FEDERAL GOVERNMENT OF NIGERIA

FEDERAL ROADS DEVELOPMENT PROJECT (FRDP) NIGERIA

IN COLLABRATION WITH FEDERAL ROADS MAINTENANCE AGENCY (FERMA)

FINAL REPORT

FOR

ENVIRONMENTAL MANAGEMENT PLAN (EMP) FOR THE PERIODIC MAINTENANCE OF KURFI – CHARANCHI ROAD

OCTOBER, 2010
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<th>Description</th>
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<tr>
<td>APHA</td>
<td>America Public Health Association</td>
</tr>
<tr>
<td>ASTM</td>
<td>America Society of Testing &amp; Materials</td>
</tr>
<tr>
<td>AIDS</td>
<td>Acquired Immune Deficiency Syndrome</td>
</tr>
<tr>
<td>BAT</td>
<td>Best Available Technology</td>
</tr>
<tr>
<td>BOD</td>
<td>Biochemical Oxygen Demand</td>
</tr>
<tr>
<td>CITES</td>
<td>Convention on International Trade in Endangered Species of Wild fauna &amp; flora</td>
</tr>
<tr>
<td>DO</td>
<td>Dissolved Oxygen</td>
</tr>
<tr>
<td>DS</td>
<td>Dissolved Solids</td>
</tr>
<tr>
<td>EAR</td>
<td>Environmental Audit Report</td>
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<tr>
<td>EEC</td>
<td>European Economic Community</td>
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<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<tr>
<td>ESA</td>
<td>Environmentally Sensitive Areas</td>
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<td>ESIA</td>
<td>Environmental &amp; Social Impact Assessment</td>
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<tr>
<td>ESMF</td>
<td>Envi. &amp; Social Mgt Framework</td>
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<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
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<tr>
<td>FEPA</td>
<td>Federal Environmental Protection Agency</td>
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<td>FERMA</td>
<td>Federal Roads Maintenance Agency</td>
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<tr>
<td>FMENV</td>
<td>Federal Ministry of Environment</td>
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<tr>
<td>FGD</td>
<td>Focused Group Discussion</td>
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<tr>
<td>FGN</td>
<td>Federal Government of Nigeria</td>
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<tr>
<td>FMWHUD</td>
<td>Fed. Ministry of Works, Housing &amp; Urban Development</td>
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<td>FRDP</td>
<td>Federal Roads Development Project</td>
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<tr>
<td>GIS</td>
<td>Geographic Information System</td>
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<tr>
<td>HC</td>
<td>Hydrocarbon</td>
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<tr>
<td>HIV</td>
<td>Human Immuno Virus</td>
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<tr>
<td>HSE</td>
<td>Health Safety and Environment</td>
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<td>IEE</td>
<td>Initial Environmental Examination</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>IUCN</td>
<td>International Union for the Conservation of Nature</td>
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<tr>
<td>KAP</td>
<td>Knowledge, Attitude &amp; Practice</td>
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<tr>
<td>KSEPA</td>
<td>Katsina State Env. Protection. Agency</td>
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<tr>
<td>LFN</td>
<td>Laws of the Federation of Nigeria</td>
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<tr>
<td>L. G. A.</td>
<td>Local Government Area</td>
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<td>MDGs</td>
<td>Millenium Development Goals</td>
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<td>NIWA</td>
<td>National inland Waterways Authority</td>
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<td>NESREA</td>
<td>Nat. Env. Standards &amp; Reg. Enfor. Agency</td>
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<tr>
<td>NGO</td>
<td>Non-governmental Organization</td>
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<td>NPC</td>
<td>National Population Commission</td>
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<tr>
<td>OP</td>
<td>Operational Policy</td>
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<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
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<td>QA/QC</td>
<td>Quality Assurance/ Quality Control</td>
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<td>RAM</td>
<td>Risk Assessment Matrix</td>
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<td>RPF</td>
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<tr>
<td>SEPA</td>
<td>State Environmental Protection Agency</td>
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<tr>
<td>SMENV</td>
<td>State Ministry of Environment</td>
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<tr>
<td>SPM</td>
<td>Suspended Particulate Matter</td>
</tr>
<tr>
<td>SS</td>
<td>Suspended Solids</td>
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<tr>
<td>STDs</td>
<td>Sexually Transmitted Diseases</td>
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<tr>
<td>STIs</td>
<td>Sexually Transmitted Infections</td>
</tr>
<tr>
<td>TDS</td>
<td>Total Dissolved Solids</td>
</tr>
<tr>
<td>TOR</td>
<td>Terms of Reference</td>
</tr>
<tr>
<td>TSRIC</td>
<td>Transport Sector Reform Implementation Committee</td>
</tr>
<tr>
<td>TSP</td>
<td>Total Suspended Particulate</td>
</tr>
<tr>
<td>UNCED</td>
<td>United Nation Conference on Environmental and Development.</td>
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<td>UNEP</td>
<td>United Nations Environmental Programme</td>
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<td>FERMA</td>
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EMP of Kurfi - Charanchi Road (Katsina State)

USDA United States Department of Agriculture
USEPA United States Environmental Protection Agency
WB World Bank
WHO World Health Organisation
WSSD World Summit on Sustainable Dev.
cfu/ml Colony forming unit per millilitres
dBA Decibel
ft Feet
g Gramme
k Kilogramme
g/cm Gramme per Centimetre
Km Kilometer
m$^3$ Meter Cube
meq Milliequivalent
mg Milligramme
mg/Kg Milligramme per Kilogramme
mg/l Milligramme per Litre
ml Millilitre
mm Millimetre
m/s Meter per Second
NTU Turbidity Unit
$^{\circ}/_{\text{oo}}$ Parts per thousand
$^\circ$E Degree East
$^\circ$N Degree North
pH Hydrogen ion concentration
ppb parts per billion
ppm parts per million
$^\circ$C degrees Celsius
EMP of Kurfi - Charanchi Road (Katsina State)

µg  Microgramme
µS  micro Siemen
µm  micrometer
%   Percentage
Al  Aluminum
C   Carbon
Ca  Calcium
CaCO₃ Calcium Carbonate
CCl₄ Carbon Tetrachloride
Cd  Cadmium
Cl  Chloride
CO  Carbon Monoxide
CO₂ Carbon Dioxide
Cr  Chromium
Cu  Copper
Fe  Iron
H   Hydrogen
H₂O Water
H₂S Hydrogen Sulphide
HCL Hydrogen chloride
Hg  Mercury
K   Potassium
Mg  Magnesium
Mn  Manganese
N   Nitrogen
Na  Sodium
Na₂PO₄ Sodium phosphate
NaOH Sodium hydroxide
NH₃ Ammonia
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Compound</th>
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<td>$\text{NH}_4^+$</td>
<td>Ammonium ion</td>
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<tr>
<td>$\text{NH}_4\text{F}$</td>
<td>Ammonium flouride</td>
</tr>
<tr>
<td>Ni</td>
<td>Nickel</td>
</tr>
<tr>
<td>NO$_2$</td>
<td>Nitrite ion</td>
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<tr>
<td>NO$_3$</td>
<td>Nitrate ion</td>
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<tr>
<td>NO$_X$</td>
<td>Nitrogen Oxides</td>
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<td>Oxygen</td>
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EXECUTIVE SUMMARY

The Federal Government of Nigeria (FGN) through the Federal Ministry of works, Housing and Urban Development (FMWHUD) requested the World Bank’s support towards the Federal Roads Development Project (FRDP). The purpose is to meet the immediate and short term funding needs for the federal road network and to support Government’s efforts with policy and institutional reforms promoting improved service delivery, road management and financing.

The project is specifically the road rehabilitation of 26km Kurfi – Charanchi Road section of the highway located in Katsina State, Northern Nigeria. The activities involved in the project comprise site clearing, rising of the low lying areas of the road with lateritic material, construction of concrete lined drains, arresting the washout areas and placing stone pitching. Others are placing of slabs on concrete lined drains, provision of lateritic sub base, crushed rock stone base construction of box culverts, surface dressing of shoulders, prime coat, asphalt concrete laying, removal of debris.

OBJECTIVES OF THE STUDY

The objectives of the EMP for the 26km Kurfi - Charanchi Road are to:

- identify the possible negative environmental and social impacts of the project as presently planned for implementation; and
- propose measures required to mitigate these potential negative impacts.
- the identification and assessment of environmental effects of rehabilitation works within the 40 km section of the road.
- Identification and address issues arising from involuntary resettlement.
- propose mitigation measures including environmental management plan/ procedure.

Varieties of methodologies exist for environmental impact assessment. The following steps were employed in preparation of this EMP:

- Identification of effects
- Prediction of effects
- Evaluation and Interpretation of impacts
- Communication
- Inspection procedures

The following considerations were the goals of the assessment methodology used:

- Comprehensiveness - ability to handle all possible range of elements and combinations thereof;
- Selectivity - capability to identify early in the procedure those aspects that are important;
EMP of Kurfi - Charanchi Road (Katsina State)

- Mutual exclusiveness - should be able to examine every component of an impact from different perspectives
- Confidence limits - is the method able to ascertain and isolate uncertainties;
- Objectivity - should allow no bias either from the assessor or project initiator;
- Interactions - should be able to examine both sides of a coin and provide feedback

**Policy, Legal and Administrative Framework**

The constitutional framework for environmental management is highly centralised with the Federal and State governments primarily responsible for developing and applying the legislative framework, including the provision of supervisory and regulatory functions. The EMP studies are carried out within the legal framework of both local and international environmental guidelines and regulations.

The EIA Act and the World Bank safeguard policies are similar. OP.4.01 and Nigerian EIA Act are also similar. World Bank EA Screening Category A is similar to Nigerian EIA Act category I, World Bank EA Category B is equivalent to Nigeria EIA Act Category II, World Bank EA Category C is equivalent Nigeria EIA Act Category III. However in the event of divergence between WB safeguard policy and the Existing Environmental laws in Nigeria that of the World Bank safeguards policies will take precedence.

**PROJECT DESCRIPTION**

The proposed activity is a road rehabilitation project of the approximately Twenty six (26) kilometre Kurfi - Charanchi Road located in Katsina State, North-West Nigeria. It involves the scarification of failed section of the Road, provision of stone base, prime coat, asphalt overlay, re-instatement of shoulders, construction of concrete lined drains and earth drains.

**PROJECT DEVELOPMENT ALTERNATIVES**

Approach to the selection of best project implementation and design alternatives will take into consideration the one that suits the purpose best. Potential alternatives considered include: Taking no action or no project option, Using alternative travel modes, Improving the existing facilities, Construction of a multi-lane alternative alignment and Design variations of alignment and grade.

**Potential & Associated Impacts:**

Varieties of methodologies exist for environmental impact assessment. The project despite been small in magnitude and scope, is expected to generate the following impacts:

- Site Clearing & Earthworks: at this stage of the project, impacts that are expected to arise include; Air Quality impairment through dust generation during scarification,
Biodiversity loss through clearing of adjoining road side vegetation, changes in river hydrology and damage to aesthetics through burrow pit excavation for fill material.

- Culverts and Drains demolishing/ construction activities will lead to generation of noise from machinery operations, impact on air quality from dust and fumes generation by heavy duty machines/ equipment, traffic obstruction and increased risk of accident.

- Pavement & Surfacing activities would lead to impact on surface water through run off of washed areas/ asphalt into the neighbouring water body, noise generation during surface dressing and air/ gaseous emissions.

- Socio-economic impacts that may arise include displacement of small road side businesses which have in most cases encroach into the main road corridor. There may all be impact on crops due to vehicles manoeuvring during site preparation and surfacing activities. There would also be loss of farmland due to burrow pit acquisition. The project may in addition lead to Social & health problems (new communicable diseases, sexually transmitted infections (STIs), HIV/AIDS) from influx of job seekers. Aside of the negative impacts, the project is expected to generate a lot of positive impacts such as job creation (even though for a short term), ease of transportation leading to reduced transport fares and significant reduction in rate of accidents.

Environmental Monitoring Plan
This Environmental Monitoring Plan will ensure that the integrity of the Road Project has been developed covering the project activities from site preparation, through construction, commissioning, operation of the highways, decommissioning and abandonment. The plan relates to the handling of hazardous materials and wastes, emission and discharge monitoring, site inspection and auditing, adverse weather preparedness, and decommissioning. The programme will help to verify the effectiveness of the prescribed mitigation measures is designed to guarantee and achieve the implementation of the EMP findings.

On the social concerns of the project, the issue of Social & health problems (new communicable diseases, sexually transmitted infections (STIs), HIV/AIDS) from influx of job seekers & post-construction demobilisation of large contingent of workers would be given adequate attention in view of its socio-economic implication when project implementation commences. This would be through Awareness campaign to enlighten the communities/field workers on the implications of drug and alcohol abuse, unprotected sex, prostitution and the need to sustain healthy lifestyle and behavior including the use of BCC/IEC materials

Institutional Arrangement for Implementing The EMP
The overall objective of the project is to ensure that the project implementation is integrated harmoniously into the communities. The monitoring staff and personnel shall achieve the following objectives:
• propose management rules and specific measures that are compatible with sustainable development while implementing the project
• promote awareness to construction workers and the general public regarding environmental protection,
• execute concrete means of applying the EMP.

In the execution of the project, the RSTD will be responsible for the implementation of the mitigation measures through their contractor who would be accountable to the RSTD. This contractor shall have an Environmental Engineer on site who will be responsible for all environmental issues. Whereas the World Bank will monitor the execution/implementation of the project by RSTD. FERMA on the other hand will regulate the contractor work, while the EIA Division the Federal Ministry of Environment in collaboration with affected state Ministry of Environment will carry out regulatory monitoring to ensure that all agreed mitigations are actually implemented in line with regulatory requirements.

RSDT shall be represented by Social and Environmental Officer who will be responsible for the implementation of the EMP in close collaboration with FERMA, FMENV and the Local environmental regulating bodies. Alternatively, an independent consultant may be hired by the RSDT to implement the EMP.

**Cost Estimates for EMP Implementation**

The cost estimates are based on the assumption that resource person/s (is) are likely to come from other parts of the country and therefore require travel allowances; participants of this training should could come from the collection or selection of members RSDT, FERMA, State Ministry of Environment and the affected L.G.As who should attend the exercise during the day only but will receive a per diem within the range of the estimated/ budgeted amount of about N562,500.00 per training session. It is proposed that the training programme will be implemented two times a year, over first four years of the project cycle. Thus, the total training cost is estimated at N4,5m for the entire period.

**Budget and Responsibilities**

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<th>Item</th>
<th>Budget (estimate)</th>
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<td>Mitigation</td>
<td>N8.0m</td>
<td>Contractor</td>
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<td>Management</td>
<td>N5.0m</td>
<td>RSDT</td>
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<tr>
<td>Capacity Strengthening</td>
<td>N4.5m</td>
<td>RSDT/World Bank</td>
</tr>
<tr>
<td>Monitoring</td>
<td>N3.0m</td>
<td>RSDT/FMENV/State Min Env</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>N20.5m</strong></td>
<td></td>
</tr>
</tbody>
</table>
CONCLUSION

The Environmental Management Plan was drawn with strict adherence to the guidelines and regulation of the Federal Ministry of Environment which is the sole statutory organ responsible for EIA certification in Nigeria.

