots, campsites, and work sites will be clearly marked for right identification. The location will also be in areas that will not disturb free flow of vehicles. 4. Adverse information on possible road closure through local media – radio and television. Also, large billboards and signage in strategic locations to show the road closure.	1. Operate the traffic management plan by applying local traffic management strategy. 2. Place information on road speed should be put in strategic place along the selected roads. 3. Communicate information on road safety in local language and English for ease of communication.	• The Contractor • Delta State SEEFOR- SPCU • Federal SEEFOR-NPCU, • Delta State Ministry of Transportation and Environment • Safety Officers of the Federal SEEFOR-NPCU, • Safety Officers of Delta State SEEFOR- SPCU
	LOT 2	Potential Traffic and transportation impact	1. Consider an ideal traffic management plan and apply with regard to safety rules, speed limits, use of road signs and traffic warnings, guidance on driving within speed limits as rehabilitation activities are continuing and equipment are moving, etc. 2. Sensitse the local people and motorists on the need to concur to these rules. 3. A selected area for storages, work depots, campsites, and work sites will be clearly	1. Operate the traffic management plan by applying local traffic management strategy. 2. Place information on road speed should be put in strategic place along the selected roads. 3. Communicate information on road safety in local language and English for ease	• The Contractor • Delta State SEEFOR- SPCU • Federal SEEFOR-NPCU, • Delta State Ministry of Transportation and Environment • Safety Officers of the

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			marked for right identification. The location will also be in areas that will not disturb free flow of vehicles. 4. Adverse information on possible road closure through local media – radio and television. Also, large billboards and signage in strategic locations to show the road closure.	of communication.	Federal SEEFOR-NPCU, • Safety Officers of Delta State SEEFOR- NPCU
	LOT 3	Potential Traffic and transportation impact	1. Consider an ideal traffic management plan and apply with regard to safety rules, speed limits, use of road signs and traffic warnings, guidance on driving within speed limits as rehabilitation activities are continuing and equipment are moving, etc. 2. Sensitse the local people and motorists on the need to concur to these rules. 3. A selected area for storages, work depots, campsites, and work sites will be clearly marked for right identification. The location will also be in areas that will not disturb free flow of vehicles. 4. Adverse information on possible road closure through local media – radio and television. Also, large billboards and signage in strategic locations to show the road closure.	1. Operate the traffic management plan by applying local traffic management strategy. 2. Place information on road speed should be put in strategic place along the selected roads. 3. Communicate information on road safety in local language and English for ease of communication.	• The Contractor • Delta State SEEFOR- NPCU • Federal SEEFOR-NPCU, • Delta State Ministry of Transportation and Environment • Safety Officers of the Federal SEEFOR-NPCU, • Safety Officers of Delta State SEEFOR- SPCU
	LOT 4	Potential Traffic and transportation	1. Consider an ideal traffic management plan and apply with regard to safety rules, speed limits, use of road signs and traffic warnings,	1. Operate the traffic management plan by applying local traffic management	• The Contractor • Delta State SEEFOR- SPCU

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
		impact	guidance on driving within speed limits as rehabilitation activities are continuing and equipment are moving, etc. 2. Sensitse the local people and motorists on the need to concur to these rules. 3. A selected area for storages, work depots, campsites, and work sites will be clearly marked for right identification. The location will also be in areas that will not disturb free flow of vehicles. 4. Adverse information on possible road closure through local media – radio and television. Also, large billboards and signage in strategic locations to show the road closure.	strategy. 2. Place information on road speed should be put in strategic place along the selected roads. 3. Communicate information on road safety in local language and English for ease of communication.	• Federal SEEFOR-NPCU, • Delta State Ministry of Transportation and Environment • Safety Officers of the Federal SEEFOR-NPCU, • Safety Officers of Delta State SEEFOR- SPCU
2	LOT 1	Likelihood of Accidents	1. Sensitise and monitor the entire workers on the need to maintain the first rule of civil works which is safety first. 2. Ensure that workers are given health and safety equipment – Personal Protective Equipment (PPE) such as High visibility vest, safety helmets, earplugs, safety glasses, and safety boots, nose cover and, stress on the need to use them all the time. 3. Ensure that suitable signs and barriers are put up along the roads project sections. 4. Standard Operating Procedure (SOP) will be considered	1. Sensitization will be done in clear terms and all workers will appreciate safety rules and regulations. 2. The Standard Operating Procedure (SOP) will be briefed and placed along strategic points along the roads for apposite guidance. 4. Workers will be permitted to work smarty and not late to forestall accidents due to fatigue.	• The Contractor • Delta State SEEFOR-SPCU, • Federal SEEFOR-NPCU, • Delta State Ministry of Transportation and Environment, • Safeguard Officers of Delta State SEEFOR

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
	LOT 2	Likelihood of Accidents	1. Sensitise and monitor the entire workers on the need to maintain the first rule of civil works which is safety first. 2. Ensure that workers are given health and safety equipment – Personal Protective Equipment (PPE) such as High visibility vest, safety helmets, earplugs, safety glasses, and safety boots, nose cover and, stress on the need to use them all the time. 3. Ensure that suitable signs and barriers are put up along the roads project sections. 4. Standard Operating Procedure (SOP) will be considered	1. Sensitization will be done in clear terms and all workers will appreciate safety rules and regulations. 2. The Standard Operating Procedure (SOP) will be briefed and placed along strategic points along the roads for apposite guidance. 4. Workers will be permitted to work smarty and not late to forestall accidents due to fatigue.	• The Contractor • Delta State SEEFOR-SPCU, • Federal SEEFOR-NPCU, • Delta State Ministry of Transportation and Environment, • Safeguard Officers of Delta State SEEFOR
	LOT 3	Likelihood of Accidents	1. Sensitise and monitor the entire workers on the need to maintain the first rule of civil works which is safety first. 2. Ensure that workers are given health and safety equipment – Personal Protective Equipment (PPE) such as High visibility vest, safety helmets, earplugs, safety glasses, and safety boots, nose cover and, stress on the need to use them all the time. 3. Ensure that suitable signs and barriers are put up along the roads project sections. 4. Standard Operating Procedure (SOP) will be considered	1. Sensitization will be done in clear terms and all workers will appreciate safety rules and regulations. 2. The Standard Operating Procedure (SOP) will be briefed and placed along strategic points along the roads for apposite guidance. 4. Workers will be permitted to work smarty and not late to forestall accidents due to fatigue.	• The Contractor • Delta State SEEFOR-SPCU, • Federal SEEFOR-NPCU, • Delta State Ministry of Transportation and Environment, • Safeguard Officers of Delta State SEEFOR
	LOT 4	Likelihood of	1. Sensitise and monitor the entire workers on	1. Sensitization will be done in	• The Contractor

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
		Accidents	the need to maintain the first rule of civil works which is safety first. 2. Ensure that workers are given health and safety equipment – Personal Protective Equipment (PPE) such as High visibility vest, safety helmets, earplugs, safety glasses, and safety boots, nose cover and, stress on the need to use them all the time. 3. Ensure that suitable signs and barriers are put up along the roads project sections. 4. Standard Operating Procedure (SOP) will be considered	clear terms and all workers will appreciate safety rules and regulations. 2. The Standard Operating Procedure (SOP) will be briefed and placed along strategic points along the roads for apposite guidance. 4. Workers will be permitted to work smarty and not late to forestall accidents due to fatigue.	• Delta State SEEFOR-SPCU, • Federal SEEFOR-NPCU, • Delta State Ministry of Transportation and Environment, • Safeguard Officers of Delta State SEEFOR
3	LOT 1	Employment Related Tension/Conflicts	1. Ensure that the project affected communities' members are given priority to reduce any socioeconomic rife from local youths. 2. The temporary residence of workers will be located remotely away from the community particularly away from familiar kin who might not allow rehabilitation activities to	1. Choosing of locals as part of the employees will be based on merit and not any inclinations or any prior suggestions. 2. Appropriate site work duties and safety precautions are considered during civil works by all workers on the sites.	• The Contractor • Delta State SEEFOR-SPCU, • Federal SEEFOR-NPCU, • Delta State Ministry of Transportation and
	LOT 2	Employment Related Tension/Conflicts	1. Ensure that the project affected communities' members are given priority to reduce any socioeconomic rife from local youths. 2. The temporary residence of workers will be located remotely away from the community particularly away from familiar kin who might not allow rehabilitation activities to progress based on project timeline.	1. Choosing of locals as part of the employees will be based on merit and not any inclinations or any prior suggestions. 2. Appropriate site work duties and safety precautions are considered during civil works by all workers on the sites.	• The Contractor • Delta State SEEFOR-SPUC, • Federal SEEFOR-PMU, • Delta State Ministry of Transportation and Environment

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
	LOT 3	Employment Related Tension/Conflicts	1. Ensure that the project affected communities' members are given priority to reduce any socioeconomic rife from local youths. 2. The temporary residence of workers will be located remotely away from the community particularly away from familiar kin who might not allow rehabilitation activities to progress based on project timeline.	1. Choosing of locals as part of the employees will be based on merit and not any inclinations or any prior suggestions. 2. Appropriate site work duties and safety precautions are considered during civil works by all workers on the sites.	• The Contractor • Delta State SEEFOR-SPCU, • Federal SEEFOR-NPCU, • Delta State Ministry of Transportation and Environment
	LOT 4	Employment Related Tension/Conflicts	1. Ensure that the project affected communities' members are given priority to reduce any socioeconomic rife from local youths. 2. The temporary residence of workers will be located remotely away from the community particularly away from familiar kin who might not allow rehabilitation activities to progress based on project timeline.	1. Choosing of locals as part of the employees will be based on merit and not any inclinations or any prior suggestions. 2. Appropriate site work duties and safety precautions are considered during civil works by all workers on the sites.	• The Contractor • Delta State SEEFOR-SPCU, • Federal SEEFOR-NPCU, • Delta State Ministry of Transportation and Environment
4	LOT 1	Aesthetics	1. Appropriate use of engineering practice will be considered with the most excellent accessible road rehabilitation technology which considers the need to keep local aesthetics. 2. Also, an engineering specialist in the field of aesthetics will be engaged as part of the team to ensure that environmentally friendly	1. The use of most excellent technology with environmental safety will be the top priority. 2. The provisions on flora and fauna will be united with the environmental aesthetics so as to have a coordinated provision for the environment.	• The Engineer • Delta State SEEFOR-SPCU, Federal SEEFOR-NPCU, and • other relevant Ministries

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			method is adopted.		
	LOT 2	Aesthetics	1. Appropriate use of engineering practice will be considered with the most excellent accessible road rehabilitation technology which considers the need to keep local aesthetics. 2. Also, an engineering specialist in the field of aesthetics will be engaged as part of the team to ensure that environmentally friendly method is adopted.	1. The use of most excellent technology with environmental safety will be the top priority. 2. The provisions on flora and fauna will be united with the environmental aesthetics so as to have a coordinated provision for the environment.	• The Engineer • Delta State SEEFOR-SPCU, Federal SEEFOR-NPCU, and • other relevant Ministries
	LOT 3	Aesthetics	1. Appropriate use of engineering practice will be considered with the most excellent accessible road rehabilitation technology which considers the need to keep local aesthetics. 2. Also, an engineering specialist in the field of aesthetics will be engaged as part of the team to ensure that environmentally friendly method is adopted.	1. The use of most excellent technology with environmental safety will be the top priority. 2. The provisions on flora and fauna will be united with the environmental aesthetics so as to have a coordinated provision for the environment.	• The Engineer • Delta State SEEFOR-SPCU, Federal SEEFOR-NPCU, and • other relevant Ministries
	LOT 4	Aesthetics	1. Appropriate use of engineering practice will be considered with the most excellent accessible road rehabilitation technology which considers the need to keep local aesthetics. 2. Also, an engineering specialist in the field of aesthetics will be engaged as part of the team to ensure that environmentally friendly method is adopted.	1. The use of most excellent technology with environmental safety will be the top priority. 2. The provisions on flora and fauna will be united with the environmental aesthetics so as to have a coordinated provision for the environment.	• The Engineer • Delta State SEEFOR-SPCU, Federal SEEFOR-NPCU, and • other relevant Ministries

Table 6.5: Mitigation Measures for the public health impacts in the Rehabilitation phase

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
1	LOT 1	HIV/AIDS and STDs	1. Liaise with health focused NGOs and provision of Voluntary Confidential Counseling and Testing on Ebola, AIDS, and STD. Also, place proper referral linkage for Most At Risk Population (MARPS) and already infected people. 2. Conduct medical examinations on new workers and repeat frequently during the term of employment. 3. Ensure that the Contractor has working procedures that control unsafe behaviours amongst personnel, and likely sexual interactions between workers and the affected communities. 4. Instigate assistance for already infected or at risk of STD, and conduct community awareness training. 5. Assist local Blood Transfusion Service in any health facility located within the project area, to enable them inaugurate Ebola and HIV screening for all donors.	1. Provide public health clarification and counseling sessions should be provided via local and English languages. 2. Conduct medical examinations for workers periodically to establish medical strength for the job. 3. Relate work safety with workforce as a key aspect of monitoring workers' health attitude. 4. Assist any member of the workforce infected as soon as it is detected. 5. Conduct well-timed and intervallic counseling for all members of SEEFOR staff.	• The Engineer • The Contractor • Federal SEEFOR-NPCU, • Delta State Ministries Health. • Safeguards Officers of the Federal SEEFOR- NPCU, • Delta State SEEFOR-SPCU • Social Officers of the Federal SEEFOR-NPCU, • Delta State SEEFOR
	LOT 2	HIV/AIDS and STDs	1. Liaise with health focused NGOs and provision of Voluntary Confidential Counseling and Testing on Ebola, AIDS, and STD. Also, place proper referral linkage for Most At Risk Population (MARPS) and already infected people. 2. Conduct medical examinations on new	1. Provide public health clarification and counseling sessions should be provided via local and English languages. 2. Conduct medical examinations for workers	• The Engineer • The Contractor • Federal SEEFOR-NPCU, • Delta State Ministries Health.

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			workers and repeat frequently during the term of employment. 3. Ensure that the Contractor has working procedures that control unsafe behaviours amongst personnel, and likely sexual interactions between workers and the affected communities. 4. Instigate assistance for already infected or at risk of STD, and conduct community awareness training. 5. Assist local Blood Transfusion Service in any health facility located within the project area, to enable them inaugurate Ebola and HIV screening for all donors.	periodically to establish medical strength for the job. 3. Relate work safety with workforce as a key aspect of monitoring workers' health attitude. 4. Assist any member of the workforce infected as soon as it is detected. 5. Conduct well-timed and intervallic counseling for all members of SEEFOR staff.	• Safeguards Officers of the Federal SEEFOR- NPCU, • Delta State SEEFOR-SPCU • Social Officers of the Federal SEEFOR-NPCU, • Delta State SEEFOR
	LOT 3	HIV/AIDS and STDs	1. Liaise with health focused NGOs and provision of Voluntary Confidential Counseling and Testing on Ebola, AIDS, and STD. Also, place proper referral linkage for Most At Risk Population (MARPS) and already infected people. 2. Conduct medical examinations on new workers and repeat frequently during the term of employment. 3. Ensure that the Contractor has working procedures that control unsafe behaviours amongst personnel, and likely sexual interactions between workers and the affected communities. 4. Instigate assistance for already infected or at	1. Provide public health clarification and counseling sessions should be provided via local and English languages. 2. Conduct medical examinations for workers periodically to establish medical strength for the job. 3. Relate work safety with workforce as a key aspect of monitoring workers' health attitude. 4. Assist any member of the workforce infected as soon as	• The Engineer • The Contractor • Federal SEEFOR-NPCU, • Delta State Ministries Health. • Safeguards Officers of the Federal SEEFOR- NPCU, • Delta State SEEFOR-SPCU • Social Officers of the Federal SEEFOR-NPCU, • Delta State SEEFOR

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			risk of STD, and conduct community awareness training. 5. Assist local Blood Transfusion Service in any health facility located within the project area, to enable them inaugurate Ebola and HIV screening for all donors.	it is detected. 5. Conduct well-timed and intervallic counseling for all members of SEEFOR staff.	
	LOT 4	HIV/AIDS and STDs	1. Liaise with health focused NGOs and provision of Voluntary Confidential Counseling and Testing on Ebola, AIDS, and STD. Also, place proper referral linkage for Most At Risk Population (MARPS) and already infected people. 2. Conduct medical examinations on new workers and repeat frequently during the term of employment. 3. Ensure that the Contractor has working procedures that control unsafe behaviours amongst personnel, and likely sexual interactions between workers and the affected communities. 4. Instigate assistance for already infected or at risk of STD, and conduct community awareness training. 5. Assist local Blood Transfusion Service in any health facility located within the project area, to enable them inaugurate Ebola and HIV screening for all donors.	1. Provide public health clarification and counseling sessions should be provided via local and English languages. 2. Conduct medical examinations for workers periodically to establish medical strength for the job. 3. Relate work safety with workforce as a key aspect of monitoring workers' health attitude. 4. Assist any member of the workforce infected as soon as it is detected. 5. Conduct well-timed and intervallic counseling for all members of SEEFOR staff.	• The Engineer • The Contractor • Federal SEEFOR-NPCU, • Delta State Ministries Health. • Safeguards Officers of the Federal SEEFOR- NPCU, • Delta State SEEFOR-SPCU • Social Officers of the Federal SEEFOR-NPCU, • Delta State SEEFOR
2	LOT 1	Waste Generation	1. Waste generated at project sites and camps are the responsibility of the contractors. Waste	1. Consider safety of the environment as top priority of	• The Engineer • The Contractor

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			generated should be segregated, kept in bins with lids, evacuated and disposed of at government approved sites for such wastes. Specifically, there should be provision of appropriate human waste disposal facilities for the rehabilitation workers. 2. Good sanitation covering appropriate waste disposal at its operation and residential accommodations. 3. Contribute in environmental sanitation initiatives in communities where its workers are resided. 4. Contribute on enhancement of the communities' sanitation and public health during the community development programmes. 5. Participation of NGOs and civil societies in waste management and healthcare activities in the area.	all including employed workforce. 2. Protect and maintain the environment. 3. Ensure that wastes are deserted at proper designated sites. 4. Ensure that wastes are not discarded in waterlogged areas, along the selected project area.	• Delta State SEEFOR-SPCU, • Federal SEEFOR-NPCU, • Delta State Ministries Health, • Federal SEEFOR-NPCU, Delta State SEEFOR, • Social Officers of the Federal SEEFOR-NPCU.
	LOT 2	Waste Generation	1. Waste generated at project sites and camps are the responsibility of the contractors. Waste generated should be segregated, kept in bins with lids, evacuated and disposed of at government approved sites for such wastes. Specifically, there should be provision of appropriate human waste disposal facilities for the rehabilitation workers. 2. Good sanitation covering appropriate waste disposal at its operation and residential	1. Consider safety of the environment as top priority of all including employed workforce. 2. Protect and maintain the environment. 3. Ensure that wastes are deserted at proper designated sites. 4. Ensure that wastes are not	• The Engineer • The Contractor • Delta State SEEFOR-SPCU, • Federal SEEFOR-NPCU, • Delta State Ministries Health, • Federal SEEFOR-NPCU, Delta State

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			accommodations. 3. Contribute in environmental sanitation initiatives in communities where its workers are resided. 4. Contribute on enhancement of the communities' sanitation and public health during the community development programmes. 5. Participation of NGOs and civil societies in waste management and healthcare activities in the area.	discarded in waterlogged areas, along the selected project area.	SEEFOR, • Social Officers of the Federal SEEFOR-SPCU.
	LOT 3	Waste Generation	1. Waste generated at project sites and camps are the responsibility of the contractors. Waste generated should be segregated, kept in bins with lids, evacuated and disposed of at government approved sites for such wastes. Specifically, there should be provision of appropriate human waste disposal facilities for the rehabilitation workers. 2. Good sanitation covering appropriate waste disposal at its operation and residential accommodations. 3. Contribute in environmental sanitation initiatives in communities where its workers are resided. 4. Contribute on enhancement of the communities' sanitation and public health during the community development programmes.	1. Consider safety of the environment as top priority of all including employed workforce. 2. Protect and maintain the environment. 3. Ensure that wastes are deserted at proper designated sites. 4. Ensure that wastes are not discarded in waterlogged areas, along the selected project area.	• The Engineer • The Contractor • Delta State SEEFOR-SPUC, • Federal SEEFOR-NPCU, • Delta State Ministries Health, • Federal SEEFOR-NPCU, Delta State SEEFOR, • Social Officers of the Federal SEEFOR-NPCU.

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			5. Participation of NGOs and civil societies in waste management and healthcare activities in the area.		
	LOT 4	Waste Generation	1. Waste generated at project sites and camps are the responsibility of the contractors. Waste generated should be segregated, kept in bins with lids, evacuated and disposed of at government approved sites for such wastes. Specifically, there should be provision of appropriate human waste disposal facilities for the rehabilitation workers. 2. Good sanitation covering appropriate waste disposal at its operation and residential accommodations. 3. Contribute in environmental sanitation initiatives in communities where its workers are resided. 4. Contribute on enhancement of the communities' sanitation and public health during the community development programmes. 5. Participation of NGOs and civil societies in waste management and healthcare activities in the area.	1. Consider safety of the environment as top priority of all including employed workforce. 2. Protect and maintain the environment. 3. Ensure that wastes are deserted at proper designated sites. 4. Ensure that wastes are not discarded in waterlogged areas, along the selected project area.	• The Engineer • The Contractor • Delta State SEEFOR- SPCU, • Federal SEEFOR-NPCU, • Delta State Ministries Health, • Federal SEEFOR-NPCU, Delta State SEEFOR, • Social Officers of the Federal SEEFOR-SPCU.
3	LOT 1	Malaria Incidence	1.Act of dumping waste into the drainage channels should not be adopted 2. Adequate reservoir operation, involve in disease surveillance and insecticide sprays to avert the propagation of the disease vector;	1. Ensure that the environment in the project area is clean and safe. This should be considered as peak priority including the	• The Engineer • The Contractor • Delta State SEEFOR- NPCU • Federal SEEFOR-

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			perform routine medical check-ups and improvement of medical facilities should be top priority. 3. Programmes to enhance existing medical and health services in the local communities should be endorsed by the Project. This covers Mosquito control programmes such as circulation of insecticide treated nets to the communities. 4. Contribute in environmental sanitation initiatives in the project affected communities where its workforce is domiciled. 5. Maintenance of excellent drainage system along all selected roads to avert the creation of dormant water bodies.	members of the labour force. 2. Adequate sanitation and cleaning of the workplaces where water is being used. 3. Ensure that solid waste is discarded at proper designated sites. 4. Avoid the usage of unclean water for personal use. Clean water must be used for all rehabilitation activities. 5. Labour force residence should be kept clean and safe.	NPCU, • Delta State Ministries Health. • Federal SEEFOR-NPCU, • Delta State SEEFOR-SPCU • Social Officers of the Federal SEEFOR-NPCU, • Delta State SEEFOR-SPCU
	LOT 2	Malaria Incidence	1.Act of dumping waste into the drainage channels should not be adopted 2. Adequate reservoir operation, involve in disease surveillance and insecticide sprays to avert the propagation of the disease vector; perform routine medical check-ups and improvement of medical facilities should be top priority. 3. Programmes to enhance existing medical and health services in the local communities should be endorsed by the Project. This covers Mosquito control programmes such as circulation of insecticide treated nets to the communities.	1. Ensure that the environment in the project area is clean and safe. This should be considered as peak priority including the members of the labour force. 2. Adequate sanitation and cleaning of the workplaces where water is being used. 3. Ensure that solid waste is discarded at proper designated sites. 4. Avoid the usage of unclean water for personal use. Clean	• The Engineer • The Contractor • Delta State SEEFOR- NPCU • Federal SEEFOR-NPCU, • Delta State Ministries Health. • Federal SEEFOR-NPCU, • Delta State SEEFOR-SPCU • Social Officers of the Federal SEEFOR-

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			4. Contribute in environmental sanitation initiatives in the project affected communities where its workforce is domiciled. 5. Maintenance of excellent drainage system along all selected roads to avert the creation of dormant water bodies.	water must be used for all rehabilitation activities. 5. Labour force residence should be kept clean and safe.	NPCU, • Delta State SEEFOR- SPCU
	LOT 3	Malaria Incidence	1.Act of dumping waste into the drainage channels should not be adopted 2. Adequate reservoir operation, involve in disease surveillance and insecticide sprays to avert the propagation of the disease vector; perform routine medical check-ups and improvement of medical facilities should be top priority. 3. Programmes to enhance existing medical and health services in the local communities should be endorsed by the Project. This covers Mosquito control programmes such as circulation of insecticide treated nets to the communities. 4. Contribute in environmental sanitation initiatives in the project affected communities where its workforce is domiciled. 5. Maintenance of excellent drainage system along all selected roads to avert the creation of dormant water bodies.	1. Ensure that the environment in the project area is clean and safe. This should be considered as peak priority including the members of the labour force. 2. Adequate sanitation and cleaning of the workplaces where water is being used. 3. Ensure that solid waste is discarded at proper designated sites. 4. Avoid the usage of unclean water for personal use. Clean water must be used for all rehabilitation activities. 5. Labour force residence should be kept clean and safe.	• The Engineer • The Contractor • Delta State SEEFOR- SPCU • Federal SEEFOR-NPCU, • Delta State Ministries Health. • Federal SEEFOR-NPCU, • Delta State SEEFOR-SPCU • Social Officers of the Federal SEEFOR-NPCU, • Delta State SEEFOR-SPCU
	LOT 4	Malaria Incidence	1.Act of dumping waste into the drainage channels should not be adopted 2. Adequate reservoir operation, involve in	1. Ensure that the environment in the project area is clean and safe. This	• The Engineer • The Contractor • Delta State