The EMP reveals no profound environmental and social impacts that could result from the periodic maintenance of the Kurfi – Charanchi road. The impacts identified are minor, non-cumulative and site specific that could be easily managed to acceptable level.
CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION
The Federal Government of Nigeria through the Federal Roads Maintenance Agency (FERMA) has proposed to rehabilitate the Twenty Six (26) kilometre Kurfi - Charanchi Road which is one of the roads identified to be in deplorable conditions to ease the difficulty being faced by road users. Over the past years, the road network has expanded rapidly to accommodate steady increase in freight and passenger traffic. This rapid expansion of the road network was only made possible by spreading the available resources as widely as possible through the construction of primarily single and intermediate lane State and Local Government Area Roads.

The Road is an important link road for the North – West transport network covering several states and terminating in Lagos. It supports greater percentage of haulage services for goods coming from Lagos to other states particularly those in the northern-most part of the country and vice-versa. As the population of the country increases, so the need for reliable transport system particularly the road increases. With a current estimated population growth rate of about 3%, there is no doubt that pressure on the nation’s roads would also continue to increase with attendant increase rate of failures at various sections.

Kurfi - Charanchi Road located in Katsina State North West Nigeria is very strategic for the economy of several northern and south-western states of the country including Lagos, which is the premier manufacturing city in W Africa in addition to having the most important sea port, node for telecommunications with the largest concentration of multinationals, and home to 250 of Nigeria’s financial institutions.

While the justification of road development and maintenance projects from socio-economic considerations cannot be overemphasized, the cumulative environmental consequences of such projects need to be brought to fore with due emphasis on scientific basis. It is apparent that previously the planning and designing of highways are normally done, almost purely, on the basis of economic and traffic flow considerations. However, the environmental impacts of road construction and operation and maintenance activities with potential air and noise pollution and possible dislocation and disruption of the delicate balance of the fragile ecosystem and the need to evolve an efficient approach to deal with such effects are now
receiving focused attention. In fact the issue of transport and the environment has assumed a relatively high priority at the national and global level. This is well reflected in the ion plan for sustainable transport development into 21st century, which emerged from the United Nations conference on environment and development (Rio De Janeiro, June 1992). The set of principles drawn up at the Rio-conference has led to renewed interest in Environmental Assessment studies.

In order to ensure environmental protection vis-à-vis the highway sector projects, an Environmental Imp Assessment (EIA) is required. It is mandatory in Nigeria as stipulated by Environmental Imp Assessment Act No. 86 of 1992 of the Federal Ministry of Environment (formerly Federal Environmental Protection Agency (FEPA). Similarly the multilateral aid agencies, African Development Bank and the World Bank require EIA as part of their conditions for project funding. The need for EIA of road projects may be seen in the context of sustainable development, to:

- Ensure that environmental concerns are explicitly addressed and incorporated into the project decision making process,
- Anticipate and avoid, minimize or offset the adverse significant biophysical, social and other relevant effects of development proposals,
- Maintain eco-system and conserve bio-diversity,
- Protect the productivity and capacity of natural systems and the ecological processes which maintain their functions,
- Promote development that is sustainable and optimizes resource use and management opportunities.

It is in compliance with the national and international regulations of minimizing impact on the environment in which it operates that FERMA planned to conduct an Environmental Imp Assessment (EIA) of the project area prior to its commencement. Presented here is the report of the environmental studies and imp assessment of the road development project in compliance with the provisions of the EIA Act 86 of 1992 and FERMA’s Corporate Health, Safety and Environmental policy.

1.2 NIGERIA
The Federal Republic of Nigeria, the host nation, covers an area of 923,768 km² with a population of over 140 million. It lies in the tropics between latitudes 4°N and 14°N and longitudes 3°E and 14°E. Nigeria’s economy as elsewhere hinges on good road network. The
Nigerian transport infrastructure comprises 200,000km road network, 3,600 km of narrow gauge Railway, 6 Sea Ports and inland waterways, 4 international and 14 domestic airports and 4,000km of pipeline. The road network is the dominant internal transport mode for the haulage of people, goods and services, accounting for 95% of the domestic traffic flows and providing the only access to the rural communities where majority of the economically active population live. The network of roads comprises 33,000km Federal Highways, 50,000km State Highways and 117,000km Local Government feeder roads. The demand for good road network is growing with the rapid rise in the traffic volume. The number of vehicles in Nigeria is presently put at about 1,000,000 of which 44% are passenger cars, 20% are buses and 30% Lorries and vans, 1% road trors and 5% motorcycles. However, current estimates show that only about 11% of the Federal roads are still in good condition.

![Map of Nigeria](image)

**Figure 1.1 Map of Nigeria**

**1.3 THE APPLICANT**

The Federal Roads Maintenance Agency (FERMA) which is an Agency under Federal Ministry of Works & Housing was established to assume responsibility for the maintenance of all Federal roads nationwide.

FERMA recognizes the importance of comprehensive environmental planning and management to any successful project and is committed to undertaking the necessary studies to understand the environmental situation and to address areas where significant environmental imp may be experienced. The key premise which affects this EIA process was
established from the initial stages of development to provide general guidance, framework and a commitment to standards acceptable nationally and internationally.

1.4 OBJECTIVES OF THE ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The objectives of the EMP for the periodic maintenance of Kurfi - Charanchi Road road are to:

- identify the possible negative environmental and social imps of the project as presently planned for implementation; and
- propose measures required to mitigate these potential negative impacts.

Specific objective of the EMP focus on the following issues:

- the identification and assessment of environmental effects of rehabilitation works within the 40 km section of the road.
- Identification and address issues arising from involuntary resettlement.
- propose mitigation measures including environmental management plan/ procedure.

1.5 EMP TERMS OF REFERENCE

1.5.1 Objective of the Consultation:

The objective of this consultation is to prepare an EMP with a view to ensuring that implementation of the federal roads project does no harm to the environment and population. In preparing this EMP, Integrated Advanced Quest Limited in strict observance of the EMP Terms of Reference (TOR) carried out the following:

- Review of Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) prepared for the project (FRDP).
- Review of relevant Nigerian law and procedures;
- Review EMPs prepared for other recent World Bank projects in Nigeria
- Consultation with relevant stakeholders
- Conducted Field Work for the collection of original and relevant data (Qualitative and Quantitative Data)
- Compiled Data collation, and Analysis
- Prepared and Submission of Draft Reports
1.5.2 Scope of Work:
The scope of Work covering the following tasks describing the most important work done under this study was also strictly observed.

i). Description of Proposed Projects
ii). EA Requirements/Regulations.
iii). Description of the Environment
iv). Determination of the Potential Impacts of the Proposed Project.
v). Analysis of Alternatives of the Proposed Project
vi). Development of Environmental Management Plan (EMP) to Mitigate Negative Impacts
vii). Institutional Arrangement for the Implementation of EMP:
viii). Monitoring and Evaluation:
ix). Public Information and Consultation

1.6 REVIEW OF ENVIRONMENTAL & SOCIAL MANAGEMENT FRAMEWORK FOR THE FEDERAL ROADS DEVELOPMENT PROJECT
The Federal Roads Development Project (FRDP) seeks to improve Federal Highways in Nigeria to reduce travel costs and increase access to goods and services.
A 1999-study on selected sections of the road network in Nigeria found that only about 26% were in good condition. Current estimates show that only about 11 % of the Federal roads are still in good condition.
Hence, the Federal Government of Nigeria (FGN), through the Federal Ministry of Works Housing and Urban Development (FMWHUD), requested World Bank’s support for the FRDP. The project is meeting the immediate and short term funding needs for the Federal road network and supporting Government’s efforts with policy and institutional reforms promoting improved service delivery, road management and financing.
The principal development objectives are: (i) to reduce road transport costs along the roads supported by the project; (ii) to introduce total asset management methods for delivery and management of federal roads; and (iii) to plan and facilitate sustainable financing arrangements for the road sector.
The FRDP is organized into three components to support both the implementation of the proposed reform and the financing of critically needed investments. The three main components are:

- Policy and Institutional Reforms
- Institutional Capacity Building
- Upgrading, Rehabilitation and Maintenance of Federal Roads
The main activities under the Federal Roads Development Project entail the upgrading and maintenance of the Kurfi - Charanchi Road using modern methods based on best practices. The Kurfi - Charanchi Road is classified as a Category B project, implying that the impacts are small scale and site-specific; thus easily remedied. In recognition of the fact that environmental and social concerns may arise as a result of the proposed project, the FMWHUD commissioned an Environmental and Social Management Framework (ESMF) study in fulfillment of the World Bank requirements.

The ESMF was prepared to satisfy national and state regulatory requirements as well as World Bank’s mandate for project of such magnitude and it addresses the environmental and socio-economic consequences of the project.

As a category B project, the Kurfi - Charanchi Road is not expected to have large-scale adverse impacts on the natural environment, health and safety, of communities and individuals. The ESMF provided guidelines to follow as to how to prepare the Environmental and Social Management Plan (ESMP) and the Environmental Management Plan (EMP).

1.7 STRUCTURE OF THE EMP
Deliverables and Reporting Requirements

The EMP report is concise and limited to significant environmental issues. The main text focused on findings, conclusions and recommended actions, supported by summaries of the data collected. and citations for any references used in interpreting those data. The Report was Organised according to the outline below:

- Executive Summary
- Introduction (Chapter One)
- Project Justification (Chapter Two)
- Description of the Proposed Project (Chapter Three)
- Description of the Environment (Chapter Four)
- Significant Environmental Impacts (Chapter Five)
- Mitigation Measures (Chapter Six)
- Environmental Management Plan (Chapter Seven)
- Remediation Plan after closure of Construction Phase (Chapter Eight)
- Conclusion (Chapter Nine)
- List of References
- Appendices:
- List of EMP Report Preparers;
- Environmental and Social management clauses that would be inserted in Contracts

### 1.8 POLICY FRAMEWORK

In EMP such as this, all actions that will result in physical, chemical, biological, cultural and social modifications of the environment as a result of the new project/development are assessed. Also, the EMP report should serve as a means of assessing the environmental impacts of a proposed action plan, rather than as a justification for decisions already made or actions already taken. Usually the EMP study is carried out using a systematic, multidisciplinary approach and should incorporate all relevant analytical disciplines to provide meaningful and factual data, information and analyses. Also, EMP studies are carried out within the framework of both local and international environmental guidelines and regulations. The work scope of this project involves development of roads and highways and related activities.

#### 1.8.1 The 1999 Constitution of the Federal Republic of Nigeria

The constitution of the Federal Republic of Nigeria (Section 30) confers jurisdiction on the Federal Government to regulate the operations and development activities in this sector. These, together with applicable International conventions provide a basis for an EMP of the project. The development will take account of the following Nigerian laws and regulations, and international conventions that apply to the subject development:

#### 1.8.2 The National Policy on Environment

The National Policy on the Environment was launched by the President in Abuja on 27 November 1989 (FEPA, 1989). The goal of that policy was to achieve sustainable development in Nigeria and, in particular to:

- Secure for all Nigerians a quality environment adequate for their health and well-being.
- Conserve and use the environment and natural resources for the benefit of present and future generations.
- Restore, maintain and enhance ecosystems and ecological processes essential for the functioning of the biosphere and for the preservation of biological diversity and to adopt the principle of optimum sustainable yield in the use of living natural resources and ecosystems.
• Raise public awareness and promote understanding of essential linkages between environment and development and to encourage individual and community participation in environmental improvement efforts.

• Co-operate in good faith with other countries, international organisations and agencies to achieve optimal use of trans-boundary natural resources and effective prevention or abatement of trans-boundary environmental pollution.

1.8.3 Economic Policy Framework
The Federal Government of Nigeria’s recently adopted National Economic Empowerment & Development Strategy (NEEDS) clearly defines its medium-term economic reform agenda and provides an overall policy objective for the country. The policy rests on promoting growth through a market-based economy with greater private sector participation in the economy and Government’s role limited to the provision of adequate infrastructure and necessary services.

The implementation of the NEEDS is crucial to the attainment of the country’s Millennium Development Goals (MDG).

1.8.4 National Transport Policy
As part of the Government’s reform policy; the Transport Sector Reform Implementation Committee (TSRC) formulated a National Transport Policy in 2003. The goal of the policy is to:

- Promote an efficient and affordable integrated transport network.
- Improve the safety, security, quality and speed of movement of goods and people.
- Increase the involvement of the private sector in the financing and operation of transport related services.
- Promote qualitative road infrastructure and operations through greater effectiveness and efficiency in meeting customer needs.
- Structure the infrastructure to ensure environmental sustainability and internationally accepted standards.
- Promote a culture of maintenance and upgrading of existing infrastructure.
- Build strong financial base (both public and private) for the creation, maintenance and upgrading of transport infrastructure.
1.9 LEGAL FRAMEWORK

1.9.1 National Legislations

- Federal Environmental Protection Agency Act No 58 of 30 December 1988: FEPA Act, cap 131, LFN, 1990
- National Environmental Protection (Management of Solid and Hazardous Wastes) Regulation S.I. 15
- Environmental Impact Assessment Act No. 86 of 10 December 1992
- Federal Ministry of Environment Procedural Guidelines for EIA
- Harmful Waste Act No. 42 of 25 November 1988
- August 1991 Federal National Parks Act
- Forestry Act, 1958
- Land Use Act 1978
- National Policy on the Environment
- Quarries Act 350 LFN of 1990
- Federal Highways Draft Act 2001. It provides guidelines and standards for construction, maintenance and operation of highways,

1.9.2 National Environmental Guidelines

The introduction of guidelines and standards was part of the implementation of the National Policy on Environment and the environmental pollution abatement strategy contained therein. The guidelines and standards relate to six areas of environmental pollution control:

- Effluent limitations.
- Water quality for industrial water uses at point of intake.
- Industrial emission limitations.
EMP of Kurfi - Charanchi Road (Katsina State)

- Noise exposure limitations.
- Management of solid and hazardous wastes.
- Pollution abatement in industries.

**National Environmental Protection (Effluent Limitation) Regulations S.I.8 (1991)**

This regulation was issued in 1991. It provides national Guidelines and Standards for industrial effluents, gaseous emissions, noise, air quality and hazardous wastes management for Nigeria.

**National Environmental Protection S. I .9 (Pollution and Abatement in Industries in Facilities Producing Waste) Regulations, 1991**

This provides general guidelines for the containment of pollution in industries that generate harmful wastes.

**National Environmental Protection (Management of Solid and Hazardous Wastes) Regulation S.I. 15**

This provides general guidelines for the management of solid and hazardous wastes in Nigeria and emphasises the followings:

**Waste Notification**: Industries are obliged to notify the FMENV of all toxic hazardous and radioactive wastes which are stored on site or which are generated as part of operations (Regulations 1991, Article 2).

**Waste Management**: With regard to waste management, a legal basis exists in Nigeria for the establishment and implementation of a “cradle-to-grave” tracking system. Specifically, the Solid and Hazardous Wastes Management Regulations 1991 provide for the establishment of a documentation scheme to cover the generation, transport, treatment and disposal of hazardous wastes.

**Environmental Impact Assessment Act No. 86 of 10 December 1992**

This Act provides the guideline for activities or development projects for which EIA/EMP is mandatory in Nigeria. Such developments include oil and gas fields, conversion of mangrove swamps covering area of 50 hectares or more for industrial use, land/coastal reclamation projects involving an area of 50 hectares or more. Pursuant to this, the EIA Act No 86 of 1992 sets out the procedure for prior consideration of environmental and social issues in certain categories of public and private development projects.
Federal Ministry of Environment Sectoral Guidelines for EIA

The FEPA Act, cap 131, LFN, 1990 allocates powers of environment legislation making and enforcement to the Federal Environmental Protection Agency (FEPA), now Federal Ministry of Environment. (FMENV)

In-line with its functions, FEPA has published the EIA/EMP Sectoral Guidelines (revised in September 1995). The guidelines cover major development projects and are intended to inform and assist proponents in conducting EMP studies.

1.9.3 Nigerian EMP Procedure
The FMEnv developed a National EIA/EMP Procedure (FEPA 1985) in response to the promulgation of the EIA Act No. 86 of 1992. The procedure indicates the steps to be followed from project conception to commissioning in order to ensure that the project is implemented with maximum consideration for the environment.

The procedure for EMP involves the project proposal stage where the project proponent notifies FMEnv of the proposed project in writing. The project proposal is expected to contain all relevant information on the project, including a land-use map.

This stage is followed by the screening phase, during which the Ministry will carry out, an Initial Environmental Examination (IEE) and assign the project into a category based on the following criteria:

- Magnitude
- Extent or scope
- Duration and frequency
- Risks
- Significance and

Mitigation measures available for associated and potential environmental impacts.

The location of the project if in Environmentally Sensitive Areas (ESAs) is also an important criterion in project categorization. The areas categorized as Environmentally Sensitive Areas (ESAs) include coral reefs, mangrove swamps, small islands, tropical rainforests, areas with erosion-prone soils, natural conservation areas, etc.

There are three categories (I, II, III) in FMEnv’s EIA/EMP Procedural Guideline. Category I projects are subjected to full-scale EIA/EMP. It consists of, among others, construction of Roads and Infrastructure projects like, Railways, Ports and Harbours, airports, Electrification Projects etc.

Projects listed in Category II may not require a full-scale EIA/EMP except when such a project is located in an Environmentally Sensitive Area (ESA) and in this case the project will be automatically assigned to Category I. The requirement for Category II projects is a
partial EIA/EMP. Also, mitigative measures or changes in project design (depending on the nature and magnitude of the environmental impacts) as well as further actions may be required from the proponent. Category II projects include reforestation/ afforestation projects, land and soil management, small-scale irrigation and drainage, mini hydro-power development, small-scale development of petroleum or related activities, etc.

**Category III** projects are those expected to have essentially beneficial impacts on the environment. For projects in this category, the Ministry will issue an Environmental Impact Statement (EIS). Projects in this category include family planning programme, institutional development, environmental awareness projects, etc.

Another stage of FMEnv’s EIA/EMP procedure which comes up after the project proposal stage in the scoping stage, the main feature of which is that the proponent will be required to submit a Terms of Reference (TOR) for the proposed EMP study. In some cases, the Ministry may demand a Preliminary Assessment Report, and any additional information from the proponent to assist in vetting the scope and the TOR of the proposed EIA/EMP study. This stage is followed by actual implementation of the EIA/EMP study, preparation of Draft Final and Final EIA/EMP Reports, review process and approval/certification.

Apart from the general EMP Guidelines, the Ministry has also prepared sectoral guidelines for EMP in different industrial sectors, including the Infrastructure Sector.

### 1.9.4 Other National Legislations
Apart from the FMEnv guidelines highlighted above, there are other legislations that have been put in place to serve as a check on the operators of oil and gas industries. Some of these are summarized below:

(i) **Penal Code**

The Nigerian Penal code makes it an offence punishable with up to 6 months imprisonment for “Any person who: Violates the atmosphere in any place so as to make it noxious to the health of persons in general dwelling or carrying on business in the neighbourhoods or passing along a public way or, does any act which is, and which he knows or has reason to believe to be, likely to spread the infection of any disease dangerous to life, whether human or animal”.

**The Explosives Act**
This Act was promulgated in 1964 and empowers the Minister of Mines & Power (now Solid Minerals) to make regulations on the importation, manufacture, storage and use and the ownership and possession of explosives.

Endangered Species Act (1985)
The endangered species Act No. 11 of 1985 prohibits the hunting, capture and trade of endangered species.

Quarries Act Cap 385 Laws of Federation of Nigeria, 1990
The act provides for and regulates quarrying activities in Nigeria. It prohibits unauthorized quarrying activities for industrial use and diversion of water course or impounding of water for that purpose. The Act gives the Minister for Mines and Power the power to make regulations for prevention of pollution of natural water supply.

Land Use Act 1978
States that “… it is also in the public interest that the rights of all Nigerians to use and enjoy land in Nigeria and the natural fruits thereof in sufficient quality to enable them to provide for the sustenance of themselves and their families should be assured, protected and preserved”.

National Inland Waterways Authority Act (1997)
Act 13 of 1997 establishing the National Inland Waterways Authority (NIWA) repeals the Navigable Waterways (Declaration) Act of 1988. The NIWA is managed by a governing board, whose functions, among others, include the following:

- Serve as the body providing regulations for all inland navigation;
- Ensure the development of infrastructural facilities for a national inland waterways network connecting the creeks and the rivers to meet the challenges of modern inland waterways transportation;
- It is charged with undertaking capital and maintenance dredging, and hydrological and hydrographic surveys;
- Design of ferry routes and operate ferry services within the inland waterways systems; and
• Involved in the survey, removal and receipt of derelicts, wrecks and other obstructions from inland waterways, and undertake the installation and maintenance of lights, buoys, and all navigational aids along water channels

1.9.5 **State Legislations**

The Nigerian Constitution allows States to make legislations, laws and edicts on the Environment as environmental is listed under the concurrent schedule of the 1999 Constitution.

The EIA Act No. 86 of 1992 also recommends the setting up of State Ministries of Environment (SMENV) and Environmental Protection Agencies (SEPA), to participate in regulating the consequences of project development on the environment in their area of jurisdiction. SMENVs thus have the responsibility for environmental protection at the state level within their states.

In accordance with the provisions of Section 24 of Act FEPA 58 of 1988 Chapter 131 of the Laws of the Federation of Nigeria (LFN), the State Environmental Protection Agencies and the State Ministry of Environment were formed in **Katsina State** which are important stakeholders in the proposed project because the site of the project is within the State.

The functions of the SMENV/SEPAs include:

- Routine liaison and ensuring effective harmonisation with the FMENV in order to achieve the objectives of the National Policy on the Environment;
- Co-operate with FMENV and other relevant National Directorates/Agencies in the promotion of environmental education;
- Be responsible for monitoring compliance with waste management standards;
- Monitor the implementation of the EMP and the Environmental Audit Report (EAR) guidelines and procedures on all developments policies and projects within the State.
EMF of Kurfi - Charanchi Road (Katsina State)

Figure 1.2: EMP process flow chart in Nigeria
1.10 WORLD BANK SAFEGUARD POLICIES

The World Bank has operational safeguard policies, which apply to various development projects which the bank is either implementing or funding. The objective of these policies is to prevent or at least minimize social environmental risks while increasing socio-economic benefits of approved projects. The effectiveness and positive impact on development of projects and programmes supported by the Bank has substantially increased as a result of these policies. The Bank’s safeguards policies include:

- OP 4.01 Environmental Assessment
- OP 4.04 Natural Habitats
- OP 4.09 Pest Management
- OP 11.03 Cultural Property
- OP 4.12 Involuntary Resettlement
- OD 4.20 Indigenous Peoples
- OP 4.36 Forests
- OP 4.37 Safety of Dams
- OP 7.50 Projects in International Waterways
- OP 7.60 Projects in Disputed Areas

However, it is the responsibility of the federal government of Nigeria for ensuring that safeguards aren’t violated.

- In preparing this EMP, consideration of the type of the planned investments vis-a-vis the requirements of the Bank Safeguard policies has led to the determination that only Environmental Assessment (OP4.01) of Bank


The already identified World Bank’s operational policy that is triggered by the FRDP is presented below:
Table 1-1: Applicable World Bank Operational Policies

<table>
<thead>
<tr>
<th>Operational Policy</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental assessment (EA)</td>
<td>World Bank financed projects must be environmentally sound and sustainable. The type and detail of the EA is dependent on the nature, scale and potential environmental risks. The safeguard instrument used here is the Environmental and Social Management Framework (ESMF).</td>
</tr>
</tbody>
</table>

From the above it is clear that the World Bank safeguard policy OP.4.01 on environmental assessment and Nigeria’s EIA Act are also similar. For instance, World Bank EA Screening Category A is similar to Nigerian EIA Act category I, World Bank EA Category B is equivalent to Nigeria EIA Act Category II, World Bank EA Category C is equivalent Nigeria EIA Act Category III. However in the event of divergence between WB safeguard policy and the Existing Environmental laws in Nigeria that of the World Bank will take precedence.

1.11 INTERNATIONAL STANDARDS, TREATIES AND CONVENTIONS

Global and Regional Treaties and Conventions are, in principle, binding in first instance on National Governments that accede to them. They are obliged to implement such arrangements through national legislation. At the international level, Nigeria is party to a number of Conventions that are relevant to the proposed development project. UNEP (1991) provides an overview of applicable, international Treaties and conventions. The more relevant ones are reviewed briefly below:

**Vienna Convention for the Protection of the Ozone Layer, including the Montreal Protocol and the London Amendment**

The objectives of this Convention adopted in 1985 are to protect human health and the environment against adverse effects resulting or likely to result from human activities which modify or are likely to modify the Ozone Layer and to adopt agreed measures to control human activities found to have adverse effects on the Ozone Layer.

**Convention on the Conservation of Migratory Species of Wild Animals or Bonn Convention**
The Bonn Convention’s adopted in 1979 aims at the conservation and management of migratory species (including waterfowl and other wetland species) and promotion of measures for their conservation, including habitat conservation.

**Convention on Biological Diversity**

The objectives of this Convention, which was opened for signature at the 1992 Rio Earth Summit and adopted in 1994, are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources by appropriate transfer of relevant technologies.

**Convention concerning the Protection of the World Cultural and Natural Heritage or World Heritage Convention**

This Convention adopted in 1972 defines cultural and natural heritage. The latter is defined as areas with outstanding universal value from the aesthetic and conservation points of view.

In addition, Nigeria is a signatory to the following relevant international conventions:

- The Convention Concerning the Protection of the World Cultural and Natural Heritage, The World Heritage Convention, 1972;
- The Framework Convention on Climate Change, Kyoto Protocol, 1995;
- The Convention on Biological Diversity, 1992;
CHAPTER TWO

2.0 PROJECT JUSTIFICATION

2.1 NEED FOR THE PROJECT
Kurfi - Charanchi Road is in advanced stage of dis-repair at the moment despite the pivotal road it is playing in conveying passengers and goods from the North western part of the Country to the Southwest and vice versa. The need for this project cannot be over-emphasized when considered with the current deplorable state of the road which has led to loss of several lives and properties. This is more significant as the nation is dependent on virtually one mode of transport system that is, road transportation which is at the moment is also near comatose.

2.1.1 Project Objectives
Naturally, every development project is conceived to provide key benefits to its main host communities and by extension, the general human kind. For this project, its main objective is to;

- provide efficient and motorable road between the affected communities.
- further easy the movement of goods and services thereby reducing the cost of transportation and by extension, prices of goods and services.
- Create job opportunities
- Reduce current accident level to the barest minimum

Other specific objectives of the project include creation of employment, reduction of accident due to poor state of the current road.

2.1.2 Benefits of the project
- Provision of an efficient road transport infrastructure.
- Reduction of accident rates from the current level.
- Contribute to the development of affected towns and communities
- Reduction of man-hour loss due to improved road network.
- Creation of job opportunities

2.2 Project Development Alternatives
Approach to the selection of best project implementation and design alternatives will take into consideration the one that suits the purpose best. Potential alternatives considered include;
i. Taking no action or no project option
ii. Using alternative travel modes
iii. Improving the existing facilities
v. Design variations of alignment and grade.

In conceiving the development options and scenarios, the following main factors were also considered:
- availability of raw materials,
- process facilities,
- Cost effectiveness and more effective utilization of resources.

2.2.1 USING OTHER TRAVEL MODES OPTION
Other modes of efficient passenger travel and goods movement over long distances include air, rail, transit, and marine. With regards to goods movement the only realistic alternative to trucking is rail. Rail, transit and air travel are all feasible alternatives for transporting passengers. However, currently there is no functional passenger rail service in the affected area coupled with its limited transit service distance. Air transport service is prohibitively expensive and unrealistic in view of the length of the area under consideration and thus by far the least sustainable option of travel. Therefore other modes of travel are not seen as effective alternatives. This option is therefore rejected.

2.2.2 ALTERNATIVE ALIGNMENTS OPTION
Alternative alignment options would be prohibitively expensive and more disruptive and could lead to loss of revenues from diverted traffic. It would also entail very high costs for property acquisition and compensation claims, lost employment, a decreased tax base and reduced access to other communities along the existing alignment. This alternative considering the total length of the road involved, would be un-economical and will create greater environmental and social impact on the adjoining communities.

2.2.3 DESIGN VARIATIONS OF ALIGNMENT AND GRADE OPTION
Consideration of design variation of existing alignment was considered defective option considering that the road would serve the same purpose as the original one which would maintain initial quality and functionality. This option was also rejected as it will create an uneven road alignment.
2.2.4 NO DEVELOPMENT/ PROJECT OPTION
No project or no-development option is a scenario in which road rehabilitation/ improvement activity would not be executed. With the “no-project” option, existing levels of service and safety deficiencies in the project area will worsen as automobile and truck traffic volumes continue to increase and would make industrial and socio-economic development impossible or at best expensive. This will negatively impact the local economy and by extension, the state and the nation in general considering our dependence on road transportation. This scenario is equally rejected as it would prevent meeting the nation’s growing transport needs.

In general all the interactions with the communities were positive. They wanted the project to commence in earnest. The results of the public meetings and the completed questionnaires supported the Project and considered it a necessity to promote economic development and reduce poverty in the region.

In addition, the consequences of the alternative without the project are inter alia, lack of fluidity of traffic and blockage of sub regional integration, worsening of poverty in the areas concerned and lack of contribution to the development of trade within the nation.

2.2.5 PREFERRED ALTERNATIVE: REHABILITATING THE EXISTING ROADS
Rehabilitate the Kurfi - Charanchi road to facilitate more efficient haulage of people, goods and services. It will accommodate the existing and projected traffic demand, improve the transportation infrastructure of the region and promote economic development in and around the project corridors. This alternative is acceptable.

2.3 VALUE OF THE PROJECT
It has been estimated that over 620 million naira will be required for the implementation of the project. The proposed project cost includes land acquisition and demolishing of structures/ compensation, mobilization, construction and decommissioning other activities. The project intends to employ about 50 – 70 people directly and over 300 people indirectly during execution. Priority will be given to qualified persons from the host community, followed by nearby communities. The total value of the project that will be brought into the local economy can be regarded as the benefits described earlier. The implication of this is that if identified negative cost and impact can be carefully mitigated, then the project would contribute an overall net positive economic benefit to the nation.
2.3 ENVISAGED SUSTAINABILITY

The sustainability of the project is based on several factors which include social, economic and technical among others. In addition, the fact that the intended communities particularly those in and around the identified L. G. A would continue to use the road as their major access and would ensure that wilful destruction or damage of the road infrastructure is not allowed is a key sustainability factor. Other sustainability factors for the road include:

- **Technical**
  The road rehabilitation project will be executed by experienced engineers and monitored by qualified resident Engineer.