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			disease surveillance and insecticide sprays to avert the propagation of the disease vector; perform routine medical check-ups and improvement of medical facilities should be top priority. 3. Programmes to enhance existing medical and health services in the local communities should be endorsed by the Project. This covers Mosquito control programmes such as circulation of insecticide treated nets to the communities. 4. Contribute in environmental sanitation initiatives in the project affected communities where its workforce is domiciled. 5. Maintenance of excellent drainage system along all selected roads to avert the creation of dormant water bodies.	should be considered as peak priority including the members of the labour force. 2. Adequate sanitation and cleaning of the workplaces where water is being used. 3. Ensure that solid waste is discarded at proper designated sites. 4. Avoid the usage of unclean water for personal use. Clean water must be used for all rehabilitation activities. 5. Labour force residence should be kept clean and safe.	SEEFOR- SPCU • Federal SEEFOR-NPCU, • Delta State Ministries Health. • Federal SEEFOR-NPCU, • Delta State SEEFOR-SPCU • Social Officers of the Federal SEEFOR-NPCU, • Delta State SEEFOR-SPCU

Table 6.6: Mitigation Measures for Maintenance phase

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
1	LOT 1	General maintenance operations (including borrow pits and Workers/Contract	1. Indiscriminate activities of the residents and others members of the communities such as waste dumps on the roads and drainage channels should be outlawed. 2. Maintenance operations should be structured according to environmental safety guidelines of	1. The community should involve in safe and clean environment. 2. Ensure that wastes are dumped in designated waste dumps not the roads.	• Delta State Ministry of: • Environment • Forestry • Transport • Works and Infrastructure • The Nigerian Police

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
		ors Camps	the Delta State Environmental Protection Agency and Federal Ministry of Environment. 3. Habitual checks should be conducted by constituted authorities to ascertain the environmental quality during maintenance operations. 4. Laterite and granites should be sourced from government approved sites. There should be clear decommissioning plan 5. Decommission plan and waste management.	3. Environmental checks should be consistent and orderly. 4. ensure provision of dust bins at predetermined interval on all selected roads	
	LOT 2	General maintenance operations (including borrow pits and Workers/Contractors Camps	1. Indiscriminate activities of the residents and others members of the communities such as waste dumps on the roads and drainage channels should be outlawed. 2. Maintenance operations should be structured according to environmental safety guidelines of the Delta State Environmental Protection Agency and Federal Ministry of Environment. 3. Habitual checks should be conducted by constituted authorities to ascertain the environmental quality during maintenance operations. 4. Laterite and granites should be sourced from government approved sites. There should be clear decommissioning plan 5. Decommission plan and waste management.	1. The community should involve in safe and clean environment. 2. Ensure that wastes are dumped in designated waste dumps not the roads. 3. Environmental checks should be consistent and orderly. 4. ensure provision of dust bins at predetermined interval on all selected roads	• Delta State Ministry of: • Environment • Forestry • Transport • Works and Infrastructure • The Nigerian Police
	LOT 3	General maintenance operations	1. Indiscriminate activities of the residents and others members of the communities such as waste dumps on the roads and drainage	1. The community should involve in safe and clean environment.	• Delta State Ministry of: • Environment • Forestry

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
		(including borrow pits and Workers/Contractors Camps	channels should be outlawed. 2. Maintenance operations should be structured according to environmental safety guidelines of the Delta State Environmental Protection Agency and Federal Ministry of Environment. 3. Habitual checks should be conducted by constituted authorities to ascertain the environmental quality during maintenance operations. 4. Laterite and granites should be sourced from government approved sites. There should be clear decommissioning plan 5. Decommission plan and waste management.	2. Ensure that wastes are dumped in designated waste dumps not the roads. 3. Environmental checks should be consistent and orderly. 4. ensure provision of dust bins at predetermined interval on all selected roads	• Transport • Works and Infrastructure • The Nigerian Police
	LOT 4	General maintenance operations (including borrow pits and Workers/Contractors Camps	1. Indiscriminate activities of the residents and others members of the communities such as waste dumps on the roads and drainage channels should be outlawed. 2. Maintenance operations should be structured according to environmental safety guidelines of the Delta State Environmental Protection Agency and Federal Ministry of Environment. 3. Habitual checks should be conducted by constituted authorities to ascertain the environmental quality during maintenance operations. 4. Laterite and granites should be sourced from government approved sites. There should be clear decommissioning plan 5. Decommission plan and waste management.	1. The community should involve in safe and clean environment. 2. Ensure that wastes are dumped in designated waste dumps not the roads. 3. Environmental checks should be consistent and orderly. 4. ensure provision of dust bins at predetermined interval on all selected roads	• Delta State Ministry of: • Environment • Forestry • Transport • Works and Infrastructure • The Nigerian Police

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
2	LOT 1	Air quality Issues	1. Use of water sprinklers 2. Regular checks on ambient environmental quality predominantly air 3. Rickety vehicles should not be allowed on the road 4. Traffic control measures should be put in place to curb road-based air pollutant effects and accident 5. Regular checks of the road should be conducted with regard to air quality parameters and general maintenance.	1. Habitual check for adherence to safety issues. 2. Ensure that road signs are installed along the road corridors. 3. Ensure that vehicles are in excellent condition so as to protect the environment 4. Ensure that motorists stick with the roads' speed limits.	• Delta State Ministry of • Environment • Forestry • Transport • Works and Infrastructure
	LOT 2	Air quality Issues	1. Use of water sprinklers 2. Regular checks on ambient environmental quality predominantly air 3. Rickety vehicles should not be allowed on the road 4. Traffic control measures should be put in place to curb road-based air pollutant effects and accident 5. Regular checks of the road should be conducted with regard to air quality parameters and general maintenance.	1. Habitual check for adherence to safety issues. 2. Ensure that road signs are installed along the road corridors. 3. Ensure that vehicles are in excellent condition so as to protect the environment 4. Ensure that motorists stick with the roads' speed limits.	• Delta State Ministry of • Environment • Forestry • Transport • Works and Infrastructure
	LOT 3	Air quality Issues	1. Use of water sprinklers 2. Regular checks on ambient environmental quality predominantly air 3. Rickety vehicles should not be allowed on the road 4. Traffic control measures should be put in place to curb road-based air pollutant effects	1. Habitual check for adherence to safety issues. 2. Ensure that road signs are installed along the road corridors. 3. Ensure that vehicles are in excellent condition so as to	• Delta State Ministry of • Environment • Forestry • Transport • Works and Infrastructure

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			and accident 5. Regular checks of the road should be conducted with regard to air quality parameters and general maintenance.	protect the environment 4. Ensure that motorists stick with the roads' speed limits.	
	LOT 4	Air quality Issues	1. Use of water sprinklers 2. Regular checks on ambient environmental quality predominantly air 3. Rickety vehicles should not be allowed on the road 4. Traffic control measures should be put in place to curb road-based air pollutant effects and accident 5. Regular checks of the road should be conducted with regard to air quality parameters and general maintenance.	1. Habitual check for adherence to safety issues. 2. Ensure that road signs are installed along the road corridors. 3. Ensure that vehicles are in excellent condition so as to protect the environment 4. Ensure that motorists stick with the roads' speed limits.	• Delta State Ministry of • Environment • Forestry • Transport • Works and Infrastructure
3		Noise and vibration	1. Construction/civil works in built up area should be limited to day Equipment 2. Equipment must be in serviceable states	1. Adequate check up for adherence to safety issues. 2. Ensure that road signs are installed along the road corridors. 3. Ensure that speed limits are rigorously adhere to. 4. Ensure that vehicles are in excellent condition.	• Delta State Ministry of Environment, Forestry, Transport, Works and Infrastructure
	LOT 2	Noise and vibration	1. Construction/civil works in built up area should be limited to day Equipment 2. Equipment must be in serviceable states	1. Adequate check up for adherence to safety issues. 2. Ensure that road signs are installed along the road corridors.	• Delta State Ministry of Environment, Forestry, Transport, Works and Infrastructure

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
				3. Ensure that speed limits are rigorously adhere to. 4. Ensure that vehicles are in excellent condition.	
	LOT 3	Noise and vibration	1. Construction/civil works in built up area should be limited to day Equipment 2. Equipment must be in serviceable states	1. Adequate check up for adherence to safety issues. 2. Ensure that road signs are installed along the road corridors. 3. Ensure that speed limits are rigorously adhere to. 4. Ensure that vehicles are in excellent condition.	• Delta State Ministry of Environment, Forestry, Transport, Works and Infrastructure
	LOT 4	Noise and vibration	1. Construction/civil works in built up area should be limited to day Equipment 2. Equipment must be in serviceable states	1. Adequate check up for adherence to safety issues. 2. Ensure that road signs are installed along the road corridors. 3. Ensure that speed limits are rigorously adhere to. 4. Ensure that vehicles are in excellent condition.	• Delta State Ministry of Environment, Forestry, Transport, Works and Infrastructure
4		Water quality issues	1. Ensure that waste dumps are not situated proximate to the selected roads and others as well as drains collectors to avert flooding and pollution cases. 2. Wastewater and sewage should be channeled properly according to safety guidelines. 3. Solid waste should not be discarded	1. Ensure that proper waste management practices are considered; 2. Obedience to the principles of safe and clean environment; 3. Road users should be aware	Delta State Ministry of Environment, Forestry, Transport, Works and Infrastructure

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			indiscriminately along the rehabilitated roads and drainage system and beyond.	of the mitigation measures. 3. Safety of the environment should be paramount for all concerned.	
	LOT 2	Water quality issues	1. Ensure that waste dumps are not situated proximate to the selected roads and others as well as drains collectors to avert flooding and pollution cases. 2. Wastewater and sewage should be channeled properly according to safety guidelines. 3. Solid waste should not be discarded indiscriminately along the rehabilitated roads and drainage system and beyond.	1. Ensure that proper waste management practices are considered; 2. Obedience to the principles of safe and clean environment; 3. Road users should be aware of the mitigation measures. 3. Safety of the environment should be paramount for all concerned.	Delta State Ministry of Environment, Forestry, Transport, Works and Infrastructure
	LOT 3	Water quality issues	1. Ensure that waste dumps are not situated proximate to the selected roads and others as well as drains collectors to avert flooding and pollution cases. 2. Wastewater and sewage should be channeled properly according to safety guidelines. 3. Solid waste should not be discarded indiscriminately along the rehabilitated roads and drainage system and beyond.	1. Ensure that proper waste management practices are considered; 2. Obedience to the principles of safe and clean environment; 3. Road users should be aware of the mitigation measures. 3. Safety of the environment should be paramount for all concerned.	Delta State Ministry of Environment, Forestry, Transport, Works and Infrastructure
	LOT 4	Water quality issues	1. Ensure that waste dumps are not situated proximate to the selected roads and others as well as drains collectors to avert flooding and	1. Ensure that proper waste management practices are considered;	Delta State Ministry of Environment, Forestry, Transport, Works and

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			pollution cases. 2. Wastewater and sewage should be channeled properly according to safety guidelines. 3. Solid waste should not be discarded indiscriminately along the rehabilitated roads and drainage system and beyond.	2. Obedience to the principles of safe and clean environment; 3. Road users should be aware of the mitigation measures. 3. Safety of the environment should be paramount for all concerned.	Infrastructure
5		Traffic and transportation management	1. Ensure free flow of traffic through diversion of traffic, signage and adequate protection maintenance workers while discharging their duties 2. Ensure that provided road infrastructures and the rehabilitated sections is kept free and safe from accidents such as speed limit regulations, street lighting systems, road marks, etc are provided. 3. Road furniture should be provided at designated bus stops and terminals along the selected roads mostly as it will ensure road safety for pedestrians and other road users.	1. Implement the traffic management plan with regard to local traffic management. 2. Information on road speed should be strategic location along the selected roads and beyond. 3. Information on road safety should be communicated in local language and English for proper understanding.	• Delta State Ministry of Environment, Forestry, Transport, Works and Infrastructure
	LOT 2	Traffic and transportation management	1. Ensure free flow of traffic through diversion of traffic, signage and adequate protection maintenance workers while discharging their duties 2. Ensure that provided road infrastructures and the rehabilitated sections is kept free and safe from accidents such as speed limit regulations,	1. Implement the traffic management plan with regard to local traffic management. 2. Information on road speed should be strategic location along the selected roads and beyond.	• Delta State Ministry of Environment, Forestry, Transport, Works and Infrastructure