- **Environmental**
  The environmental sustainability of the project is predicated on the fact that not much interference is expected with the physical setting. In addition, adequate environmental management plan, EMP, is to be put in place to ensure that as much as possible existing alignment would be followed.

  A good housekeeping practice will be maintained and the project will implement all the regulations related to EMP.

- **Social**
  FERMA and RSDT will ensure that adequate compensation is paid to all affected person as well as ensuring cordial relationship with stakeholders and communities by the contractor. The people of the area shall be given consideration in employment.

- **Life Span**
  It is expected that the road will remain viable and sustained for at least fifteen (20 - 25) years or more.
CHAPTER THREE
PROJECT DESCRIPTION

3.1 PROJECT DESCRIPTION
The proposed activity is a road rehabilitation project of the approximately 26km Kurfi - Charanchi road. It involves the scarification of failed section of the Road, provision of stone base, prime coat, asphalt overlay, re-instatement of shoulders, construction of concrete lined drains & earth drains and replacement of bridge deck (bridge span 19.30m).

3.1.1 Project Location
The Highway route is located within Katsina State covering Kurfi and Charanchi. The section of the route stretches through a distance of about 26km along an approximately Southwest - Northeast orientation.

3.2 DESIGN STANDARDS
The horizontal and vertical alignments of this route as they exist will in a lot of cases meet with the design standards required of Federal highways by the Federal Ministry of Works & Housing without much impediment and re-alignment. In general, the road design has been carried out to the Federal Ministry of Works’ “Highway Manual Part I – Design”, from
inception. The design speed required is 100Km/hr. Permanent features like bridges and culverts shall be rehabilitated in accordance with the Federal Highways standards.

3.3 LAYOUT AND EXISTING CONDITIONS OF THE ROAD

A site assessment of the project roads, covering the full length of the road was undertaken. The objectives of this study were:

- To assess the present condition of the local network at each location so as to determine the present state of effects of the local environment
- To ascertain the details of the road geometry (width, slopes, curvature, etc) pavement construction method and pavement conditions, drainage location and condition of structures;
- To identify rock cuts, agricultural farms, steep side slopes and other control, bridge crossings, expensive buildings and structures are also noted; and
- To ascertain the present site of the road development in its locality, the communities served by the section of the highway, the common goods moved, the alternative mode of transportation, problems militating transport and travel within these locations.

Road inventory sheets were prepared along the route of the project during the detailed assessment study. The following were the observations made:

3.3.1: Carriageway and Shoulders

The existing Kurfi - Charanchi carriageway in general was 7.30m wide and the width of the existing shoulders varied from 1.20 to 1.5m (of the required width of 2.75m) the condition of which was largely eroded or non-existent. Even though originally paved with asphaltic material, the condition of the roads ranged from fair to poor and has fallen below acceptable standards in places because of neglect and inadequate maintenance.

3.3.2: Pavement

A significant portion of the Kurfi - Charanchi road pavement which was made up of an asphalted concrete surfacing was observed to have failed, with prevalent pavement distress features like potholes, cracks, ruts and edge failure were prevalent along the carriageway. The shoulders were observed to have major erosion problem occasioned by long period of runoff and poor drainage.

3.3.3: Existing Alignment

The alignment generally traverses a flat to gently rolling terrain with sharp decent and ascends in various points along the route. Most part of the existing alignment between Kurfi and
Charanchi has long strained sections. Thus some of the horizontal alignment has to be improved upon to satisfy geometric design requirements.

3.3.4 Drainage
The project road is criss-crossed by many rivers. There are therefore various types of existing drainage structures – mainly bridges and culverts along the route to ensure adequate drainage and maintenance of moisture equilibrium throughout the year. There are a number of bridges and culverts along the Kurfi - Charanchi section of the road, which is apparently because of the high incidence of rainfall and the fact that the terrain is undulating thus forming many water pathways. However, from the assessment, it was noticed that over a significant part of the road, side drains were not provided which is likely one of the reasons why the pavement has completely failed in places.

3.3.5 Road Furniture
The traditional highway furniture such as road markings and safety warning signs and kilometre posts for proper direction of traffic are not common on the project roads. The few ones provided along the roads are either in poor condition or inscriptions had faded. Embankments and some bridges also lack guardrails. The reason for this deplorable condition of road furniture could be traced to the old age and poor maintenance of the roads.

3.4 SCOPE OF WORKS / PROJECT OVERVIEW
The rehabilitation of the Road involves (a) Scarification of failed sections (b) Provision of Stone Base (c) provision of Prime Coat (d) Asphalt Overlay (e) Reinstatement of Shoulders (f) Construction of concrete lined drains and earth Drains and (g) replacement of Bridge Deck.

The Detailed scope of work is as follows:

(a) Site Clearance and Earthworks

- Site Clearance on either side of road up to limits of construction width of all bush, grass and trees including topsoil
- Vegetation Clearing viz; cutting of bush, grass, shrub and trees etc on either side of the roadway and/or median
- Scarification of failed sections of existing asphaltic surface
- Cutting of potholes to rectangular shapes
- Excavation of burrow pits etc.
EMP for Kurfi – Charanchi Road (Katsina State)

(b) Culverts and Drains
- Demolition of failed pipe Culverts
- Removal of Debris
- Excavation and backfilling works for pipe, box, culverts and side drains
- Laying of precast single RC pipes
- Concrete works

(c) Pavement and Surfacing
- Provision, spread and compacting of base and sub base material
- Laying of prime Coat
- Surface dressing
- Laying of Asphaltic concrete binder

3.5 INPUT AND OUTPUT OF RAW MATERIALS AND PRODUCTS

Construction Materials

Quality construction materials - gravel and fill material are abundant around the road corridor. Aggregates can be sourced from neighbouring quarry sites while sand can be obtained from the several riverbanks that are easily accessible from the project site.

Raw Material Supply

Major inputs in the road project include the various construction equipment and machinery for scarification, grading/ earth (soil) movement, topographic levelling, creation of road pavement, Asphalt overlay (coal tarring) and bridge works, and construction materials including bitumen, gravel and fill material usually excavated on site.

3.6 STAFFING AND SUPPORT

The project is expected to provide employment for reasonable number of people (both skilled and unskilled) directly and indirectly through sales of food to the workers by the local community.

Facilities and Services

Sources of Energy Available to the Project

Petroleum products which include motor gasoline, dual purpose kerosene, automotive gas oil, liquefied petroleum gas, low- and high-pour fuel oil and base oil represent major energy sources in Nigeria available to the project.
Base Camp

A temporary base camp for construction activities shall be located adjacent to FERMA Field Observation Office and Camp. All necessary sanitary and messing facilities shall be provided for an estimated 45 workers expected on site.

3.7 PROJECT SCHEDULE
The total duration from zero date to commissioning of the road will be determined. The remaining phases required prior to construction include completion of the environmental impact assessment, detailed field survey for the Highway rehabilitation project. The Highway is expected to be maintained and to remain in operation for a long time to come before another round of maintenance work.
CHAPTER FOUR

4.0 DESCRIPTION OF THE ENVIRONMENT

4.1 GENERAL
The environmental baseline (physical, chemical, biological, socio-economic and health) characteristics of the proposed 26km Kurfi – Charanchi Road Rehabilitation project area are herein presented. The environmental baseline characteristics are required to establish the existing environmental status of the proposed project route and also serve as a reference data for future studies and environmental monitoring. They will also be used as a baseline for which the anticipated impacts of the project would be determined for appropriate mitigation measures to be put in place.

4.2 FIELD METHODOLOGY AND SAMPLING TECHNIQUES
Field studies, sampling, socio-economic data gathering were conducted from 10th to 17th March, 2010. Extensive reconnaissance of the project area and surrounding communities were undertaken. Based on this survey, vegetation transects and quadrants, soil, water, sediment and air sampling points, socio-economic and health data gathering areas were established.

All baseline data gathering activities were carried out in accordance with the Federal Ministry of Environment (FMENV) and other international standards and guidelines. Field sampling methods and laboratory procedures were consistent with established and standard methodologies (ASTM, APHA and USEPA). The study methodologies, sampling techniques number of samples collected and their corresponding geographical coordinated are presented in the next chapter.

4. 2.1 LITERATURE REVIEW
Extensive review of available relevant literatures was carried out to acquire background information and data on the physical, biological and socio-economic characteristics of the project area.

4.2.2 CLIMATIC AND METEOROLOGICAL STUDIES
Field data covering the following climatic elements viz: temperature, rainfall, wind and sunshine hours were gathered for each day while comprehensive meteorological data were obtained from the NIMET Office at Oshodi, Lagos.

4. 2.3 AIR QUALITY MEASUREMENT
In-situ air quality assessment was conducted using the Modern MSA Gas Guard-2 while suspended particulate meter (SPM) was monitored by means of a Digital Dust Indicator, Model P-5L2.
The Gaseous parameters measured included the following, viz:

- Carbon monoxide (CO)
- Nitrogen dioxide (NO₂)
- Sulphur dioxide (SO₂)
- Hydrogen dioxide (H₂S)
- Ammonia (NH₃)
- Chlorine (Cl₂)
- Hydrogen chloride (HCL)

4. 2.4 NOISE LEVEL MEASUREMENTS
The level of noise in the project area and surrounding communities was measured in 13 locations using the Portable Rion Sound Level Meter Model NA-24 on the A-weighted scale.

Dust Particles
The particulate matter in the project area and surrounding communities was measured in 13 locations using the Portable dust Meter (particulate monitor).

4. 2.5 VEGETATION STUDIES & BIODIVERSITY ASSESSMENT
The vegetation and biodiversity status of the proposed site were assessed using a combined of sampling techniques and study methodology. The major ecosystem types were identified, species diversity recorded, photographic recordings made and representative plant specimens collected.

4.2.5.1 Sampling Techniques
The belt and line transects were adopted for rapid and extensive assessment of all vegetation types while the quadrant was used for the intensive and detailed study of randomly selected sites. The quadrant consists of a number of either 5m x 5m or 10m x 10m squares demarcated within the study areas while the belt transects consist of 5-10m-wide transect located both within and outside the length of the Kurfi – Charanchi Road. The transects were randomly selected linear cuttings across the vegetation types.

Within the quadrants and along the transects, the under listed vegetation and flora characteristics were determined.
Floristic Composition: Plants species were identified to family, generic and species levels. Those that couldn’t be identified in the field were collected for subsequent identification in the Herbarium.

Quantitative Assessment of Species Abundance: The abundance, dominance and ecological importance of plant species in each quadrant were quantified by determining the Density, Cover, Frequency and performance.

Life Form and Biological Spectrum: The best – known description and classification of life forms and the use of life form to construct a biological spectrum are due to Raunkiare (1934), and this was adopted in this study with some modifications. The life forms of the species are arranged in a natural series in which the main criterion is the height of buds which reflects adaptation to climate. Species are classified as: Phanerophytes, Chamaephytes, Hemicryptophites, Cryptophytes, Therophytes and Epiphytes.

Structure of Vegetation: The vegetation structure is defined by three components viz:

i. The vertical arrangement of species, i.e. stratification

ii. Horizontal arrangement of species, i.e. spatial distribution of individuals, and

iii. The abundance of each species.

These components are used to produce scaled profile diagrams for the vegetation types of the project route.

4.2.5.2 Biodiversity Assessment
Biodiversity is a global asset of tremendous ecological, genetic, social, economic and scientific value. It is important for maintaining life sustaining system of the biosphere. The ecological status of ecosystems and species was evaluated and classified using the appropriate IUCN (1992) threat categories i.e. A-Endangered Species; B-Threatened; C-Rare; D-Vulnerable; E-Endemic; F-Introduced/Exotic Species.

4.2.5.3 Herbarium Studies
Representatives’ samples of plant species in the project area were collected and prepared as standard herbarium specimens, using appropriate techniques. Plant identification was carried out both in the field and Herbarium using appropriate Floras, Manuals and Monographs (Hutchinson & Daziel, 1972).
These specimens would serve as permanent records of the vegetation and floristic composition of the area. Each specimen would always be available for study or quick reference in connection with any future operations in any of the study sites.

4.2.5.4 Economic Crops Inventory
All economic crops including plants of medicinal values were identified and documented using their scientific and vernacular names.

4.2.6 HYDROBIOLOGICAL STUDIES

4.2.6.1 Surface Water Quality
Most of the rivers (2) traversed by the road were dry during the time of the baseline studies collection. However, water handlers were observed digging water holes at the river beds. Some samples were obtained from the handlers (see pic below ) and were analysed in-situ.

![Ground Water Studies](image)

**Fig: 4.1: Ground Water Studies**

Six (6) samples were collected from hand dug wells and one. Groundwater samples were also treated and preserved as in surface water above.

Water, Soil and Sediment Samples for microbiological analysis were separated from the pool in the field by transferring appropriate quantities to the laboratory in iced park containers (Coolers) and stored in the refrigerator at 4°C prior to analysis.
4.2.7 SOIL STUDIES
Soil samples were collected from 10 locations, which included two controls, by taking five auger borings at depth of 0-15cm (for top soil) and 15-30cm (for bottom soil) at appropriate intervals. All samples were labeled, geo-referenced and transported to the laboratory in iced chambers.

4.2.8 SOCIO-ECONOMIC AND CULTURAL SURVEY
This study employed a combination of survey questionnaire, interviews, focus group discussions, community forum meetings and field observations to achieve an understanding of the Socio-economic variables which must be considered in relation to the proposed project.

The main objective of the survey was to evaluate the possible impacts of the proposed project on the socio-economic and cultural life of the neighboring communities. It was also aimed at determining the perception of the people of their environment and development activities.

4.2.9 HEALTH RISK ASSESSMENT
In conjunction with Socio-economic Survey, health interviews were conducted in the communities. Some public and private health institutions were also visited for secondary data collection.

4.2.10 CONSULTATION PROGRAMME
Consultations shall be carried out throughout the project lifecycle with all stakeholders to ensure that their views and opinions are integrated into the EIA process. Two broad levels of consultation i.e. Institutional and Public have been embarked upon. Details shall be presented in the chapter on consultation below.

4.3 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)
Quality assurance and quality control programmes were put in place to cover all aspects of the study including sample collection, sub-sampling, handling, laboratory analysis, data coding, statistical analysis, presentation and communication of results.

4.3.1 Sample Collection And Handling
This was carried out in accordance with National and International Guidelines and Standards.

4.3.2 Sample Identification And Coding
All samples were properly sealed and labeled and the under listed information attached in a clear/legible and durable manner to permit identification without ambiguity:

(1) Identification code or sample number
(2) Date and time of sampling

(3) Description of sample: type of water/volume collected/where collected

(4) Source of collection: river, stream, well, borehole.

(5) Method of sampling

(6) Analysis to be performed on the sample.