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			street lighting systems, road marks, etc. are provided. 3. Road furniture should be provided at designated bus stops and terminals along the selected roads mostly as it will ensure road safety for pedestrians and other road users.	3. Information on road safety should be communicated in local language and English for proper understanding.	
	LOT 3	Traffic and transportation management	1. Ensure free flow of traffic through diversion of traffic, signage and adequate protection maintenance workers while discharging their duties 2. Ensure that provided road infrastructures and the rehabilitated sections is kept free and safe from accidents such as speed limit regulations, street lighting systems, road marks, etc. are provided. 3. Road furniture should be provided at designated bus stops and terminals along the selected roads mostly as it will ensure road safety for pedestrians and other road users.	1. Implement the traffic management plan with regard to local traffic management. 2. Information on road speed should be strategic location along the selected roads and beyond. 3. Information on road safety should be communicated in local language and English for proper understanding.	• Delta State Ministry of Environment, Forestry, Transport, Works and Infrastructure
	LOT 4	Traffic and transportation management	1. Ensure free flow of traffic through diversion of traffic, signage and adequate protection maintenance workers while discharging their duties 2. Ensure that provided road infrastructures and the rehabilitated sections is kept free and safe from accidents such as speed limit regulations, street lighting systems, road marks, etc. are	1. Implement the traffic management plan with regard to local traffic management. 2. Information on road speed should be strategic location along the selected roads and beyond. 3. Information on road safety	• Delta State Ministry of Environment, Forestry, Transport, Works and Infrastructure

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			provided. 3. Road furniture should be provided at designated bus stops and terminals along the selected roads mostly as it will ensure road safety for pedestrians and other road users.	should be communicated in local language and English for proper understanding.	
6	LOT 1	Health and safety concerns	1. Maintenance workforce are expected to imbibe the workplace safety rules via proper sensitisation procedures during maintenance works. 2. Ensure that workers operate under safety tools such as nose guard, safety boots, safety helmets, and other essential safety wears on-site. 3. Ensure that first aid tools for minor injuries are provided and used prior to being forwarded to a medical centre in case of minor accident. 4. Awareness on Ebola Virus, HIV/AID and other communicable diseases	1. Sensitization should be conducted in clear terms and all workers aware safety rules and regulations. 2. The Standard Operating Procedure (SOP) should be briefed and placed along strategic points for proper guidance. 3. Workforce should be permitted to work smarty and not late to avert accidents due to fatigue.	• Delta State Ministry of Environment, Health, Forestry, Transport, Works and Infrastructure

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
	LOT 2	Health and safety concerns	1. Maintenance workforce are expected to imbibe the workplace safety rules via proper sensitisation procedures during maintenance works. 2. Ensure that workers operate under safety tools such as nose guard, safety boots, safety helmets, and other essential safety wears on-site. 3. Ensure that first aid tools for minor injuries are provided and used prior to being forwarded to a medical centre in case of minor accident. 4. Awareness on Ebola Virus, HIV/AID and other communicable diseases	1. Sensitization should be conducted in clear terms and all workers aware safety rules and regulations. 2. The Standard Operating Procedure (SOP) should be briefed and placed along strategic points for proper guidance. 3. Workforce should be permitted to work smarty and not late to avert accidents due to fatigue.	• Delta State Ministry of Environment, Health, Forestry, Transport, Works and Infrastructure
	LOT 3	Health and safety concerns	1. Maintenance workforce are expected to imbibe the workplace safety rules via proper sensitisation procedures during maintenance works. 2. Ensure that workers operate under safety tools such as nose guard, safety boots, safety helmets, and other essential safety wears on-site. 3. Ensure that first aid tools for minor injuries are provided and used prior to being forwarded to a medical centre in case of minor accident. 4. Awareness on Ebola Virus, HIV/AID and other communicable diseases	1. Sensitization should be conducted in clear terms and all workers aware safety rules and regulations. 2. The Standard Operating Procedure (SOP) should be briefed and placed along strategic points for proper guidance. 3. Workforce should be permitted to work smarty and not late to avert accidents due to fatigue.	• Delta State Ministry of Environment, Health, Forestry, Transport, Works and Infrastructure
	LOT 4	Health and safety concerns	1. Maintenance workforce are expected to imbibe the workplace safety rules via proper	1. Sensitization should be conducted in clear terms and	• Delta State Ministry of Environment, Health,

S/N	Implied LOT	Environmental and social impacts	Suitable Mitigation measures	Monitoring Strategies	Organizational Responsibility
			sensitisation procedures during maintenance works. 2. Ensure that workers operate under safety tools such as nose guard, safety boots, safety helmets, and other essential safety wears on-site. 3. Ensure that first aid tools for minor injuries are provided and used prior to being forwarded to a medical centre in case of minor accident. 4. Awareness on Ebola Virus, HIV/AID and other communicable diseases	all workers aware safety rules and regulations. 2. The Standard Operating Procedure (SOP) should be briefed and placed along strategic points for proper guidance. 3. Workforce should be permitted to work smarty and not late to avert accidents due to fatigue.	Forestry, Transport, Works and Infrastructure

6.2 Institutional Responsibilities and Accountabilities of the SEEFOR Project

Specific roles and responsibilities and satisfactory institutional arrangements are essential to the efficient implementation of the environmental and social safeguard measures delineated in the current ESMP for rehabilitation and maintenance activities of the SEEFOR project in Sapele, Sapele Local Government Area (LGA) of Delta State. In this regard, detailed institutional arrangements, and the roles and responsibilities of the different institutions in the implementation of the ESMP are covered in the subsequent sub-sections.

6.2.1 Prior to the Rehabilitation Phase of the Delta SEEFOR Project

6.2.1.1 Key Agencies Concerned

The main agencies with roles and responsibilities in the implementation of the ESMP during the pre-rehabilitation phase are listed as follows:

- Delta State SEEFOR-SPCU As the proponent of this project, the SPMU/Safeguard officers has the responsibility for ensuring that World Bank Safeguards Policies and other relevant laws in Nigeria are complied with. Ensure that the ESMP is fully implemented. Supervision of the contractors, supervisors and site engineer, training of contractors and workers, monitoring of the implementation of the ESMP etc.
- Federal SEEFOR-SPCU,
- Delta State Ministries, Departments and Agencies (Works and Infrastructure, Environment, Agriculture, and Forestry)
- Federal Ministry of Environment (FEnv), NESREA) - Supervision and compliance enforcement.
- World Bank: Provision of oversight, capacity building of the proponent as needed.
- Contractor/Supervisors/Site Engineers: Ensuring that World Bank Safeguards Policies and other relevant laws in Nigeria are complied with on site. Develop and implement contractors ESMP, ensure that workers consistently use PPE, adequate signage's are in place, traffic is managed, waste generated by the project are collected, transported and disposed off at government approved sites for such wastes etc.

6.2.1.2 Role of the Concerned Agencies

The key responsibility for monitoring and reporting on the implementation of the ESMP rests with the Contractor. The contractor's responsibility covers the pre-rehabilitation stage in which ground works and preparatory meetings and consultations are conducted with the project Monitoring Committee, Community Based Organisations (CBOs) as well as members of the affected communities along the selected roads for the proposed project activities. The contractor should cooperate with the Delta State SEEFOR-SPCU on the issues raised so as to meet international standard such as the World Bank safeguard polices. These issues will be communicated to the Delta State Ministries and their respective departments and agencies (MDAs) for prompt action on issues raised. In cases of displacement of people due to the land properties along the selected roads for the project, the provisions of the RAP must be implemented. It is anticipated that RAP consultant would have consulted broadly before the submission of the final report to Delta State SEEFOR- SPCU. The implementation of the issues raised should be managed based on the Federal SEEFOR-NPCU in conjunction with the Delta State SEEFOR-SPCU and the World Bank.

6.2.1.3 Reporting and Follow-Up the Project Activities

The proposed project monitoring committee through the secretary should send the details of meetings held with the Delta State SEEFOR- SPCU. This is to promote a feedback mechanism as well as reporting and follow-up strategy for the issues raised and the suggested respective implementation. The issues raised must be sent with the contributions of the Delta State SEEFOR who would have reviewed the comments within the scope of the proposed project and the relevance to World Bank requirements. The Contractor has to ensure that the identified comments and notes are implemented rigorously as agreed and the feedback relayed to Delta State SEEFOR- SPCU. This process must continue through an incessant chain of reporting-feedback, follow-up and response mechanism until the pre-rehabilitation phase of the proposed SEEFOR project is completed.

6.2.2 Rehabilitation Phase of the SEEFOR Project Activities

6.2.2.1 Key Agencies in the Project Activities

The Key Agencies with major roles in the implementation of the SEEFOR ESMP during rehabilitation phase are:

- Delta State SEEFOR- SPCU: As the proponent of this project, the SPMU/Safeguard officers has the responsibility for ensuring that the World Bank Safeguards Policies and relevant laws in Nigeria are complied with. Ensure that the ESMP is fully implemented. Supervision of the contributors, supervisors and site engineers, training of contractors and workers, monitoring of the implementation of the ESMP etc.
- Federal SEEFOR- NPCU,
- Delta State Ministries, Departments and Agencies (Works and Infrastructure, Environment, Agriculture, and Forestry)
- Federal Ministry of Environment (FEnv), NESREA – Supervision and compliance enforcement.
- World Bank: Provision of oversight, capacity building of the proponent as needed.
- Contractors/Supervisors/Site Engineers: Ensuring that World Bank Safeguards Policies and other relevant laws in Nigeria are complied with on site. Development and implement contractors ESMP, ensure that workers consistently use PPE, adequate signage's are in place, traffic is managed, waste generated by the project are collected, transported and disposed off at government approved sites for such wastes etc.

  Besides the main agencies, the Delta State Government through the MDAs will also have a role to play in the general supervision of ESMP implementation.

6.2.2.2 Role of Concerned Agencies

The key duty for monitoring and reporting on the implementation of the SEEFOR project activities lies with the Engineer. Thus, the Engineer through its Environmental and Social Specialist (ESS) should be responsible for adequate supervision and reporting on the project implementation. The Engineer's ESS should have access to a team of experts in various fields (water, soil, social consultant etc) to ensure adequate capacity to supervise the implementation of the ESMP. The implementation of the ESMP must be handled by the Delta State SEEFOR-SPUC through the Safeguard Officers (SOs). The SOs must be

primarily responsible for the daily inspection and monitoring of the ESMP implementation.

The Delta State Ministries of Works and Infrastructure, Environment, Agriculture, and Forestry should monitor ESMP implementation on the rudiments of the internal mechanisms and policies as established by laws guiding their operations. These institutions may carry out announced and unannounced site visits with representatives from Federal SEEFOR- NPCU. The reports of the findings should be sent to the World Bank.

The Federal Ministry of Environment (FEnv) and NESREA should also forward Environment Officers and officials monitoring of ESMP projects under the Federal SEEFOR approved to observe the level of implementation of the provisions of ESMP. At the local level, the Delta State Ministries of Environment should also visit the proposed SEEFOR project site to observe and monitor the level of compliance to the provisions of ESMP.

6.2.2.3 Reporting and Follow-Up of SEEFOR Project Activities

The ESMP by SEEFOR must prepare monthly and incident reports to be submitted to the Engineer, who will then submit the reports to the Delta State SEEFOR-SPCU with their comments, observations, and recommendations. Delta State SEEFOR- SPCU should forward response to the Engineer through the consultant(s) or directly when urgent action is demanded. Monitoring and reporting exercise on the implementation of follow-up action should also be a fraction of the duties of the ESM.

The Engineer shall prepare and submit in monthly basis, the project environmental and social management reports to Delta State SEEFOR- SPCU, who should arrange for the project environmental management meetings as at when due to discuss and educate them on the environmental and social management aspects of the Project. The Engineer and the Contractor involved in the meetings when necessary. At the appropriate time, representatives of World Bank and Federal SEEFOR-NPCU must also be called for meetings.

6.2.3 Maintenance Phase

It is crucial to note that, mitigation and monitoring actions should not be the solitary responsibility of the Delta State SEEFOR or the Federal SEEFOR during the maintenance phase. The Delta State SEEFOR in collaboration with the Federal SEEFOR as a managing entity of the rehabilitation and maintenance activities of the selected roads project in Sapele, Sapele LGA of Delta state, has the responsibility to consider these measures, and to bring these to the attention of other government agencies for their actions as necessary.

6.2.3.1 Key Agencies

At the maintenance phase, the chief institutions to which Delta State SEEFOR should collaborate with are Delta State Ministries such as environment, forestry, transport, works and infrastructure, and the Police. Also, during the rehabilitation phase, the Local government administrative council, such as Sapele LGA, during the maintenance phase would have a role in the general supervision of the ESMP implementation and updating.