4.3.3 Transport Of Samples
Bottles or other containers holding samples were protected and sealed to avoid deterioration or loss of any of their contents. Packaging protected the bottles from possible external contamination, particularly near the opening. All samples were kept in ice-chest to keep them preserved.

4.3.4 Reception Of Sample In The Laboratory
On arrival in the laboratory, all samples were preserved under conditions such that any contamination is avoided and any change in their contents is prevented. All samples were kept in the refrigerator.

4.3.4.1 Records
Chain of custody records were completed and signed by all parties who came into contact with the samples.

4.4. FIELD RESULTS AND OBSERVATIONS
The results of field observation, number of samples, sample coordinates and in-situ measurements are presented in this chapter.

4.4.1 Hydrobiological Studies
Five physico-chemical parameters were determined in-situ for two surface water samples from the project site as shown in Table 4.1

Table 4.1: Physico-Chemical characteristics of surface water of Kurfi – Charanchi Road Route
Table 4.2: Physico-Chemical characteristics of groundwater of Kurfi – Charanchi Road Route (Dry Season)
EMP for Kurfi – Charanchi Road (Katsina State)

<table>
<thead>
<tr>
<th>S/N</th>
<th>Sample Code</th>
<th>Latitude (N)</th>
<th>Longitude (E)</th>
<th>Area Description</th>
<th>pH</th>
<th>Temp. (°C)</th>
<th>Cond. (µS/cm)</th>
<th>TDS (mg/l)</th>
<th>DO (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>P KU-CH W2</td>
<td>12°40'50.4&quot;</td>
<td>007°57'20.6&quot;</td>
<td>Banye</td>
<td>5.9</td>
<td>29.61</td>
<td>111</td>
<td>68</td>
<td>5.05</td>
</tr>
<tr>
<td>3</td>
<td>KU-CH W3</td>
<td>12°42'37.9&quot;</td>
<td>007°43'54.2&quot;</td>
<td>Charanchi</td>
<td>5.9</td>
<td>29.00</td>
<td>104</td>
<td>64</td>
<td>6.40</td>
</tr>
</tbody>
</table>

(WW = WELL WATER; BH = BOREHOLE)

4.4.2 Noise Level And Suspended Particulate (Dust)
Mean value of noise levels measured in 10 locations which included two control areas are shown in Tables 4.3.

Table 4.3: Background Noise Level/Dust Measurements in the Project Route (March 2010)

<table>
<thead>
<tr>
<th>S/N</th>
<th>Sample Code</th>
<th>Description of Location</th>
<th>Latitude (N)</th>
<th>Longitude (E)</th>
<th>Noise Level (dBA)</th>
<th>Dust</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>KU-CH ND1</td>
<td>Kurfi</td>
<td>12°39'54.5&quot;</td>
<td>007°28'59.8&quot;</td>
<td>58.0</td>
<td>12.3</td>
</tr>
<tr>
<td>2</td>
<td>KU-CH ND2</td>
<td>Banye</td>
<td>12°40'50.4&quot;</td>
<td>007°57'20.6&quot;</td>
<td>51.1</td>
<td>11.8</td>
</tr>
<tr>
<td>3</td>
<td>KU-CH ND3</td>
<td>Charanchi</td>
<td>12°42'37.9&quot;</td>
<td>007°43'54.2&quot;</td>
<td>45.3</td>
<td>07.8</td>
</tr>
</tbody>
</table>

FMENV Limit for 8 - hour exposure

90.0
4.4.3 Vegetation Studies
The project area falls within the Sudan Savanna Zone, which consists of short grasses. The height of the grasses is greatly affected by the decrease in the amount of rain fall. The major trees found within this zone include acacias, dumb-palms, fan-palms and shea butter. Bush Fallows of different ages and farmlands are also abundant in the area. Different species of trees, shrubs, herbs, grasses and sedges were identified and documented. The various characteristics of the vegetation including floristic composition, life form spectrum and species density, among others, shall be given in forthcoming reports. Vegetation and reproductive organs of representative plant species were collected at the various locations where collected at the various locations where soil samples were taken. Additional random samples were also collected along the Kurfi – Charanchi road and adjacent areas with similar characteristics.

4.4.4 Soil Studies
Top and bottom soil samples were collected in ten locations including two control sites. Top and bottom soil samples were collected in fourteen locations including two control sites. Also, all samples were preserved and transported to the laboratory for analysis. All locations were geo-referenced as shown in below.

The Soils are largely clayey soils (locally called "Laka") and about five meters in depth, and fine in texture. The soils are occasionally difficult to work, tending to become waterlogged with heavy rains and to dry out or crack during the dry season. Though, in Kurfi town and its surroundings the soils are more fertile in nature. The characteristics crops are cotton, maize, millet, Guinea corn, groundnuts etc.

Table 4.4: Coordinate and Area description of Soil Samples of Kurfi Charanchi road.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Sample Code</th>
<th>Latitude (N)</th>
<th>Longitude (E)</th>
<th>Area Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Geographic</td>
<td>Geographic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>KU-CH SS1</td>
<td>12°39'54.5&quot;</td>
<td>007°28'59.8&quot;</td>
<td>At Chainage 0.00 Kurfi</td>
</tr>
<tr>
<td></td>
<td>(T&amp;B)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>KU-CH SS2</td>
<td>12°40'19.9&quot;</td>
<td>007°58'06.1&quot;</td>
<td>Sabon Baraye</td>
</tr>
<tr>
<td></td>
<td>(T&amp;B)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### EMP for Kurfi – Charanchi Road (Katsina State)

<table>
<thead>
<tr>
<th>S/N</th>
<th>Sample Code</th>
<th>Latitude (N)</th>
<th>Longitude (E)</th>
<th>Area Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>KU-CH SS3 (T&amp;B)</td>
<td>12°40'50.4&quot;</td>
<td>007°57'20.6&quot;</td>
<td>Benye Market Square</td>
</tr>
<tr>
<td>6</td>
<td>KU-CH SS4 (T&amp;B)</td>
<td>12°41'08.3&quot;</td>
<td>007°06'08.1&quot;</td>
<td>Banye dutse</td>
</tr>
<tr>
<td>7</td>
<td>KU-CH SS5 (T&amp;B)</td>
<td>12°42'37.9&quot;</td>
<td>007°43'54.2&quot;</td>
<td>Charanchi</td>
</tr>
</tbody>
</table>

(SS = Soil Samples; T = Top Soil i.e. 0-15cm; B = Bottom Soil i.e. 15-30cm; V = Vegetation)

#### 4.4.5 Wildlife

Pertinent information on wildlife was obtained by direct interviews and through the administration of questionnaires. There is a general widespread decline in wildlife population as a result of population growth, which has resulted in land-take, intensive agriculture that has reduced wildlife habitats.

#### 4.4.6 Socio-Economic Study

Katsina State was created in 1989 and has a total land mass of about 34,685 sq.km. The state comprises 34 Local Government Council Areas with an estimated population of about three million people. The Road Route cut across two Local Government Areas (L.G.As), Kurfi LGA(b) Charanchi LGA. The following communities were visited during the studies and questionnaires were administered. Focus group discussions were also held with the communities visited are Kuri, Benye and Charanchi.

#### 4.4.7 Health Assessment

Both primary and secondary data on health and medical facilities of the various communities have been gathered. These would be analysed in details and presented in forth coming reports.
Figure 4.2: Entrance to Charanchi Town on the Kurfi Charanchi Highway

4.4.7.1 Air Quality Data
The results of air quality assessment for the proposed site are shown in Table 4.11 and 4.12 while Nigeria ambient air quality standard and WHO guidelines are indicated below the table.
Table 4.5: Air Quality Data for Kurfi Charanchi Road Route (Dry Season)

<table>
<thead>
<tr>
<th>S/ N</th>
<th>Sample Code</th>
<th>Description Location</th>
<th>Long (N)</th>
<th>Latitude (E)</th>
<th>NO₂ ppm</th>
<th>H₂S ppm</th>
<th>CO ppm</th>
<th>S0₂ ppm</th>
<th>NH₃ ppm</th>
<th>CL₂ ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>KU-CH AQ1</td>
<td>At Chainage 0.00 Kurfi</td>
<td>12°39'54.5''</td>
<td>007°28'59.8''</td>
<td>0.003</td>
<td>ND</td>
<td>0.003</td>
<td>0.002</td>
<td>0.03</td>
<td>0.01</td>
</tr>
<tr>
<td>2</td>
<td>KU-CH AQ2</td>
<td>Sabon Baraye</td>
<td>12°40'19.9''</td>
<td>007°58'06.1''</td>
<td>0.002</td>
<td>ND</td>
<td>0.002</td>
<td>0.001</td>
<td>0.012</td>
<td>0.01</td>
</tr>
<tr>
<td>3</td>
<td>KU-CH AQ3</td>
<td>Benye Market Square</td>
<td>12°40'50.4''</td>
<td>007°57'20.6''</td>
<td>0.003</td>
<td>ND</td>
<td>0.003</td>
<td>0.000</td>
<td>0.007</td>
<td>0.03</td>
</tr>
<tr>
<td>4</td>
<td>KU-CH AQ4</td>
<td>Banye dutse</td>
<td>12°41'08.3''</td>
<td>007°06'08.1''</td>
<td>0.001</td>
<td>ND</td>
<td>0.002</td>
<td>0.002</td>
<td>0.008</td>
<td>0.02</td>
</tr>
<tr>
<td>5</td>
<td>KU-CH AQ5</td>
<td>Charanchi</td>
<td>12°42'37.9''</td>
<td>007°43'54.2''</td>
<td>0.002</td>
<td>ND</td>
<td>0.001</td>
<td>0.002</td>
<td>0.008</td>
<td>0.00</td>
</tr>
</tbody>
</table>

FMENV Standards: 0.04-0.06 NS 10-20 NS NS

WHO Guidelines: 0.08 NS 10 NS NS

(ND = Not Detected; NS = Not Specified)
4.4.8 Public Information And Consultation Programme
This is the processes of seeking and disseminating useful information about the proposed project and the probable environmental and socio-economic effects form or to designated bodies, organizations and other stakeholder with environmental protection responsibilities and interests. Public participation is a very important aspect of this programme and the entire process is therefore strongly influenced by culture/tradition, educational attainment and the political awareness of the host communities of the project being as assessed.

4.4.8.1: Consultation Objectives
The objective of the Consultation Process is to acquire and disseminate information, identify and address legislative, community and environmental concerns and to proffer appropriate mitigation options for all identified negative impacts. The intention was to:

- Avoid conflict by addressing issues promptly;
- Ensure that any fears or apprehensions about the nature, scale and impacts of the proposed project have been fully addressed;
- Avoid any misunderstanding about the project;
- Promote the good cooperate image of the organization.
- Accelerate the approval process by Regulatory Agencies thereby fulfilling legal requirements.
- Inform the public about plans, programmes and activities related to projects under consideration;
- Seek collectively the cooperation and understanding of all stakeholders;
- Identify and mitigate possible environmental, health and social impacts that may emanate from the proposed project operation and activities;
• Assuage any fears and suspicions/apprehensions the communities may have regarding the nature, severity and effects of the project on the environment and health;

• Avoid misunderstanding and prevent conflict that may arise from wrong perception of stakeholders concerning the project, thus engendering harmony commitment and legitimacy among host communities; nationally and internationally;

4.4.8.2: Consultation
Consultation is necessary in order to enlist the participation of groups in the assessment of any project. For this project, consultation was carried out at two main levels - public and institutional consultation. Public consultation was conducted at major towns/villages all along the project road as many are to be affected by the project. Interviews with individuals belonging to different social and/or economic categories and concerned local administrative bodies were made. Questionnaires were also administered to local or international NGOs for their opinions on the construction works in relation to their adverse effects on the environment. This was to indicate local initiatives to participate in the road development project and assess the key roles to be played by the different stakeholders in terms of delivering services, goods, works, or other elements in the project, mechanisms used for consultation and participation in the project, main outcome and recommendations of the consultation process, and how these recommendations can be incorporated into the project.

Consultation was approached in the following ways:

(i) A Community Liaison Officer (CLO) was appointed and charged with the responsibility of:

- Identifying and establishing contacts with the respective stakeholders;
- Providing a link between the communities and FERMA;
- Acting pro-actively to identify and inform FERMA Management of various community issues and concern;
- Documenting all contacts and actions and advising on appropriate community assistance projects.

(ii) Issuance of notice of intent to carry out an EIA for the proposed development project in cooperation with the local regulatory Agencies (Federal Ministry of Environment, State Ministries of Environment and State Ministries of Works and Housing, Local Government Officials etc.) for a meeting with FERMA and the Project Consultants, where the project was explained to the people and their co-operation solicited;

(iii) Adopting a transparent method of surface right compensation payment to all affected parties;

(iv) Sustaining consultation with stakeholders via "Peoples' forum" both before and after the payment of compensation, with explanations of key issues as they arise and affect the people;

(v) Maintaining effective communication between FERMA and the communities, through the Community Liaison Officer (CLO);

(vi) Ensuring the full commitment of FERMA to implement all mutually agreed Community Assistance Projects.

The environmental management team has established sound working relationships with FMENV and the three State Ministries of Environment officials.

4.4.8.3: Levels of Consultation
Two broad levels of consultation were identified viz: (a) Institutional and (b) Public

(a) Institutional Consultation

The following Federal, State and Local Government Institutions and line agencies with environmental protection responsibilities have been consulted, viz:

- Federal Ministry of Environment, Abuja (FMENV)
- Katsina State Ministry of Environment & Tourism
• Katsina State Environmental Protection Agency (KSEPA)
• Katsina State Ministry of Land & Housing
• Ministry of Agriculture and National Resources
• National Population Commission (NPC)
• Affected Local Government Areas.

(b) Public Consultation

The underlisted communities located near the Road Right-of-Way, Traditional Rulers, Chiefs and relevant stakeholders were consulted and discussions held with them in several from between 11th to 12th March, 2010. The communities include: Kurfi, Banye and Charanchi

4.4.8.4: Future Consultation
Consultations shall be carried out through the project lifecycle with all stakeholders to ensure that their views and opinions are integrated into the EIA process.

4.4.8.5: Identifying Stakeholders
Stakeholders for the purpose of this project shall be defined as all those people and institutions that have an interest in the successful planning and execution of the project. This includes those positively and negatively affected by the project. To identify the key stakeholders, Table 4-6 was developed.

Table 4.6: The Stakeholder Identification Matrix

<table>
<thead>
<tr>
<th>Those who may be affected by the project:</th>
<th>How to identify them</th>
</tr>
</thead>
</table>
| People living in close proximity of the proposed activity route. | • Identify the local government area(s) that falls within 1 km radius of the proposed sites.  
• Review available data to determine the stakeholder profile of the whole stakeholder or relevant group.  
• Use identified groups and individuals to tap into stakeholder networks to identify others. |
| Special interest groups. | • Identify key individuals or groups through organised groups, local clubs, community halls |
| Individual property owners that will be directly or indirectly affected. | • Advertise in local newspapers, requesting people that they may be affected to register interest in attending meetings or receiving further information. |
| Business (owners and employees). | • Council lists or property registers. |

### 4.4.8.6: Consultation Strategies

The consultation process shall ensure that all those identified as stakeholders are consulted. Subject to approval by FERMA, the contractor for the project should share information about the project with the public, to enable meaningfully contribution and enhance the successfull implementation.