6.2.3.2 Role of Interested Agencies

The duties of the institutions having a role in the monitoring processes of the maintenance phase of the selected roads by the Delta SEEFOR are:

- The Monitoring and Supervision Unit of the Delta State Ministry of Environment who has to conduct regular visits to the site to examine and verify how the selected road networks are maintained. Numerous biophysical components of the environment (air, water, soil, flora and fauna) which include activities such as waste management, drainage system, noise and vibration, and others have to be monitored. This should be carried out within the legal and administrative ability of the Ministry of Environment through their respective departments, and agencies.
- The Delta State Ministry of Environment should conduct regular inspections to check the compliance of the site operators with planting of trees along the roads plans, which should be according to international standards.
- The Ministry of Transport must check the character of vehicular traffic and road transportation pattern in the selected roads with respect to transportation safety and

vehicular controls. This should be carried out for the safety of road users and members of the communities in the SEEFOR project corridors.

- The Ministry of Works and Infrastructure will be required to conduct unconstipated checks on the nature of infrastructure available during the duration of the project and the period of assessment. The approach should be conducted in such a way as to provide a mechanism for punctual response and rehabilitation of any of the provided road furniture and infrastructure in the selected road networks.
- The Armed Forces should ensure that criminal activities are curbed to the barest minimum to avoid wrong attachment of such events to the rehabilitation process.

6.3 Environment and Social Monitoring Plan Measures

This subsection of the chapter gives a framework for the content of the ESMPs predicted for the SEEFOR roads project in Sapele project site. As the proposed project continues through the rehabilitation and related civil works, the EMSP provisions will be extended to include specific procedures to guide implementation by the Delta State SEEFOR-SPCU personnel and contractors, and to provide for periodic updating when necessary.

6.3.1 Flora and Fauna Management Plan

The main rationale of the Flora and Fauna Management Plan is to guard the biodiversity along the selected road against any unintentional damage as a result of the rehabilitation and maintenance activities, and to care for the project personnel against dangers connected with native flora and fauna. This plan must include but not limited to the following provisions as it will be further developed:

- Animals should not be manhandled, removed, killed or unnecessarily disturbed by the SEEFOR/World Bank officials or its employees, or by SEEFOR/World Bank's contractors' or their subcontractors' employees.
- The Delta State SEEFOR should not tolerate poaching of fauna or flora by its personnel or by any of its contractors or subcontractors
- The Delta State SEEFOR must ensure through a High Conservation Value study that all High Conservation Value Forest sites are properly marked and left untouched.
- The Delta State SEEFOR should help to maintain the integrity and quality of biodiversity along the selected roads networks.

- Delta State SEEFOR must assist in protecting the swampy section from liquid effluent from solid and liquid wastes generated during rehabilitation and maintenance phases
- Land clearing operations, where necessary, are expected to drive wildlife away from the clearing operations for the proposed project activities, nevertheless, if any species classified as VU by the Ministry of Environment moves to the project roads is trapped or hurt during land clearing operations, the Wildlife Division under the Ministry must be informed to determine whether translocation or other actions are required to save individuals. The Delta State SEEFOR must allocate funds for such eventuality.
- The Delta State SEEFOR should plan its roads projects in advance to minimise the impact on the fauna, help identify and control impacts such as flood zones and to result in a lower amount of biomass to manage.
- The Delta State SEEFOR should ensure that the project site is kept clean, tidy and free of garbage that would attract animals.
- For the risk of invasive species, the monitoring programme for the project activities, should track what types of invasive species occur, where they occur, how they were most likely introduced to the area, how they could be eradicated, and the success of the various eradication measures. If any of the Delta State SEEFOR officials or contractor identifies a continuing problem with invasive species, it should determine the root cause of that problem and investigate additional measures to address that root cause.
- In order to halt the demand for local bush meat, the Delta State SEEFOR should take the following measures:
    - ❖ Minimize hunting pressure by ensuring that adequate supplies of meat other than local bush meat as well as other protein sources are available in stores and markets within the project areas;
    - ❖ Instruct its workforce on the unfavourable impacts of hunting and consuming bush meat;
    - ❖ To possible extent, proscribe and enforce prohibitions on hunting down within and around the project areas;
    - ❖ Education programmes should be conducted in the settlement areas about the negative impacts of hunting and consuming bush meat; and

- ❖ Sponsored programmes by SEEFOR to transition hunters to other sustainable livelihood activities.

- The Delta State SEEFOR should work with conservation groups and other stakeholders within and around the selected roads to assist in preventing poaching. Initiative methods may include hiring guards, posting signs among others.

6.3.2 Waste Management Plan

The essence of the Waste Management Plan is to guarantee that solid and liquid wastes are reduced and any form of waste generated are well managed and disposed to avert damage to the environment. This approach can be stated as follows:

- to curtail waste production to the barest minimum;
- to reuse or recycle wastes generated as much as possible;
- if reuse or recycling of waste is impossible such waste should be treated, neutralized, or transformed into motionless materials; and
- if the approach in 3 above is impossible, the waste should be disposed in a way that is not injurious to the environment and the human beings.

The following gives a summary of the imperative components of a Waste Management Plan:

- the WMP should establish the duty for waste management and employ an overall Waste Management Supervisor, who must be adequately trained in the implementation of the Plan;
- The Delta State SEEFOR must develop a list of all wastes generated, particularly harmful waste, at the different facilities with estimated quantities of each on a monthly basis or other time interval;
- The Delta State SEEFOR must provide well pronounced storage bins for the different classes of wastes in specific designed plastic or metal bins so that each type of waste can be treated or disposed of as indispensable;
- Harmful wastes must be appropriately disposed according to their precise properties as prescribed in the Material Safety Data Sheets (MSDS) and should not be disposed with harmless wastes;

- Perilous wastes at the proposed selected road project in Sapele are anticipated to be solely composed of the following:
  - ❖ empty chemical contents containers (e.g. pesticides, fungicides);
  - ❖ empty petrochemical contents containers (e.g. oil, grease, lubricants);
  - ❖ empty used lubricants containers; and
  - ❖ worn towels soaked with oil and grease or lubricants;
- Hazardous wastes cannot be mixed except distinctively prescribed in the plan;
- The Delta State SEEFOR must establish a list of accredited waste disposal contractors and obtain a Certificate of Accreditation for each to ensure that they are operating legally;
- The Delta State SEEFOR must have accredited waste disposal contractors for the following items and activities:
  - ❖ Used engine oil reusing contractor/facility;
  - ❖ Lead and lead battery reprocessing contractor (include other heavy metal pollutants);
  - ❖ Tire and rubber recycling/reusing contractor;
  - ❖ Plastic recycling contractor, mostly for plastic containers which must be washed prior to disposal (do not burn PVC in open air because dioxins and furans can be created);
  - ❖ Already used batteries (car and equipment batteries) and e-waste (electronic waste) recycling/exporting contractor;
  - ❖ Harmful waste incineration contractor (for incineration at high temperatures in particularly constructed incinerators); and
  - ❖ Household waste collection contractor;
- The Delta State SEEFOR must track all harmful waste disposal activities using a proper Waste Manifest Form and all completed forms shall be held for record purposes;
- The Delta State SEEFOR should occasionally reconcile its estimated disposal amounts with the waste manifests and other records of actual wastes produced, and examine any important differences;
- The Waste Management Supervisor should ensure that regular inspections are conducted on waste management practices to ensure compliance with the plan.

6.3.3 Erosion and Sedimentation Management Plan

The Erosion and Sedimentation Management Plan should give guidance to managing soil erosion, flooding and the transport of sediment to surface waters, especially in the process of de-silting. An efficient erosion and sedimentation is needed to curtail flooding and pollution. The Delta State SEEFOR shall monitor effectiveness of erosion and run-off control through logical verification of compliance with control measures implemented through the monitoring of impacts to surface water quality and run-off accumulation at streams and natural drainage channels in the project area. Erosion and runoff should be minimized through the implementation of the following measures:

- Vegetated buffer zones must be guarded to help control sedimentation.
- Site clearing operations must continue in a gradual and arranged manner to ensure there are no huge increases in sediment discharge.
- Though vegetation clearing and earthmoving activities are in progress and long-term erosion control devices cannot be implemented, short-term erosion control devices would have to be applied.
- Short-term protection of endangered soil surfaces with measures such as plastic film, bio-membranes or other means, should be implemented on every occasion necessary.
- Long-term erosion control may be accomplished through measures such as terracing along with a re-vegetation programme. Erosion protection may be utilised around culvert entrances.
- Inlet structures utilized to hoard storm run-off has to be constructed with any suitable construction material. The structures will ensure logical removal of design-storm runoff to avert disruption of rehabilitation during storms and to check erosion resulting from overtopping of the inlet.
- Piles of soil or other materials must only be permitted for short time and should be placed mainly on flat areas and away from any storm water courses. Only topsoil piles should be permitted to continue for lengthy periods and should be controlled from rainfall.
- Essentially, all geomorphologic, hydraulic and hydrologic, and civil engineering preparations with respect to all the selected roads must be designed similar to the SEEFOR ESMP procedures to have an environmentally-friendly, coherent and consistent engineering design and implementation for the project areas.

Storm water will be managed in the course of the implementation of the following measures:

- The runoff over exposed soil surfaces should be along predetermined drains collectors that will not obstruct the vehicular movements and other activities and should include breakers and other devices to control flow velocity. Hydraulic stairs, drop structures or other energy dissipation structures will be used when necessary to convey storm.
- Cautious circumstance must be provided to the drainage systems of all the selected roads, road facility areas, surplus soil deposit, silts and accumulated sand in the areas.
- Drains along the selected roads must be discharged via surface drainage systems. Maximum use of natural drainage system features should be seriously considered. Runoff from cleared areas along the roads must be collected in open channels or ditches for removal from the immediate area. The act of masked pipe must be minimised and buried pipes should be day-lighted to open channel drains as soon as achievable.

6.3.4 Employment, Training, and Awareness Management Plan for the SEEFOR Project

The Employment, Training, and Awareness Management Plan focuses on both the rehabilitation and maintenance phases. For the phases, the following should be integrated, as necessary:

- During the new workers' orientation development, all workforces has to be given health and safety training on standard work processes and other health and safety requirements pertinent to their work actions.
- All workers shall be given weekly safety orientations that last at least 15 minutes. If major accidents transpire or other health and safety issues come up, these orientations may be appended.
- The training status for workforce shall be recorded.
- Health and safety training would be elaborated in the Integrated Health and Safety Plan (IHSP) that would also indicate the contents, intention groups, regularity and forms of evaluation of each type of training to be used. It shall contain but not limited to the following modules:
  - ❖ Training health and safety,
  - ❖ Community dealings training,

- ❖ First aid strategy,
- ❖ Noxious animals,
- ❖ Method of PPE, and
- ❖ Safe Work Operations.

6.3.5 Water Management Plan

The Water Management Plan would have to deal with water conservation, protection of water resources, conscientiously using surface water and groundwater for agriculture and agricultural activities, and mill purposes, and rainfall harvesting technique. The vital aspects of this plan are:

- training of workforce to ensure understanding of the significance of guarding all water sources;
- accomplishment of measures included in the Erosion and Sedimentation Management Plan to manage sedimentation of surface water resources and reduce the loss of nutrients and the need for chemical fertilizers;
- accomplishment of the measures included in the Chemical Management Plan to ensure that all chemicals applied on the selected roads are used suitably and in the least necessary amounts to control adverse impacts to surface and groundwater;
- implementation of the measures included in the Waste Management Plan to ascertain that all wastes generated on the selected roads are well stored and disposed to control unfavourable impacts to surface and groundwater by liquid effluents or by leachate from solid wastes;
- monitoring considerable effluent streams on a cyclic basis to make sure that they attain germane discharge needs;
- developing and enforcing a site-based water quality monitoring plan for surface water and groundwater for management measures to achieve the desired results;
- developing parameters for the mechanism of water wells to ensure that wells meet all desired national standards and that they do not have important negative impacts on other groundwater users.

6.3.6 Air Quality Management Plan for the SEEFOR Project

The Air Quality Management Plan should cover the following essential aspects:

- noise levels in the selected roads, predominantly during the rehabilitation activities must meet the requirements of the Federal and Delta State Ministries of Environment;
- all project vehicles for movement should be appropriately maintained and suited for standard pollution control equipment to reduce emissions;
- Delta State SEEFOR must avoid the use of ozone depleting contents such as coolants or cleaning operations.

6.3.7 Vegetation Clearing and Biomass Management Plan

The Vegetation Clearing and Biomass Management Plan must make sure that all vegetation clearing and biomass management for all components of the project activities are in accordance with a comprehensive procedure that should meet the requirements of Nigeria and international best practices.