Public consultation should take place through public forum, seminars, meetings, radio programs, request for written proposals/comments, questionnaire administration, public reading and explanation of project ideas and requirements. The consultation plan would be monitored by relevant regulators who will set their own verifiable indicators to assess the degree of participation of the key stakeholder during all the phases of the project implementation.

### 4.4.8.7: LEVEL OF ENGAGEMENT

The level of stakeholder involvement would be based on the project phase, location and expected outcome. Small projects would require less complicated stakeholder involvement programs as the issues are likely to be less complex and their impact smaller. This section is a guide to determining the level of stakeholder involvement required.

Specifically, the extent of stakeholders’ involvement would be based on the following:

- the project is likely to have significant impacts, that is, high impacts in one area/location, or relatively small impacts spread out over a large area.
- the project involves significant issues, that is, the wider stakeholder may be affected.
Through these engagement strategies; the FERMA would be able to:

- clarify the project's objectives in terms of stakeholders’ needs and concerns
- identify feasible alternatives (in particular alternative locations) and examine their relative merits in terms of environmental, social and economic factors
- identify and prioritise environmental issues, and establish the scope of future studies

identify processes for continued stakeholders’ involvement.
CHAPTER FIVE

5.0 ASSOCIATED & POTENTIAL ENVIRONMENTAL IMPACTS

5.1 BACKGROUND

Varieties of methodologies exist for environmental impact assessment. The following steps were employed in preparation of this EIA:

- Identification of effects
- Prediction of effects
- Evaluation and Interpretation of impacts
- Communication
- Inspection procedures

The following considerations were the goals of the assessment methodology used:

- Comprehensiveness - ability to handle all possible range of elements and combinations thereof;
- Selectivity - capability to identify early in the procedure those aspects that are important;
- Mutual exclusiveness - should be able to examine every component of an impact from different perspectives
- Confidence limits - is the method able to ascertain and isolate uncertainties;
- Objectivity - should allow no bias either from the assessor or project initiator;
- Interactions - should be able to examine both sides of a coin and provide feedback

5.1.1 Basis for Screening

In assessing the impacts of the proposed road project the following information were used:

(a) Knowledge of the project activities, equipment types, construction activities, commissioning activities, operational maintenance, procedures, and abandonment procedures,
(b) The results of baseline studies (biophysical, health and socio-economic)
(c) Findings of previous EIA studies and Audits of similar projects and other literature findings on the primary project activities,
(d) Comparison with FMEnv/WHO/EEC/World Bank guidelines and standards,
(e) Series of expert group discussions and seminars,
EMP for Kurfi – Charanchi Road (Katsina State)

(f) Past experience on other EIA projects.

The criteria applied to the screening of various activities were:

(i) Magnitude - Probable level of severity.

(ii) Prevalence - likely extent of the impact.

(iii) Duration and frequency – likely duration - long-term, short-term or intermittent.

(iv) Risks – Probability of serious impacts.

(v) Importance - value attached to the undisturbed project environment.

The various components of the project environment likely to be impacted by the proposed road rehabilitation project activities and the associated impact indicators were identified and are listed in Table 5.1 below.

### Table 5.1: Impact Indicators for Various Environmental Components

<table>
<thead>
<tr>
<th>Environmental Components</th>
<th>Impact Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td></td>
</tr>
<tr>
<td>Emissions</td>
<td>Particulates, NO\textsubscript{X}, SO\textsubscript{X}, CO\textsubscript{2}, CO, Oil and grease</td>
</tr>
<tr>
<td>Noise &amp; Vibration</td>
<td>Day-time disturbance, hearing loss, communication impairment, annoyance</td>
</tr>
<tr>
<td>Climate</td>
<td>Humidity, temperature, rainfall, wind speed and direction</td>
</tr>
<tr>
<td>Land Resources</td>
<td></td>
</tr>
<tr>
<td>Soil/Landuse</td>
<td>Erosion, fertility, subsidence, farming, hunting, recreation.</td>
</tr>
<tr>
<td>Ecology</td>
<td>Diversity, distribution &amp; abundance of Aquatic &amp; Terrestrial Flora &amp; Fauna.</td>
</tr>
<tr>
<td>Hydrology</td>
<td></td>
</tr>
<tr>
<td>Hydrology</td>
<td>Drainage, discharge, hydrologic balance, sedimentation, erosion.</td>
</tr>
<tr>
<td>Water Quality</td>
<td></td>
</tr>
<tr>
<td>Water Quality</td>
<td>Solids (DS, SS), turbidity, toxicity, eutrophication, contamination, microbiology, \textit{E. Coli}</td>
</tr>
<tr>
<td>Hydrogeology</td>
<td>Ground water level, quality &amp; availability</td>
</tr>
<tr>
<td>Biological</td>
<td></td>
</tr>
<tr>
<td>Fisheries</td>
<td>Productivity, diversity &amp; abundance.</td>
</tr>
</tbody>
</table>
### 5.1.2 Scoping

Scoping identifies the various aspects (activities) of the proposed road project that could have significant impact on the environment. It identifies issues of critical concerns. Scoping of the proposed project also seeks to provide solutions to issues such as:

- What are the potential impact from the execution and operation of the road project?
- What will be the magnitude, extent and duration of the impacts?
- Of what relevance are the impacts on the environment within local, contexts?
- What mitigation or amelioration measures can be put in place to reduce or avoid the negative impacts or to enhance and maximize positive impact?

Consequently, scoping was used to identify the biophysical, health, and socio-economic components of the environment that will significantly be affected by the proposed project activities. The project activities that will have impact on the environment are:

- Site Preparation/clearing
- Blasting/Excavation/piling
- Civil works & Asphalt Laying
- Operation and maintenance activities
- Decommissioning and abandonment
5.2 IMPACTS IDENTIFICATION
The main effects of the residues and emissions from site preparation/bush clearing, road construction, operations and abandonment, were identified and analyzed in sufficiently clear and comprehensive manner. These residuals and emissions include but were not limited to:

- Emissions to air.
- Noise and vibrations.
- Discharges to land and soil.
- Effects on ecosystems.
- Influx of job seekers

5.3 IMPACTS QUANTIFICATION AND DETERMINATION OF SIGNIFICANT IMPACTS
The identified associated and potential impacts of the proposed Road Project were quantified using the Risk Assessment Matrix (RAM) and the ISO 14001 criteria for identifying significant environmental aspects/impacts. The following are ISO 14001 based Criteria and Ratings for identifying significant environmental impacts of the proposed project.

LEGAL/Regulatory Requirements (L)

Is there legal/regulatory requirements, or a permit requirement?

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>There is no legal/regulatory requirement</td>
</tr>
<tr>
<td>3</td>
<td>There is legal/regulatory requirement</td>
</tr>
<tr>
<td>5</td>
<td>There is a permit required</td>
</tr>
</tbody>
</table>

RISK (R ) - What is Risk/Hazard rating based on Risk Assessment Matrix

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low risk</td>
</tr>
<tr>
<td>3</td>
<td>Medium/Intermediate risk</td>
</tr>
<tr>
<td>5</td>
<td>High risk</td>
</tr>
</tbody>
</table>
Environmental Impact Frequency (F) - What is frequency rating of impact base on RAM?

1 = Low frequency
3 = Medium/Intermediate risk
5 = High Importance

Importance of Affected Environmental Component and Impact (I) - What is rating of importance based on consensus of opinions?

1 = Low importance
3 = Medium/Intermediate
5 = High frequency

Public Perception (P) – What is the rating of public perception and interest in proposed project and impacts based on consulting with stakeholders?

1 = Low perception and interest
3 = Medium/Intermediate perception and interest
5 = High perception and interest

The significant potential impacts of the proposed project were identified as those impacts in the checklist of indicator parameters in Table 5.7 that satisfy the following criteria:

L+R+F+I+P) ≥ 15: This is the sum of weight of the legal requirements, Risk factor, Frequency of occurrence, Importance and public perception greater than or equal to the benchmark (15).

(F+I) IS > 6: Sum of weight of frequency of occurrence and importance of affected environmental components exceeds benchmark (6).

P = 5: The weight of the public perception/interest in the potential impact exceeds the benchmark (5).

68
<table>
<thead>
<tr>
<th>Project Scope</th>
<th>Project Activity</th>
<th>Potential/Association Impacts</th>
<th>L</th>
<th>R</th>
<th>P</th>
<th>I</th>
<th>Assessment Criteria</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Clearing &amp; Earthworks</td>
<td>Roadside clearance</td>
<td>Biodiversity loss, changes in river hydrology,</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>Significant</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Vegetation Clearance</td>
<td>Vegetation clearance: Biodiversity loss, changes in river hydrology,</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>Not significant</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Scarification &amp; cutting of potholes</td>
<td>Scarification &amp; cutting of potholes: Air quality, dusts etc</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Significant</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Excavation of burrow pits</td>
<td>Excavation of burrow pits: Biodiversity loss, changes in river hydrology, air quality,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culverts and Drains</td>
<td>Demolition &amp; removal of failed pipe culverts</td>
<td>Demolition &amp; removal of failed pipe culverts: Air quality, dusts etc</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>Significant</td>
<td>10</td>
</tr>
<tr>
<td>Potential/Associated Impacts</td>
<td>Criteria</td>
<td>Total Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------------</td>
<td>-------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excavation &amp; backfilling works</td>
<td>Air quality, dusts, noise etc</td>
<td>3 1 5 3</td>
<td>Significant</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laying of pre-cast pipes</td>
<td>Air quality, dusts, noise etc</td>
<td>3 5 5 5 1</td>
<td>Significant</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete works</td>
<td>Air quality, dusts etc</td>
<td>2 3 3 1</td>
<td>Significant</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compacting of base &amp; sub base</td>
<td>Air quality, dusts, noise etc</td>
<td>2 1 2 3</td>
<td>Significant</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Dressing</td>
<td>Air quality, dusts, noise etc</td>
<td>3 1 3 3</td>
<td>Significant</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>prime Coating</td>
<td>Air quality, dusts, noise etc</td>
<td>3 1 5 3</td>
<td>Significant</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphalting</td>
<td></td>
<td>3 5 5 5</td>
<td>Significant</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rock Aggregates transportation</td>
<td></td>
<td>2 1 2 3</td>
<td>Significant</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.3: Risk Assessment Matrix for Environmental Consequences
## EMP for Kurfi – Charanchi Road (Katsina State)

### Table: Consequence vs Increasing Probability

<table>
<thead>
<tr>
<th>Severity</th>
<th>People</th>
<th>Assets</th>
<th>Environment</th>
<th>Reputation</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No injury</td>
<td>No damage</td>
<td>No effect</td>
<td>No impact</td>
<td>Incident has occurred in road construction</td>
<td>Incident has occurred in project</td>
<td>Happens several times per year in project</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Slight Injury</td>
<td>Slight damage</td>
<td>Slight effect</td>
<td>Slight impact</td>
<td>Low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Minor Injury</td>
<td>Minor damage</td>
<td>Minor effect</td>
<td>Limited impact</td>
<td>Risk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Major</td>
<td>Localize</td>
<td>Localized</td>
<td>Considerable</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes:
- **Severity**:
  - 0: No injury
  - 1: Slight Injury
  - 2: Minor Injury
  - 3: Major

- **People**:
  - No injury

- **Assets**:
  - No damage

- **Environment**:
  - No effect

- **Reputation**:
  - No impact

- **Increasing Probability**:
  - A: Never heard of incident
  - B: Incidents have occurred in road construction
  - C: Incidents have occurred in project
  - D: Happens several times per year in project

<table>
<thead>
<tr>
<th>CONSEQUENCE</th>
<th>INCREASING PROBABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Injury</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ed damage</td>
</tr>
<tr>
<td>4</td>
<td>Single Fatality</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Multiple Fatalities</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 5.4  Example of further definition of consequence – severity rating for risk matrix**
<table>
<thead>
<tr>
<th>Severity</th>
<th>Potential Impact</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Zero effect</td>
<td>No environmental damage. No change in the environment. No financial consequences.</td>
</tr>
<tr>
<td>1</td>
<td>Slight effect</td>
<td>Local environmental damage within the fence and within systems. Negligible financial consequences.</td>
</tr>
<tr>
<td>2</td>
<td>Minor effect</td>
<td>Contamination, damage sufficiently large to affect the environment single exceedance of statutory or prescribed criteria, single complaint. No permanent effect on the environment.</td>
</tr>
<tr>
<td>3</td>
<td>Localized effect</td>
<td>Limited loss of discharges of known toxicity. Repeated exceeding of statutory or prescribed limit affecting neighbourhood.</td>
</tr>
<tr>
<td>4</td>
<td>Major effect</td>
<td>Severe environmental damage. The company is required to take extensive measures to restore the contaminated environment to its original state. Exceeding of statutory or prescribed limits</td>
</tr>
<tr>
<td>5</td>
<td>Massive effect</td>
<td>Persistent severe environmental damage or severe nuisance extending over a large area. in terms of commercial or recreational use or nature conservancy, a major economic loss for the company. Constant high exceedance of statutory or prescribed limits.</td>
</tr>
</tbody>
</table>
CHAPTER SIX

6.0 MITIGATION MEASURES

6.1 INTRODUCTION
The preceding chapter identified and assessed a number of potential and associated environmental, socio-economic and health impacts of the project. At the end of the assessment, each negative environmental impact was defined as being of high, moderate or low significance. To further assure environmental sustainability of the project, mitigation measures are presented in this chapter for impacts identified as having high and moderate significance. No additional mitigation measures are considered necessary for some impacts of low significance. This is either because these impacts are by their nature of little or no significance, and or because they have been adequately mitigated through design and construction plans philosophy.

The mitigation measures proffered for the predicted environmental impacts from the project took cognizance of:

- Environmental laws in Nigeria, with emphasis on permissible limits for waste streams [FEPA (1991) now FMEnv.]
- Best available technology for sustainable development;
- Feasibility of application of the measures in Nigeria; and
- Social wellbeing of project affected persons (PAPs).

To further assure environmental sustainability of the project, mitigation measures are presented in this chapter for impacts identified as having high and moderate significance. No additional mitigation measures are considered necessary for some impacts of low significance. This is either because these impacts are by their nature of little or no significance, and or because they have been adequately mitigated through design, construction plans and plant operations philosophy.

6.2 Approach to Impact Mitigation
Mitigation measures are options that can be used to either completely eliminate or minimize identified negative impacts of a development project. The traditional approach to design and operations is to ensure compliance with the applicable safety codes and standards during design. However, compliance with regulations, codes and standards may not be sufficient to achieve an appropriate level of Health Safety and Environmental (HSE) performance in design. Design codes are generic and applicable to facilities in a number of geographical areas that face a wide range of technical challenges unique to the project.
The HSE objective with respect to the design and operation of the project is to implement all cost effective measures to reduce the risk and effects from major hazards including accidents. The approach has been to use this as a goal rather than a prescriptive objective that cannot be achieved without following a documented process of identification, assessment, reduction and continuous monitoring.