Bush clearing for rehabilitation process where appropriate and other road infrastructure development can damage the habitats of terrestrial flora and fauna species, if clearing is not done efficiently, as well, it could result in the elimination of ecologically important habitats and species. The alteration of forests, even secondary, reduces biodiversity, with species reductions occurring for insects, birds, reptiles, and soil microorganisms.

The plan under this issue should contain the following procedures:

- Outlining areas to be cleared;
- Delimiting areas to be protected;
- Delineating methods for clearing in different areas or terrain along the selected and affected roads, including methods to allow fauna to relocate out of the area to be affected;
- Lining procedures to make sure that non-timber forest products are reasonably utilized by local communities in the affected areas; and
- Delimitating procedures to ensure utilizing and/or disposing of the biomass produced by the clearing activities

This plan should be used in collaboration with the Employment, Training, and Awareness Management Plan and the Erosion and Sedimentation Management Plan to ensure that

workers in all phases of the Sapele SEEFOR project, the environment, and surrounding communities are protected.

6.3.8 Emergency Response and Incident Management Plan for the SEEFOR Project

The Emergency Response and Incident Management Plan must embrace procedures for outlining all realistically anticipated and feasible emergencies such as:

- Fire incidence;
- Flooding during rainy period;
- spillages of harmful chemicals or wastes to the groundwater or surface water;
- the need for medical emergencies; and,
- other weather-associated emergencies

The Emergency Response and Incident Management Plan has to outline the methods of intervention and required resources to be implemented by the Delta State SEEFOR in the event of an accident to protect staff and property and to prevent harmful effects on the local population and the environment. As part of the plan, the Delta State SEEFOR must encourage the alert of rescue services and inform the capable pertinent authorities. The spillage response components of the plan should address all workers and relevant staff who should have been trained in specific spill response procedures for the contents in which they are responsible. The impacts of spills can have diverse unfavourable impacts on the environment and humans.

Spills can take place during many of the typical operations such as: refuelling of equipment, painting of kerb etc., changing oil, during transfer of the liquids or solid from containers to another, washing of drums comprising liquid or solid harmful substances. They may also transpire due to a burst of hoses or pipes, the faulty of a runoff valve of a tank or road accident of a fuel tanker. The Emergency Response and Incident Management Plan must cover the following features to specify spills of harmful contents:

- outline the personnel liable in the event of a spillage and hierarchy for notices within the Government and emergency response personnel;
- give the organizational structure for a spillage response;

- exemplify the various types of materials and potential amounts of spillages that could arise due to the project activities;
- specify spill response measures as well as equipment, protective equipment and materials to maintain the response;
- delimit training guidelines and procedures for personnel to make a safe and effective response to liable spill events; and
- give training guidelines for improvement and disposal of all materials infected in the event of a spillage.

The Emergency Response and Incident Management Plan must in addition outline the measures, training, supplies, and materials for designated personnel to react to fires, medical emergencies, and other noteworthy emergencies or incidents during rehabilitation and maintenance of the Sapele SEEFOR project activities.

6.3.9 Cultural Heritage Management Plan

This plan should ensure that cultural sites along the roads project roads are identified and effectively protected, and that a procedure is prepared for addressing anonymous sites that may be encountered during the development (Chance Find Procedure). To address impacts to known sites, the Delta SEEFOR must segregate, along with communities, the cultural and sacred sites used by communities for traditional practices, in order to exclude such sites from vegetation clearing or other rehabilitation activities.

In the process of rehabilitation, if any relic or human remains are discovered, work in the immediate area shall stop and the Delta State SEEFOR should implement a Chance Find Procedure that will cover as follows:

- Delta state SEEFOR will engage Archeologists and Anthropologists to examine, recover and preserve evidence and artifacts affected through relevant Ministry.
- Delta State SEEFOR's HSE coordinator will take logical safety measures to avert any person from removing or damaging any such item;
- all work will be motivated at least 30 m away from the artifact, or outside the boundaries of the site containing the artifact;

- the local Chiefs and Government Officials will be notified to determine whether it is considerable from a cultural perspective;
- If the artifact emerges to be pre-historic, the countrywide museum will be notified; and, proper actions will be considered after consultations the relevant ministry.

6.3.10 Traffic and Vehicle Management Plan

The Traffic and Vehicle Management Plan should cover but not limited to the following provisions during the SEEFOR project activities in Sapele:

- Delta State SEEFOR should place speed limits and appropriate road signage along the affected roads including all access roads during all activities;
- Delta State SEEFOR must impose speed limits for safety, air quality, and noise purposes at all SEEFOR project roads and beyond;
- All employed drivers by SEEFOR should be well-trained by a road safety specialist; and,
- All vehicles should be adequately maintained and experienced occasional safety inspections.

6.3.11 Health, Safety, and Security Management Plan of the SEEFOR Project

The Health, Safety, and Security Management Plan for the proposed SEEFOR project should conform to all Delta State requirements and international best practices. It should outline measures for hygiene, health, and safety at the project roads and include training programme for all workforces. Delta State SEEFOR must give the basic safety equipment to its staff. The plan must identify issues such as follows:

- the adequate provision and use of personnel protective equipment (PPE) such as safety boots, respirators, eye protection, hearing protection, gloves, nose guard and hardhats;
- study of risks connected with job activities to develop standard requirements for PPE on a job-specific and station-specific levels;
- provision of training on the appropriate usage of PPE and penalties for the unacceptable usage of PPE;
- training on the suitable and secure usage of all equipment mobilized etc.;
- placing of physical barriers so that unofficial personnel are not admitted to areas where dangerous equipment is in use;

- training related to job-specific risks and activities, comprising: electrical installations (e.g. electric shock on direct contact with conductors and indirect contact with masses powered up, burns, fire and detonation);
- automatic equipment such as tool blasting or matter risk, crushing of fingers, wounds, equipment shock;
- lifting devices such as crushing risk, harm induced by appurtenances, falling, collision;
- machinery and vehicles such as danger of accident on contact with other materials, collision with or knocking down of persons, obstruction shock, fall by the operator, collision with a vehicle or machine;
- hand tools, electric or other welding equipment such as danger of harm, electrocution, poisoning, temporarily deprive of sight;
- workshops and garages such as risk of mechanical harm, shock and collision with machines;
- sterilizers and boilers such as danger of burns as result of heat and steam from furnace, explosion risk;
- power plant, processing lines and workshops such as noise-related risks, electrocution risk, and
- provision of suitably trained and equipped first aid personnel covering a stocked pharmacy, a treatment room with beds, and an ambulance for any worksite injuries.

  Other safety precautions are stipulated in the World Bank/IFC Environmental, Health and Safety Guidelines particularly the sections of the Toll Roads and Construction Materials Extraction

6.3.12 Community Health & Safety Plan for the Delta SEEFOR Project

This is intentionally designed to specify the potential management plan on the human population living in and around the proposed project corridors. The measures under this sub-section include:

- Since one of the key purposes of the SSEFOR project is to empower youth in the locality, rehabilitation activities could draw significant numbers of single men and others attracted by the opportunities to supply goods and services to rehabilitation workers and project beneficiaries with disposable income. Activities such as alcohol, drugs, and sex trade

could lead to increased crime and diseases, including HIV/AIDS, thus the Delta State SEEFOR should make effort to recruit most of its rehabilitation workers including skilled workers from the immediate area to minimize the number of single men migrating for work;

- Delta State SEEFOR must also ensure that its contractors provide proper training and enforcement codes of conduct to reduce workforce participation in dangerous activities such as sex trade, drugs, and alcohol;
- Delta State SEEFOR should conduct sensitization programme of local communities concerning the potential impacts of the SEEFOR project activities and inform the people about the terms and conditions of Delta State SEEFOR's workers' Code of Conduct;
- Delta State SEEFOR will conduct communities' training and awareness programmes to ensure that the local population understands the risks of participating in risky economic activities for short-term economic gain;
- Delta State SEEFOR must cooperate with local government councils to ensure that they fully understand the risks
- for rehabilitation activities and support, Delta State SEEFOR will require efforts from the law enforcement perspective;
- Delta State SEEFOR has to work directly with the health districts of the Ministry of Health in the State and promote sensitization campaigns to assist the local population avert risky activities; and Delta State SEEFOR should work seriously with the health districts to check the prevalence of diseases and other health measures that have depicted a need for further intervention to guard the communities' health and safety.

6.3.13 Stakeholders' Engagement Plan for the SEEFOR Project

As part of ESMP, the Delta State SEEFOR has been implementing its Stakeholders' Engagement Plan since the commencement of the proposed project. This plan includes the following most important considerations:

- identification of the proposed project stakeholders;
- summary of earlier period consultation efforts;
- designed consultation efforts to plan for rehabilitation activities;
- stakeholders' engagement during rehabilitation;

- stakeholder engagement during maintenance;
- funds for stakeholder engagement;
- monitoring and reporting on stakeholder commitment; and
- development of the site monitoring committees.

In collaboration with the Stakeholder Engagement Plan, the Delta State SEEFOR has to develop and implement a Grievance Procedure that will cover the following aspects:

- SEEFOR contacts, in person, by email, or by telephone to submit a grievance;
- contacts regarding grievances may be by the affected person(s) or through an agreed local liaison committee in Sapele;
- all complaints will be accepted by Delta State SEEFOR and tracked for resolution, and information on the status will be obtainable to the person making the complaint;
- Delta State SEEFOR will scrutinize the complaint, using technical assistance if needed, and determine the response including, if pertinent, proposed actions;
- Delta State SEEFOR will inform the person making the complaint, either verbally or in writing, of SEEFOR response and proposed actions (if any);
- prior to rehabilitation, Delta State SEEFOR will work with stakeholders to develop a binding arbitration system for resolving complaints;
- the complaint mechanism will inform complainants of their options if the complaint cannot be settled;
- Delta State SEEFOR will strive to probe and settle complaints punctually;
- there will be no charge to the individual posing the complaint;
- all complaints will be addressed with apposite discretion;
- complaints will be examine and settled without retribution to the complainant or other persons; and,
- project personnel, principally those who have contact with the public, will be briefed/trained about the grievance procedure, including who to contact within the Delta State SEEFOR or the Delta State Government about a complaint.

6.3.14 Resettlement Action Plan (RAP)

Although, it has been identified that, the SEEFOR project in Sapele will not require involuntary resettlement, however, there is a need to brief on Resettlement Action Plan

framework for unforeseen circumstance. Therefore, the comprehensive details of the resettlement for affected members of the Project communities will be expected to cover within the framework designed by the RAP consultant. It is the duty of the Delta State SEEFOR that such framework must be all-inclusive with the affected person(s) fully engaged and integrated as part of the report. It must include all details of either total resettlement, or payment of compensation. These must agree with the provisions of the World Bank safeguard policy OP 4.12 Involuntary Resettlement.

6.3.15 Training Programmes for the SEEFOR Project

The Delta State SEEFOR must develop, implement, and track training programmes which are to include:

- the dividends of protecting local fauna and alternatives to activities such as hunting for local bush meat along the selected roads by the Delta SEEFOR;
- the call for waste management and how to execute the Waste Management Plan;
- the desire for appropriate selection, handling, storage, application, usage, and disposal of all harmful contents and chemicals used in the project activities according to the Chemical Management Plan;
- accomplishment of the entire emergency response measures as specified in the Emergency Response and Incident Management Plan;
- accomplishment of the Cultural Heritage Management Plan and connected Chance Find Procedures;
- accomplishment of the Health, Safety, and Security Management Plan for all work labour;
- Basic programmes specified in the Community Health and Safety Plan; and,
- executive management exercise.

6.3.16 Contractor Social and Environmental Management System

The contractor should have a documented Social and Environmental Management System (SEMS) that identifies individuals in the contractor's organization who have responsibility for EHS issues, their scope of work, and reporting lines and requirements.

6.4 Monitoring and Evaluation

The proposed Delta SEEFOR project in Sapele, Sapele LGA must develop an in-depth Environmental and Social Monitoring Plan to supervise key components of both the biophysical and human environments. This is purposely meant to ensure that noteworthy impacts were fittingly identified in the evaluation process, then to check the efficiency of the alleviation measures. The detailed results of monitoring activities will be recurrently reexamined to resolve if existing management measures are sufficient, or if those measures should be reviewed, deleted, or supplemented.