Thus the steps taken in the HSE process for the Project included the following:

- Design based on Codes, Standards and Regulations.
- Improved design based on Quantitative Risk Assessment and Environmental Impact Assessment
- Improved design from human factors evaluation

The hierarchical order of importance of these HSE design elements is illustrated in Figure 6-1

![Figure 6-1](image)

In line with the HSE performance objectives of the Project Development a number of mitigation measures have been built into the project design and operating philosophy. These in-built mitigation measures are expected to significantly improve the environmental sustainability of the project and are therefore presented in subsequent sections together with additional mitigation measures that shall be put in place for moderate and high significance negative impacts.
identified in the preceding chapter. Some mitigation measures are also aimed at enhancing the positive impacts of the project.

6.3 Recommended Mitigation Measures and Residual Impacts
The primary aim of the EMP process is to identify and evaluate the significant environmental impacts of a project with a view to developing methods of mitigating these effects. The ultimate goal of the Project development EMP is therefore to achieve as much as possible, a design and operations that have no significant residual environmental impacts.

The associated and potential negative impacts of the project have been identified and discussed in Chapter 5 of this report. The essence of this section of the report is to address all the identified negative impacts through the provision of mitigation measures that will help to minimize to the barest minimum or completely eliminate the impacts at the various stages of the project implementation.

In this EMP study, negative impacts categorized as being of low significance are considered to have acceptable residual impacts while negative impacts of high and moderate significance are re-examined after mitigation. Comments are then provided as to the nature of residual impacts. Table 6.1 gives a summary of impacts and mitigation measures responsibilities.

6.4.0 Environmental Impacts Mitigations
6.4.1 Air Quality: Emissions and Particulates
The primary air emissions during project construction shall arise from Asphalt Plants, construction vehicles and emissions from cutback bitumen during the pavement asphalt laying process. Some of these emissions have carcinogenic properties. Emissions from earth-moving and construction equipment and other vehicles plying the road are likely to increase the concentrations of Carbon Monoxide (CO), Nitrogen Oxide (NOx), Lead (Pb), Suspended Particulate Matter (SPM) and Hydrocarbons (HC) along the project route. These pollutants can induce severe health problems. For instance, CO can interfere with the absorption of oxyhaemoglobin and an acute exposure to NOx is considered a major cause of respiratory diseases, while HC concentrations can cause severe eye irritation, coughing and sneezing. The changes in air quality are considered significant since they could have direct implications on
health.

6.4.1.1 Mitigation
Operational emission impact will be mitigated by the upgrading of the existing roads and consequent speeds control to reduce acceleration/deceleration on the roads and reduce CO, HC and NOx emissions.

During site clearing, preparation and construction, all equipment and vehicles shall have their engines properly maintained and tuned to eliminate noxious emissions.

Workers shall be made to wear appropriate nose masks and PPEs.

6.4.2 Dust
Airborne dust shall be generated from vehicular movements, Road Plants (road dust) and construction equipment. Dusts may be also generated from point or diffuse sources, which include sources such as exhaust stack, Adequate mitigation measures shall be put in place to ensure almost zero fugitive SPM emissions and limit exhaust SPM emission to <200 ppm.

6.4.2.1 Mitigation
- The construction site shall be watered regularly to minimize fugitive dust emissions.
- Construction equipment and the Stone crusher and batch mixing plants will be located at least 300 m from residential and other sensitive receptors, Stone aggregates granites etc shall be covered where possible.

6.4.3 Noise
The main noise sources during construction are construction machinery, which are known to generate noise at levels from 76 dB(A) to 98 dB(A) measured 5 m from running machines. The noise will have an impact mostly on construction workers and residents living near the construction sites. The noise sources during site preparation and construction activities are the internal combustion powering diesel engines for civil works. Activities at the road construction and road sites involving blasting, drilling, use of explosives and movement of heavy equipment and envisaged increase in volume of traffic will cause safety problems to the general public. Noise impacts will cause nuisances, hearing loss and general disturbance to workers and the general public.

6.4.3.1 Mitigation
- During construction and facility operation, workers will be provided with ear muffs and other personel protectors equipment (PPE);
- Limit construction to Daytime
- The Equipment will be well maintained so that their noise will be within acceptable level
6.5.0 Land Resources:

6.5.1 Site Clearing
Site clearing will lead to lost of plant community and wildlife habitat, leading to the death of plants and relatively immobile animals as well as the migration of the animals that are capable of escaping. This will lead to the reduction of biodiversity in the area and possible soil erosion and landslides caused by rain water due to soil exposure.

6.5.1.1 Mitigation
Minimal land take will be affected during the preconstruction stage. Devegetation shall also be restricted to road shoulders. Tree stumps shall be left in place along cleared highway corridors to hold the soil.

6.5.2 Vegetation Clearing
Clearing of surface vegetation especially at the project location and road construction will expose the soils and lead to localized flooding of adjacent farmlands and impairment of associated soils.

6.5.2.1 Mitigation
Development activities, especially land preparation, will be carried out in the dry season (November-March) in order to minimize interference by heavy rainfall, otherwise adequate drainage channels will be constructed to convey storm water runoff from field to retention ponds.

6.6 Waste Management Issues
Experience in Nigeria has shown that sections of newly constructed roads are usually turned into waste dumps due to the absence of sanitary waste dumps especially close to urban areas. Also, abandoned burrow pits by construction firms are usually converted to waste dumps by local authorities thereby also encouraging waste truckers to dump by the road side close to his converted dumps. This project may be affected by this menace. Roadside litters from indiscriminate disposal of waste from vehicles shall also affect the aesthetic and environmental cleanliness of the roads.

6.6.1 Mitigation
- Very aggressive public relations campaign shall be carried out to enlighten people on the need for proper disposal of waste at Govt approved dump sites.
- Burrow piston shall be located further away from roads to discourage the dumping of waste in them. The pits could also be reclaimed or converted to fish ponds.
6.7  Hydrology

6.7.1  Crossing of rivers/ streams;
Construction activities leading to accidental or deliberate dumping and piling of soil material during the project shall cause deviation and changes in river hydrology and also obstruction of the river. Modifications to the natural drainage patterns and groundwater elevation are also possible impacts consequent on changes in river hydrology due to road construction. In addition, mud deposits extracted from the river for construction activities will also have negative impacts on the benthic environment. Hydrological changes in river courses can also affect farmland and grazing lands leading to land foreclosure by owners.

6.7.1.1 Mitigation
Although there was water body of significance to the host communities noted during the fieldwork, the fact that there are signs of season streams/ drain channels elicited the need to be pro-active in providing mitigations which include the following:

➢ A soil material handling policy shall be adopted by construction firms such that soils are not indiscriminately dumped.
➢ Storm water channels and sluice gates shall be constructed where the need for modification of river channel arises.

6.7.2  Erosion and Landslides Due to Rains
Heavy rains may result in landslides and erosion at burrow pits. Where these pits are located close to the road construction or close to natural drainages, the hydrology of the rivers shall be affected. Flash flooding could also wash away road sections into river courses.

6.7.2.1 Mitigation
➢ Burrow pits shall be located away from road construction areas. The pits shall have their slopes stabilized to prevent erosion.
➢ Adequate channelization and discharged of the surface runoff into river courses

6.7.3  Waste Dumps
Waste dumps and road side litter could also block the natural drainage flow and cause changes in flow hydrology and direction.

6.7.3.1 Mitigation
Road side litter shall be discourage and the construction crew shall immediately evacuate waste to recognized dumpsite if found during construction.
6.8 Water Quality

6.8.1 River/stream sedimentation;
During the bush clearing and construction stage, silt from disturbed soil may result in increased suspended solids (SS) in rivers/streams immediately downstream from the road. Such impacts will be temporary and limited to small areas downstream. Furthermore, runoff of sediment resulting from increased soil erosion and from dust and sand at construction sites may lead to increased turbidity in surface watercourses.

6.8.1.1 Mitigation
- During construction, surface water flows shall be controlled and if necessary channelled to temporary discharge points to minimize the potential threat of erosion and siltation in the receiving water channels.

6.8.2 Use of Chemicals and pesticides;
- Construction camps will generate domestic effluent of 60 L per person per day on average, and total wastewater in the largest camp may be up to 60,000 L per day. If discharged directly into natural water bodies, the domestic effluent from construction camps would raise COD concentrations by about 1.2 mg/L in large rivers and up to 34.7 mg/L in smaller streams.

6.8.2.1 Mitigation
- All contractors will be required to build septic tanks at their construction camps for waste disposal. They will also be required to have sound environmental management programs for the storage of hazardous materials, solid waste collection and disposal, and environmental contingency plans.

6.8.3 Fuel and oil spills;
Contamination of surface and groundwater will arise from chemical effluents, solid waste and domestic sewage discharge and discarded lubricants, fuel and oils. Discharge of effluents has potentials for water pollution with attendant effect on water quality and aquatic life.

6.8.3.1 Mitigation
- Chemicals and Fuel storage areas shall be properly bunded
- Alternative source of potable water shall be provided during construction

6.8.4 Fuel Spills from Road Usage
Water pollution from spills or accumulated contaminants on road surfaces
Small quantities of sediment and dripping oil and grease from the road surface may be washed out and discharged to nearby surface water bodies as runoff during the rainy season. Groundwater pollution may result from wastewater produced by construction crews and by the...
accidental spillage of fuel, lubricants and any other hazardous chemicals used in the process.

6.8.4 Mitigation
Adequate drainage shall be constructed for the roads to channel rain water and runoff.

6.9 Biological:

6.9.1 Land clearance and loss of habitat;
The proposed project is expected to have direct impact on wildlife and forestry in the following ways: (a) Site preparation and construction will result in the reduction of wildlife habitats for arboreal and in faunal species. (b) Bush clearing will lead to the loss of important vegetation and economic tree species which are at the moment being faced with serious deforestation threat and desert encroachment.

6.9.1.1 Mitigation
- Selective and controlled clearing of vegetation restricted to what is needed for the project will be carried out.
- To mitigate the impact of loss of vegetation, trees and bushes will be planted on both sides of the expressway, and land will be seeded to grass the embankment in the road landscape plan.

6.9.2 Biodiversity loss
Impacts on biodiversity can be caused by facilitation of access to and spontaneous settlements in natural areas as the road shall increase access to hitherto inaccessible areas; There will also be biodiversity loss caused by facilitation of access as a result of the rehabilitation of the road. Increased mechanized farming activities shall be taken place along the road as it is now easier to haul farm produce to urban centres.

6.9.2.1 Mitigation
- Community assistance programmes will be provided along with project development to boost the health status and socio-economic conditions of the stakeholders;
- Trees and plants of economic interest that are not within developed areas will be conserved;
- Ornamental trees and shrubs will be planted as additional environmental conservation measures.

6.10 Socio-Economic:

6.10.1 Spread of STIs including HIV AIDS
The proposed rehabilitation of Kurfi-Charanchi road has re-potential for the dissemination of STIs including HIV AIDS. This is because most of the workers will be spending long period
outside of their homes and usual sex partners. This may result in risky sexual behaviour including unprotected sex with new partners and or commercial sex workers.

6.10.1 Mitigation

- Suitable mix of a range of HIV intervention measures will be adopted. This will include awareness creation on behaviour communication change (BCC) including the promotion of abstinence, fidelity to spouse or usual sex partner and use of condom. IEC materials will be used to convey this message to the workers and the host community.

6.10.2 Rural - Urban Migration

In-migration occasioned by the increased mobility shall lead to changes in demography as this road shall encourage the rural urban migratory pattern prevalent in Nigeria.

6.10.2.1 Mitigation

- Youths from the host communities will be given priority in unskilled labour employment;

6.10.3 Archeological and Heritage Sites

There are no heritage properties, National Historic Sites, or known archaeological/fossil sites within the corridor for the proposed alignment.

6.10.3.1 Mitigation

- Adequate care shall be taken to enlighten construction workers on the possible unearthing of archeological relics
- Awareness training of workers shall be conducted on local heritage sites, graves and shrines to avoid desecration and possible conflicts with the local communities.

6.10.4 Traffic Congestion and Road Accident

The rehabilitation of Kurfi-Charanchi Road may lead to Traffic congestion and road accident, if not properly managed.

6.10.4.1 Mitigation

- Traffic congestion and road accident will be properly managed through the use of road signs, diversion and Flag men including the use of e tapes to code up the construction sites.