Monitoring has to cover components such as:

- water quality of the waste matter streams discharged from the rehabilitation activities;
- water quality and common water health of streams receiving waste matters from the rehabilitation activities;
- encroaching species;
- bush meat sales in local markets in the project area;
- communications between local fauna such as birds to decide if added mitigation measures are needed and if implemented, how efficient they are working;
- the efficiency of waste management actions;
- the efficiency of sediment and erosion management measures and of storm water management measures;
- all clearing actions for conformity with the Vegetation Clearing and Biomass Management Plan;
- accomplishment of the Cultural Heritage Management Plan and connected Chance Find measures;
- conformity with the Traffic and Vehicle Management Plan;
- health and safety variables, together with accidents, for all work labour and residents working in the SEEFOR project;
- grievances of workers, PAPs and the local communities;
- health indicators in the local communities to notify any modifications to the Community Health and Safety Plan; and,
- flora and fauna in the proposed SEEFOR project areas

6.5 Implementation Schedule of the SEEFOR Project

ESMPs for the relevant components of work will be formulated based on the abovementioned frameworks prior to additional development of the proposed SEEFOR project such as Vegetation Clearing and Biomass Management Plan and continuing to commissioning of the SEEFOR project and the specified workers' health and safety issues connected with the project. Also, the IPMP primed and disclosed by the project would be enforced in this respect. The schedule for this development is shown in Table 6.7 below.

Table 6.7: ESMP Implementation Schedule for SEEFOR Road Project

s/n	Plan Name	Duration
1	Flora and Fauna Management Plan	Two weeks before the beginning of land clearing for rehabilitation and construction activities
2	Waste Management Plan	Two weeks before the commencing of land clearing for rehabilitation activities
3	Erosion and Sedimentation Management Plan	Two week before the commencement of land clearing for rehabilitation activities
4	Employment, Training and Awareness	Two week before the commencement of land clearing for rehabilitation activities
5	Water Management Plan	Two week before the land clearing activities
6	Air Quality Management Plan	Two week before the clearing activities
7	Vegetation Clearing and Biomass Management Plan	Two week before clearing activities
8	Emergency Response and Incidence Management	Two weeks prior to clearing activities
9	Cultural Heritage Management Plan	Two weeks before clearing activities
10	Traffic and Vehicle Management Plan	Two weeks before clearing activities
11	Social Investment Plan	Within five months of the start clearing activities
12	Health, Safety, and Security Management Plan	Two weeks before clearing activities
13	Community Health and Safety Plan	Two weeks before the start of clearing activities
14	Stakeholder engagement Plan	continuing updates
15	Resettlement Action Plan	At least one months prior to any resettlement

6.6 ESMP Costing and Cost Analysis

The analysis of cost obtainable in this sub-section is considered for each of the specified mitigation measures to be resourcefully implemented. It is planned distinctively for apiece of the action itemized for the phases of the proposed SEEFOR project. Consequently, it includes the pre-rehabilitation phase, the rehabilitation phase and the maintenance phase. In this regard, the cost is designed distributing across the declared measures s shown in Table 6.8.

Table 6.8: Cost Analysis of the Proposed SEEFOR Road Project in Sapele

S/N	ESMP Actions	Cost Estimate ($)
1	Capacity building on environmental mitigations covering safety standards, assessment measures and or screening	3,000.00
2	Waste management approach and taking of proper steps for waste collection and disposal	4,000.00
3	Institutional aid (procedures manuals on mainstreaming environmental and aspects from Ministry of Health, Environment, Forestry, Information, Physical planning and urban development land)	5,000.00
4	Awareness-raising campaigns for local communities and other stakeholders on environmental safeguard, safety and health	5,000.00
5	Capacity building	5,000.00
6	Environmental and social quality standards, including decommissioning of camps and borrow pits	15,000.00
6	Institutional aid (procedures manuals on mainstreaming environmental and social aspects from Ministry of Health, Environment, Forestry, Information, Physical planning and Urban Development, Land)	6,000.00
	TOTAL	**43,000.00**

CHAPTER SEVEN

7.0 SUMMARY, RECOMMENDATIONS AND CONCLUSION

7.1 Summary of Findings

The proposed activities of State Employment and Expenditure for Results (SEEFOR) of Delta State aimed at facilitating effective decision making and ensuring that accomplishment processes during the implementation of the project activities at the Sapele SEEFOR selected roads project sites, which include mainly rehabilitation and maintenance phases; repairing of collapsed drains, vegetation control, sweeping of roads' surface, painting of kerbs, de-silting of drains, patching of potholes as well as employing the youths in the affected communities in the processes are all sustainable. This ESMP ensured that civil and rehabilitation works of the selected roads project are environmentally sound, encouraging community consultation and participation, enhancing social wellbeing of the project affected persons and communities.

The SEEFOR project activities in Sapele, Delta State involve between low to medium-sized civil works, and the selected roads have been grouped into four LOTS (LOT 1 to LOT 4). At the maintenance phase, the general maintenance of the selected roads for effective performance would be the focus where the youth of the communities would be highly engaged. Meanwhile, throughout the components of the project activities, both skilled and unskilled persons will have an opportunity to be employed. To this end, the project will generate employment opportunities for local populace without skill discrimination. Consequently, the ESMP assessment provides a clear process including action plans to integrate environmental and social considerations into the SEEFOR intervention process in Sapele.

With the aid of primary and existing data acquired, the ESMP assesses the socio-economic activities in the proposed project area, and as in most other assessments, it critically examines the bio-physical processes and baseline information of the area. The assessment of the host communities revealed that the most residents in the Sapele project area were mainly low income groups earning less than N50,000 on monthly basis with a pocket of medium to high income groups with an average households of 7 persons. The

residents engage in diverse economic activities including farming. Most sections of the selected roads are occupied by small and medium scales commercial and industrial activities. It was also observed that, the living standard of the residents in the area has been affected by high cost of living and large family sizes.

The negative environment, social and economic impacts of the road rehabilitation and maintenance by the SEEFOR in Sapele, were noted to be minimal and site specific while potential positive impacts outweigh the potential negative impacts. This was quite understood from the sampled households' perceptions and this necessitates the acceptance for the implementation of the proposed projects. As regards the potential positive impacts, the proposed project would result in improved access roads and employment generation, vibrant economic activities and increased productivity.

Though the observed negative impacts will be temporary and occur mostly during the rehabilitation process, the most concerns were flooding, possible encroachment of land properties and environmental pollution. It is understood that, during the maintenance phase, pollution especially air and water as well as environmental degradation would be of concern.

7.2 Recommendations and Conclusion

It has been realized that the benefits of the proposed SEEFOR project in Sapele will far outweigh the potential adverse impacts. Consequence upon this, the proposed Sapele SEEFOR project by the Delta State SEEFOR should be implemented as this would enhance effective and efficient intra and inter urban mobility in Sapele while at the same time generating employment opportunities for the youth in the area. It is also capable of eradicating road infrastructure decay in the area.

Lastly, the community should be engaged in the project prior to the commencement of the civil works on the site. This would enable the community to make their contributions towards the sustainable implementation of the project. Job opportunity should be given to qualified members of the affected communities. In other words, local youths should be employed during the rehabilitation and maintenance phases of the project. The consultant desires to document the following:

It is definite that, the proposed project activities will have negative impacts but this can be minimized to acceptable levels with the implementation of mitigation measures provided. However, the overall positive impacts of the proposed project will be greatly far more than few liable negative impacts.

- Due to the nature of the activities of the Delta SEEFOR project, the potential negative impacts will certainly be less significant in rating and this can be smoothly and tranquilly moderated.
- It is understood that, the proposed intervention project at Sapele will result in significant positive impacts on the affected people, particularly in respect to the quality of access roads and employment generation. The principal social impact management issues revolve around adequate drainage system and acquisition of buffer zone where necessary.

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APPENDIX I

QUESTIONNAIRE ON ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN ON State Employment and Expenditure for Results (SEEFOR) FOR SAPELE, SAPELE LGA, DELTA STATE

Dear Respondent,

Thank you for taking the time to complete the following survey! The purpose of this survey is to gain valuable insight from the Project Affected Persons (PAPs) on the Environmental and Social Management Plan (ESMP) of SEEFOR project activities. This is your chance to tell us what you think!

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/Community: …….. State/L.G.A: ……..

Name of Interviewer: ……..…….…….. Date: ……..……

SECTION A: Household data

1. Gender of Respondent: (a) Male (b) Female
2. Age: (a) Below 18 yrs (b) 18-45 yrs (c) 46-65 yrs (d) Above 66 yrs
3. Marital Status: (a) Single (b) Married (c) Divorced/Separated (d) Widowed
4. Residential Status: (a) Permanent Resident (b) Back Home (Returnee) (c) Non Resident, Visiting
5. Ethnic Group: (a) Edo(b) Igbo (c) Yoruba (d) Other, specify…….
6. Religion: (a) Islam (b) Christianity (c) Traditional
7. Education: (a) None (b) Primary School (c) Secondary School (d) Tertiary (Excluding University) (e) University Graduate (f) University Post Graduate
8. Relationship to HH: (a) Self (b) Spouse (c) Child (d) Parent (e) Other, specify……..
9. Type of HH (a) Normal (Father) (b) Woman (c) Child
10. Size of the HH……

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

11. Are you affected by SEEFOR project activities? (a) yes (b) no

12. If question 11 is yes, how (a) loss of farmland (b) loss of building (c) loss of landed property (d) others specify……..
13. Occupation: (a) Famer (b) Daily Labourer (c) Trading & Shop Keeping (d) Artisans (e) Employed (salary) (f) Self Employed (g) Social Support (h) unemployed (i) Others specify…….
14. How long have you been living in this area? (a) 0-2 yrs (b) 3-5 yrs (c) 6-9 yrs (d) 10 yrs and Above
15. If non-resident, please state your actual location: …….. (Location/LGA/State)

Education

1.1 Does anyone in the household currently attend school *(If no, skip*	A	Yes	b	No
1.2. Where do the children go to school? (*Place name*)		**School Category**	**Number**	
	A	Primary		
	B	Junior High		
	C	Senior High/ Tech/		
	D	Post-Secondary		
1.3. 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	30-60 mins		
	E	60+ mins		
1.4. 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		

SECTION B: HEALTH STATUS

1. Is your present state of health affected in any way by the SEEFOR project activities? (a) Yes (b) No
2. If yes, in what way? (a) Skin diseases (b) Cough (c) Catarrh (d) Malaria (e) Water-borne diseases (f) Other, Specify……...
3. 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…….
4. 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.

5. Please tick one or more of the under-mentioned ailment/sickness, you suffer from most accordingly?

Degree Ailment	**Alwa**	**Spari**	**Seldo**	**Neve**	**Degree**	**Alwa**	**Spari**	**Seld**	**Nev**
Whooping					Rheumatis				
Tuberculosis					Rashes				
Asthma					Eczema				
Dysentery					Ringworm				
Diarrhoea					Eye pains				
Cholera					Cataract				
Pile					Glaucoma				
Hypertension					Typhoid				
Congestive health problem					Malaria				
Pneumonia					Sickle cell anaemia				
Sexually transmitted					Epilepsy				

6. Do you think your ailment/sickness is directly or indirectly caused by the SEEFOR project activities?
   (a) Yes (b) No
7. If yes, how? (a) Contamination of ground water (b) Contamination of surface water (c) Provide breading site for disease vectors (d) Noise/air pollution
   (e) Others, specify:……

SECTION C. STANDARD OF LIVING / SOCIO-ECONOMIC ACTIVITIES

1. Assets

1.1 Do you have any of the following items			
	Quantity		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. fishing traps		r. hunting trap	
i. fishing nets		s. other hunting	
j. fishing hooks		t. other (specify)	

1.2 What sort of transport does your family own			
	Quantity		Quantity
a. bicycle		f. car	
b. motorcycle/okada		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			
a. bicycle		f. car	
b. motorcycle/okada		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		Plastered mud	c. Number of rooms		1-2
		Cement blocks			3-4
		Other (specify)			Other
b. Construction material - roofing		Corrugated	d. Other structures on plot		Animal Pen
		Aluminium			Granary
		Asbestors			Shops
		Tile			Kiosks

		Other (specify)				Other
e. Construction material - floor		Earthen				
		Concretes				
		Tiles				
		Other (specify)				
f. Toilet Facility		Pit latrine				
		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				
		Others 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) Palm Oil Lamp	(f) Torchlight Battery	(g) Wood	(h) Kerosene	(i) Gas

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

3.0 Sources of Water

	for drinking		for cooking		for bathing and	
a. Lagoon	Yes	No	Yes	No	Yes	No
b. Well	Yes	No	Yes	No	Yes	No
c. Borehole	Yes	No	Yes	No	Yes	No
d. Water pump	Yes	No	Yes	No	Yes	No
e. Community tap	Yes	No	Yes	No	Yes	No
f. Piped water outside	Yes	No	Yes	No	Yes	No
g. River	Yes	No	Yes	No	Yes	No
h. Rain harvesting	Yes	No	Yes	No	Yes	No
i. Water vendor	Yes	No	Yes	No	Yes	No
j. Tanked water	Yes	No	Yes	No	Yes	No
k. Other (specify)	Yes	No	Yes	No	Yes	No

4.0 Income

State your main income per month	₦

4.1 Remittances

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

5.0 Other Income

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

6.0 Total Income

1 What is the total household monthly income (all activities)?	₦

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 SEEFOR project activities 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 organizations
    (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 SEEFOR project activities?
   (a) Soil infertility (b) Poor drainage system (c)Bad road (d) Low visibility
   (e) Bad lands (f) Flooding (g) environmental degradation (h) Degraded land
   (i) Destruction of infrastructures (j) Others (specify) ……..
2. Please indicate the environmental problems which your settlement/community would likely experience and whose cause can be linked to the SEEFOR project activities during project construction? (a) Soil infertility (b) Poor drainage system (c) Bad road
   (d) Low visibility (e) Erosion Problems (f) Flooding
   (g) environmental degradation (h) Destruction of infrastructures
   (i) encroachment of land properties
   (j) Pollution (air, surface water, ground water, noise)
   (k) Others (specify) ……..
3. Please indicate the environmental problems which your settlement/community would likely experience and whose cause can be linked to the SEEFOR project activities during project operation? (a) Soil infertility (b) Poor drainage system (c) Bad road
   (d) Low visibility (e) Erosion Problems (f) Flooding
   (g) environmental degradation (h) Destruction of infrastructures
   (i) encroachment of land properties
   (j) Pollution (air, surface water, ground water, noise)
   (k) Others (specify) ……..
4. Do you think the SEEFOR project activities will affect any valued resource/cultural/archaeological property in your area?
   (a) Yes (b) No
5. If yes mention the name(s) of the valued resource/cultural/archaeological property…….
6. How will valued resource/cultural/archaeological property be affected?
   (a) Displacement of such valued cultural properties
   (b) Vandalisation of sacred items/locations
   (c) Possible theft of sacred/archaeological items (d) Others, specify: ……

SECTION E: SEEFOR Project Activities Impact Evaluation

1. Are you aware of the proposed intervention by SEEFOR (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 project 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 theft of sacred/archaeological items
   (d) local people not employed during project activities
   (e) Others, specify: ……
5. How often do members of your household use this road? ……times/day

6. Is the frequency of use related to the problem your household experiences using the road? YES: ……. NO: …….
7. If yes to question 6, What were the problems? …….
8. Are you able to use your vehicles (e.g. bicycle, motorcycle, cars, etc) on the road? YES:….. , NO: ……
9. Who is responsible for maintaining the road? ……
10. Are maintenance and repairs carried out quickly? YES: ……. NO: …….
11. What contribution do you make towards maintenance of the road?……
12. Do you think the intervention of SEEFOR would improve the situation of the road? YES:……. NO: ……
13. How do you feel the improved road will benefit the community? Please describe fully.
    ……
    ……
14. How will the proposed project impact on your livelihood and environment?

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

15. Can you name some of the animals and other habitat around the project site that may be affected by the intervention
    ……
    ……
    ……
    ……
16. What do you expect from the activities of SEEFOR project activities?
    (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 please specify……..
17. Are there any other issue(s) of concerned as regards the intervention project in your area, please state clearly?
    ……

APPENDIX II

Nigerian Ambient Air Quality Standards (NAAQS)

Pollutants	Time of Average	Limits
Particulates	Daily average of daily values 1hour	250µg/m^3 600 µg/m^3
Sulphuroxide (Sulphurdioxide)	Daily average of hourly values 1 hour	0.01ppm 0.1ppm
Non-methanehydrocarbon	Daily average of 3-hourly values	160µg/m^3
Carbonmonoxide	Daily average of hourly values 8-hour average	10ppm 20ppm
Nitrogen oxides (Nitrogen dioxide)	Daily average of hourly values (range)	0.04- 0.06ppm
Photochemical Oxidant	Hourly values	0.06ppm

Source: Guidelines and Standards for Environmental Pollution Control in Nigeria (FEPA, 1991)

Noise Exposure Limits for Nigeria

Duration per Day, Hour	Permissible Exposure Limit dB(A)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25	115

Source: Guidelines and Standards for Environmental Pollution

Noise Level Guidelines

Receptor	One Hour LAeq (dBA)	
	Day time (07:00 -22:00)	22:00 – 07:00
Residential; Institutional; educations	55	45
Industrial; commercial	70	70

Source: World Bank Group 2007: General EHS Guidelines

Groundwater Samples

Parameters	GW1	GW2	GW3	GW4	GW5	GW6	WHO LIMITS		FMEnv Limit
							Highest Desirable Level	Max. Permissible Level	
Ph							7.0-8.5	6.5-9.2	6.5-8.5
Conductivity, µS/cm							NS	1000	-
Temperature, ^0C							NS	NS	<40
Turbidity, NTU							NS	NS	1.0
Total Dissolved Solids, mg/l							200	500	500
Salinity, ppt							NS	NS	
Hardness, mg/l $CaCO_3$							100	500	200
Alkalinity, mg/l							NS	NS	-
Dissolved Oxygen, mg/l							NS	NS	7.5
BOD_5, mg/l							NS	NS	0
COD, mg/l							NS	NS	-
Chloride, mg/l							200	600	250
Nitrate, mg/l							-	-	10
Sulphate, mg/l							200	400	500
Phosphate, mg/l							NS	NS	5
Sodium, mg/l							NS	NS	200
Calcium, mg/I							75	200	-
Magnesium, mg/l							30	75	-
Potassium, mg/l							NS	NS	-
THC, mg/l							0.01	0.3	-
Oil and Grease							-	-	0.05

Parameters	GW1	GW2	GW3	GW4	GW5	GW6	WHO LIMITS		FMEnv Limit
							Highest Desirable Level	Max. Permissible Level	
Heavy Metals									
Iron, mg/l							0.1	1.0	1.0
Zinc, mg/l							5.0	15.0	5.0
Lead, mg/l							NS	NS	0.05
Mercury, mg/l							NS	NS	0.01
Copper, mg/l							0.05	1.5	0.05
Chromium, mg/l							NS	NS	0.01
Cadmium, mg/l							NS	NS	0.03
Nickel, mg/l							NS	NS	-
Arsenic, mg/l							NS	NS	-

Appendix III

Minutes of Meetings and Consultations on the Sapele SEEFOR Project

MINUTES OF THE PUBLIC CONSULTATION HELD WITH THE WOMEN'S GROUP AT SAPELE SEEFOR PROJECT SITE IN DELTA STATE ON APRIL 4th, 2014 AT 10:40 AM

This is a brief of the minutes of FGD held with women in the proposed SEEFOR project area. This stakeholders' meeting was hold to elicit relevant information from the women group on the commencement of the different phases of the proposed SEEFOR project. This was to ensure that women in the affected communities at Sapele project area are enlightened about the proposed SEEFOR project.

In Attendance were 10 persons as shown in the attendance list below:

s/n	Name	Phone No
1	Mrs. Justina Uche	08087171541(Women Leader)
2	Mrs. Clementina Joseph	---
3	Mrs. Urgustian John	08030676367
4	Mrs. Loretta Calistos	07033034966
5	Mrs. Lovet Iba	070567206861
6	Mrs. Cristiana Johnson	---
7	Mrs. Rita Kingsley	07066118836
8	Mrs. Anna Soye	08038251958
9	Mrs. Mary Tomson	---
10	Mrs. Susan Seyiwunmi	07046315100

Opening Remarks Suffice

For the opening remarks, the lead consultant with the team members was introduced by the Site Monitoring Secretary to the women. The head appreciated the women for taking time to attend the meeting ensuring that the importance of gender balanced perception is relevant to the success of the proposed SEEFOR project. He did a brief introduction concerning the proposed project. He explained that the team which in Safeguard officers were in the community to gather information that would pave way for the smooth implementation of the SEEFOR project adding

that this is to ensure that women in the proposed project affected community were engaged in the project as required by international standards.

Perceived cause(s) of Bad State of Roads

As explained by the leader of the women's group, though some roads were in good conditions, adequate maintenance was definitely required. Some bad roads were in such conditions as a result of lack of poor quality of construction materials, lack of maintenance culture and heavy rainfall associated with climatic condition of the region. These issues combined gave way to gradual deterioration, which aggravated to the present state of the concerned roads.

Level of awareness of the project and the contribution of the women to the project

After the briefing, it was realized that majority of the attendees were aware about the proposed SEEFOR project. As was reported by some of them, this was because sometimes in 2013, the representative from Delta SEEFOR had come to inform the residents in the area about the proposed project activities by the government of Nigeria, in which some of the concerned roads were mentioned.

In terms of contribution towards the success of the project, the women unanimously made the following recommendations;

- Women should be employed as part of the labour force. They express the fact that some of the women are as skilled as men in some areas. Therefore, the women should be given equal consideration in this aspect of the project
- The women are also ready to provide voluntary service if needed during the construction phase of the jobs.
- Since the workers will need food during the civil and rehabilitation works, this service should be provided to the workers by women in the affected community
- The women will support the project peacefully.

MINUTES OF THE KEY IN-DEPTH INTERVIEW WITH THE YOUTH LEADER OF THE SEEFOR PROJECT IN SAPELE, DELTA STATE ON APRIL 4TH, 2014 AT 02:30 PM

The KII with the Youth Leader was compelled by the relevance of the youths to the success of the proposed project. It was on this basis that the KII was prepared to feel the pulse of the youths concerning the project. The interview was conducted by the socio-economic consultant and it lasted for 45 minutes.

Precisely, the following points were discussed in the course of the interviews.

(a) A brief explanation on state of the roads
(b) Awareness of the Proposed SEEFOR project
(c) The efforts of the youths towards curtailing the adverse impacts of bad roads
(d) The impacts of the roads on commuters and the affected communities
(e) The vulnerable groups - women, widows, children and physically challenged
(f) What were the key issues that concern the youth about the project
(g) Additional input from the youth members to ensure that the project is executed without any glitch

Opening remarks

The interview commenced with a brief introduction of the project details in the community to the youth leader. The need to get the youths informed before the commencement of questionnaire administration and survey for ESMP in the area was emphasized and reiterated. It was against this background that the interview was based.

A brief explanation about the concerned roads

The respondent claimed that bad state of the roads was as a result of lack of maintenance, and absent and poor drainage system. It was reported that at some point youths have made efforts to fill some big pot holes without any success. When it became unbearable by them, the youth leader said that optimistically, the current approach, if implemented would yield better results at remediating and rehabilitating the affected roads to become comfortable.

As reported, SEEFOR and the objectives of the government towards the programme were not new to the youth of the affected communities. As a member of the site monitoring committee,

the respondent claimed that SEEFOR's objectives have been discussed at length with respect to affected roads in the communities.

Efforts of the youths before now

As was initially stated, the respondent claimed that there have been several efforts by the youths. He added that on several occasions, the youths had resulted to the use of sands to fill large pot holes hindering effective movement of vehicles and thus making efforts to control further damage and the opening of the soil surface to sheet erosion which could eventually result to gully. The approach was reportedly periodic and mostly pronounced during the rainy season. This effort was to curtail the expansion of the pot holes. Apart from local palliatives, the youths also claimed thy assisted in rescuing accident victims. Also, the youths had also helped government agencies in the provision of skilled and unskilled labour when needed in area.

Key issues that concerns the youths in the area

For the youths, the maximum support needed was guaranteed as reported by the Youth Leader. He reiterated that as a youth leader, the youths of the area were ready to support the project. However, some things were critical that must be addressed. They are listed below:

1. The local youths wanted to be employed as members of ad hoc staff for the project. Some of the youths were unemployed graduates who were looking for jobs to make ends meet. And, there were unlettered unskilled youths that can form the group of labourers employed for menial jobs during the civil works. Some of the skilled youths could be administrative staff members particularly within the duration of the project.
2. Some of the youths could be employed as local security personnel. Although, there would have been special security provided by the government, the local security who understands the terrain better would provide better security for either expatriate workers or top executives of the company.
3. There was an assurance of peace and tranquility for the period of the project and other civil works that the youths can help to fast-track the completeness of the project. The youths posses the energy and were self-motivated.

Further words to ensure success of the project

Prior to the commencement of the main civil works, the contractor with SEEFOR official must engage the local populace about the next phase of the project. In order words, people must be

carried along. This would enhance information dissemination for the project. This should be based on sensitization across social and demographic lines. All social groups must be aware of the project.

Some of the female youths could also be considered key as well. They could be employed as cooks or be permitted to supply food to the workers on the field during break periods. This will also provide a means of livelihood for some of the female youths which can be continued after the project.

The full cooperation of everyone must be sought and the project must not be taken as a political statement by one. In order to ensure this, information about the project must be aired on different media houses.

Closing

The interview ended afterwards