Table 6.1: Impact and Mitigation Responsibilities
<table>
<thead>
<tr>
<th>Environmental Component</th>
<th>Impacts</th>
<th>Mitigation Required</th>
<th>Responsibilities for Implementation</th>
<th>Responsibilities for Monitoring</th>
<th>Cost (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Noxious Emissions and Particulates</td>
<td>Speed Control, proper Engine maintenance, Use of PPEs</td>
<td>Contractors</td>
<td>RSDT, FERMA/ FMENV, State EPA/Min of Environment</td>
<td>N0.75m</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Dust</td>
<td>Dust suppressants, water spraying, covering of stockpiles etc</td>
<td>Contractors</td>
<td>RSDT, FERMA/ FMENV, State EPA/Min of Environment</td>
<td>Part of project Cost</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Use of PPEs, restriction of work to day time and the make sure the machines are in good conditions.</td>
<td>Contractors</td>
<td>RSDT, FERMA/ FMENV, State EPA/Min of Environment</td>
<td>N0.75m</td>
</tr>
<tr>
<td></td>
<td>River Bank failures, loss of Riparian vegetation</td>
<td>Construction of storm water drainages and slope stabilization</td>
<td>Contractors</td>
<td>RSDT, FERMA, FMENV, State EPA/Min of Environment</td>
<td>Project determined</td>
</tr>
<tr>
<td>Environment Component</td>
<td>Impacts</td>
<td>Mitigation Required</td>
<td>Responsibilities for Implementation</td>
<td>Responsibilities for Monitoring</td>
<td>Cost (N)</td>
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<tr>
<td>Land Resources</td>
<td>Reduction in biodiversity from soil erosion and landslides from site clearing activity</td>
<td>Minimal land take, vegetation clearing restricted only to road shoulders, Highway corridors to be left intact</td>
<td>Contractor.</td>
<td>RSDT, FERMA, FMENV, State EPA/Min of Environment</td>
<td>Project Cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Construction activities to be carried out mainly in the dry season</td>
<td>Contractor.</td>
<td>RSDT, FERMA, FMENV, State EPA/Min of Environment</td>
<td>See project Costs</td>
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<tr>
<td></td>
<td></td>
<td>Construction of drainage channels</td>
<td></td>
<td></td>
<td>See project Costs</td>
</tr>
<tr>
<td></td>
<td>Waste dumps in burrow pits, loss of aesthetics</td>
<td>Burrow pits to be located far from road corridors, public awareness campaigns</td>
<td>Contractor.</td>
<td>Government health officials, FMENV, State Min of Env, RSDT,</td>
<td>See project Costs</td>
</tr>
<tr>
<td>Environmental Component</td>
<td>Impacts</td>
<td>Mitigation Required</td>
<td>Responsibilities for Implementation</td>
<td>Responsibilities for Monitoring</td>
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<tr>
<td>Hydrology</td>
<td>Erosion and landslides due to heavy Rains</td>
<td>Slope stabilization of burrow pits to prevent erosion Adequate channelization and discharged of the surface runoff into river courses</td>
<td>Contractor</td>
<td>Government health officials, FMENV, State Min of Env, RSDT,</td>
<td>See project Costs</td>
</tr>
<tr>
<td></td>
<td>Blockages of Natural drainage from dumping of roadside litter</td>
<td>Evacuation of wastes to approved dumpsite, public awareness campaigns</td>
<td>Contractor</td>
<td>Government health officials, FMENV, State Min of Env, RSDT,</td>
<td>See project Costs</td>
</tr>
<tr>
<td>Water Quality</td>
<td>Turbidity and sedimentation</td>
<td>Control of surface water flows, use of turbidity nets,</td>
<td>Contractors</td>
<td>RSDT, FERMA, FMENV, State EPA/Min of Environment</td>
<td>See project Costs</td>
</tr>
<tr>
<td></td>
<td>Reduction in water quality from untreated</td>
<td>Biological Sewage treatment, proper</td>
<td>Contractors</td>
<td>RSDT, FERMA, FMENV, State</td>
<td>N2.25m</td>
</tr>
<tr>
<td>Environmental Component</td>
<td>Impacts</td>
<td>Mitigation Required</td>
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<td></td>
<td>effluents, chemical spills etc</td>
<td>handling of chemicals,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological</td>
<td>Contamination of groundwater from fuels spills during road usage</td>
<td>Construction of adequate road drainages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loss of fauna and flora due to land clearance</td>
<td>Selective clearing of vegetation, re-vegetation where necessary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biodiversity loss from opening of access for increased farming and hunting</td>
<td>Public awareness campaigns to reduce tree felling, hunting etc by locals</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Contractors</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>RSDT, FERMA, FMENV, State EPA/Min of Environment</td>
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<td></td>
<td></td>
<td>N1.5m</td>
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<td></td>
<td></td>
<td>Cost (N)</td>
<td></td>
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<td></td>
<td>See project Costs</td>
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<tr>
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<td>Responsibilities for Monitoring</td>
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<tr>
<td>Socio-Economic</td>
<td>Loss of income from agricultural lands</td>
<td>Compensatio n for loss of farmlands</td>
<td>RSDT.</td>
<td>RSDT</td>
<td>To be determined</td>
</tr>
<tr>
<td></td>
<td>Social disruptions from Loss of private properties e.g. kiosks etc</td>
<td>Payment of compensation, Resettlement</td>
<td>RSDT.</td>
<td>RSDT</td>
<td>To be determined</td>
</tr>
<tr>
<td></td>
<td>Loss of public utilities, e.g. telephone lines, power cables, water lines etc</td>
<td>Replacement of removed infrastructure, public awareness campaigns etc</td>
<td>Contractors</td>
<td>RSDT</td>
<td>See project Costs</td>
</tr>
<tr>
<td></td>
<td>Creation of Squatter settlements and shanty towns</td>
<td>Control of shanty town development</td>
<td>Contractors</td>
<td>RSDT, FERMA, Town Planning Authorities</td>
<td>To be determined</td>
</tr>
<tr>
<td></td>
<td>HIV Aids and other related health issues</td>
<td>Public awareness on alcohol abuse, unprotected</td>
<td>Contractors</td>
<td>RSDT, FERMA</td>
<td>N1.5m</td>
</tr>
<tr>
<td>Environmental Component</td>
<td>Impacts</td>
<td>Mitigation Required</td>
<td>Responsibilities for Implementati on</td>
<td>Responsibilities for Monitoring</td>
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<td>sex, etc, provision of adequate health facilities</td>
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<td></td>
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<tr>
<td>Loss of communal income due to rural urban migration</td>
<td>Youths to be given priority for unskilled jobs</td>
<td>Contractors</td>
<td>RSDT, FERMA, FMENV</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>Desecration of archaeological sites and heritage areas</td>
<td>Awareness training for workers on heritage sites, taboos and customs</td>
<td>Contractors, RSDT, FERMA, FMENV</td>
<td>N0.75m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic Congestion and Accident</td>
<td>Delays in travel time, irritation, injuries and death</td>
<td>Provision of road signs diversion, flag men and security tapes</td>
<td>Contractor RSDT, FERMA, FMENV</td>
<td>N1.0m</td>
<td></td>
</tr>
</tbody>
</table>

6.11 Stakeholder Consultation Process
To ensure effective monitoring, all Environmental Social and Health Monitoring issues to be monitored shall be in conjunction with the Federal and State Ministries of Environment as well as Kurfi and Charanchi LGAs. It pertinent to note that all aspects/ measures for which consultations will be undertaken as well as the goals and expected outcomes of these
consultations shall be identified prior to the commencement of monitoring exercises. Mitigation measures for social economic impacts generally require that some consultation is carried out before they are implemented.

Parties to be consulted shall include the primary stakeholders on the Kurfi – Charanchi road while the secondary stakeholders are; The Federal Ministry of Works, Housing and Urban Development, Federal Ministry of Environment, as well as the Katsina State Ministry of Environment (SMENVs), State Ministries of Works, Lands and Housing, and the affected Local Government, major Highway users such as the National Union of Road Transport Workers (NURTW) and The Road Transport Employers Association of Nigeria (RTEAN) shall also be consulted during the EMP implementation stages.

It is agreed that for this aspect of monitoring, consultation will be carried out at two main levels - public and institutional consultation. Public consultation will be conducted at major towns/villages all along the project road as many are to be affected by the project. Interviews with individuals belonging to different social and/or economic categories and concerned local authorities shall be carried out whenever considered necessary.
CHAPTER SEVEN
ENVIRONMENTAL MANAGEMENT PLAN (EMP)

7.0 INTRODUCTION
An Environmental Management Plan (EMP) is a management tool that stipulates strategies and procedures for managing the potential environmental impacts associated with a proposed project. For the Kurfi – Charanchi Road Rehabilitation project, the EMP shall be incorporating various mitigation measures for the potential impacts and also form the basis for the actual project implementation.

7.1 The Objective of the EMP
The overall objective of the EMP is to ensure the progressive reduction of the impact of the project activities on the environment. This objective shall be achieved by: ensuring compliance with stipulated legislation on protection of the environment at the local and international level; integrating environmental issues fully at all phases of the project development and operational philosophies; promoting the environmental management awareness among workers; rationalizing and streamlining existing environmental activities to add value to efficiency and effectiveness; providing standards for overall planning, operation, audit and review; ensuring that only environmentally sound procedures are used in the execution of the project.

The anticipated impacts of the proposed project, corresponding mitigation measures, residual impact rating, action party and timing, parameters to be monitored and monitoring frequency are provided in the Environmental Management Plan for land acquisition, construction, operation and decommissioning activities. The EMP provides the procedures and processes that should be incorporated into the organization's activities to measure and check, in a continuous mode, the compliance with, and effectiveness of the mitigation measures recommended to minimizing or eliminating the identified negative impacts of the planned project throughout its life cycle.

The application of the EMP usually starts from the pre-construction phase, when all the mechanisms required for effective implementation of recommended mitigation measures are put in place. Other components of the EMP usually find application during the project operational phase, as monitoring tools for the compliance of specific environmental attributes with required operational regulatory standards.

In view of the foregoing, the EMP presented in this section of the report has taken into consideration, all the specific project activities covering the site preparation/construction stage...
and the project operation/maintenance stage; predicted impacts of the proposed project as contained in Chapter 5; and the prescribed mitigation measures to control or completely eliminate the negative impacts of the proposed project as contained in Chapter 6. The Contractor to the project shall incorporate this EMP into all the stages of its activities to manage, monitor and control all the potential and associated impacts of the project on the bio-physical and socio-economic characteristics, as well as, the health and safety of the workers and the public in the area. The implementation of the EMP by the Contractor in the course of the execution of the project shall also be in accordance with the Nigerian and other applicable international HSE standards and regulations.

In order to make the implementation of the proposed EMP worthwhile, a two-pronged environmental management framework has been developed for adoption. The framework consists of,

a. an Environmental Management System (EMS), and

b. an Environmental Monitoring Programme (EMP).

7.2 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)
According to ISO 14001, an Environmental Management System (EMS) is that part of the overall management system which includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the Environmental Policy. What this definition connotes is that, for an EMS to be put in place in an organization, the organization must already have an Environmental Policy\(^1\) which is:

- Commitment by leadership at all levels to foster a culture of operational excellence by assuring alignment of vision, expectations, resources and accountabilities.

- Define and widely communicate the operational excellence mission, vision, values, strategies, and objectives.

- Comprehensively identify high-level issues, risks, opportunities, and gaps in system and operating practices that can impact its current or future ability to achieve world-class performance. Assess and prioritize those identified high-level issues, risks, opportunities, and gaps using a systematic, cross-functional
approach. Identify a wide range of possible risk-reduction alternatives (prevention and mitigation) for all identified high-level risks.

- Establish clear metrics to measure statistically significant performance improvement toward goals and targets for operational excellence. Implement the action plans and monitor Operational Excellence (OE) performance.

- Establish a job selection process to fill defined Health, Safety and Environment (HSE)-sensitive jobs to ensure individuals have the knowledge, skills, performance history, abilities, and demonstrated behaviours to conduct their activities in an incident-free manner, in compliance with applicable laws, regulations, company policies, and operational excellence requirements.

- Establish processes to ensure that documents and records that are critical to operational excellence are current, controlled, and accessible. The retention of documentation and records should be established and recorded, and procedures should be maintained regarding their availability, confidentiality, and destruction.

- Implement a process to ensure that contractors ("agents") authorized to act on behalf of the company understand and comply with relevant company policies and procedures.

- Establish and maintain appropriate processes for management to regularly monitor operational excellence performance. Conduct regular operational excellence performance evaluations to ensure that the system is implemented and maintained and remains effective.

The project Contractor shall be committed to incorporate all the elucidated components of an OEMS into its operational procedures for the implementation of the proposed project.

7.3 ENVIRONMENTAL MONITORING PLAN
This Environmental Monitoring Plan will ensure that the integrity of the Road Project has been developed covering the project activities from site preparation, through construction, commissioning, operation of the highways, decommissioning and abandonment. The plan relates to the handling of hazardous materials and wastes, emission and discharge monitoring, site inspection and auditing, adverse weather preparedness, and decommissioning. The plan takes account of national and international standards for (environmental) planning, such as the International Standards Organization, the Health, Safety and Environment Management System,
FERMA/RSDT Environmental Management Plans and environmental standards. The monitoring programme has also been outlined. The programme will help to verify the effectiveness of the prescribed mitigation measures is designed to guarantee and achieve the implementation of the EMP findings thus;

- Effective integration of EMP into project design, from construction through abandonment;
- Environmental Monitoring of development phases including operations and close down;
- Specific training of staff and contractors to enhance environmental awareness; and
- Sustained consultation with all stakeholders at all times on the field development.

7.4 MONITORING PLAN
The environmental monitoring program for the implementation of the Road Sector Development Project (RSDP) will serve as an integral part of the operational activities and is expected to generate the requisite information for environmental management and environmental information dissemination.

It is anticipated that monitoring will be conducted during all phases of the project: design, construction and operation. This plan will play a pivotal role in ensuring that the trends for specific parameters are tracked and it will provide information on compliance with legislative norms, set guidelines or desirable operational limits; and form the basis for corrective actions and modification of activities if necessary. The intensity of sampling will depend on the time and location of the development activities and results derived from monitoring data.

7.4.1 Monitoring Objectives
The aim of the monitoring is to establish appropriate monitoring criteria to verify the predicted impact of the project, and to ensure that any unforeseen impacts are detected and the mitigation adjusted where needed at an early stage. The monitoring will keep relevant records to ensure compliance with sound environmental procedures recommended. The monitoring plan will ensure that mitigating measures and impacts of the project during construction and operation phases are implemented. Adequate funds will be provided for this purpose through the project.

Other specific objectives of the monitoring plan are to:

- check the effectiveness of suggested mitigative measures;
• demonstrate that the project activities (construction and operation) are carried out in accordance with the prescribed mitigation measures and existing compliance regulatory procedures; and

• provide early warning signals whenever an impact indicator approaches a critical level. Impact indicators are defined in terms of carrying capacity, threshold levels, and regulation and enforcement standards. Implementation of the EMP will allow for control and manage the timing, location and level of impacts and potentially provide the cause and effect data for the empirical verification or validation of various predictive models of action/impact relationships.

7.4.2 Monitoring Requirements
A monitoring program requires a number of components to ensure effective results. These include:

• Relevant baseline data
• Verifiably objective indicators for each project and project component for which monitoring will be conducted;
• An independent body responsible for monitoring;
• Those responsible for monitoring must have the capacity for such;
• Monitoring on a regular basis;
• An effective monitoring reporting mechanism including feedback and commitment to action on monitoring results and recommendations.
<table>
<thead>
<tr>
<th>Variable to be Monitored</th>
<th>Linkages</th>
<th>Indicators to be Considered</th>
<th>Baseline Data to be Considered</th>
<th>Monitoring Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Habitat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habitat</td>
<td>Rare and endangered species needs</td>
<td>Area and quality of habitat</td>
<td>Species abundance</td>
<td>Yearly</td>
</tr>
<tr>
<td>Flora</td>
<td>Populations of important flora</td>
<td>Current species list and numbers</td>
<td></td>
<td>Quarterly</td>
</tr>
<tr>
<td>Fauna</td>
<td>Populations of important fauna</td>
<td>Current species list and numbers</td>
<td></td>
<td>Quarterly</td>
</tr>
<tr>
<td>Fisheries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Populations</td>
<td>Community economic needs; water quality and quantity</td>
<td>Population size and offtake</td>
<td>Current population and offtake</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Species composition</td>
<td>Ecosystem health; water quality and water quantity</td>
<td>Species mix</td>
<td>Current species mix</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Variable to be Monitored</td>
<td>Linkages</td>
<td>Indicators to be Considered</td>
<td>Baseline Data to be Considered</td>
<td>Monitoring Frequency</td>
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<tr>
<td>Water Resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater quality</td>
<td>Health, crop production, desertification</td>
<td>Quality of water (chemical composition)</td>
<td>Current chemical composition</td>
<td>Monthly</td>
</tr>
<tr>
<td>Groundwater quantity</td>
<td>Health, irrigation</td>
<td>Depth and yield</td>
<td>Current depth and yield</td>
<td></td>
</tr>
<tr>
<td>Surface water quality</td>
<td>Health, natural habitats, flora and fauna, irrigation</td>
<td>Quality of water (chemical analysis / indicator species of water quality)</td>
<td>Current chemical composition / fauna and flora inventory (e.g. macroinvertebrates, microinvertebrates, microflora)</td>
<td>Monthly</td>
</tr>
<tr>
<td>Surface water quantity</td>
<td>Health, crop production</td>
<td>Yields and flows (seasonal)</td>
<td>Current yields and flows (in different seasons)</td>
<td>Monthly</td>
</tr>
<tr>
<td>Land Resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Crop productivity,</td>
<td>Sediment</td>
<td>Sediment loads</td>
<td>Monthly</td>
</tr>
<tr>
<td>Variable to be Monitored</td>
<td>Linkages</td>
<td>Indicators to be Considered</td>
<td>Baseline Data to be Considered</td>
<td>Monitoring Frequency</td>
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<td>--------------------------</td>
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</tr>
<tr>
<td>Soil quality – chemicals</td>
<td>Pesticide use</td>
<td>Chemical analysis soil</td>
<td>Chemical analysis of soil</td>
<td></td>
</tr>
<tr>
<td>Soil quality – waterlogging</td>
<td>Irrigation, drainage</td>
<td>Soil analysis, crop production</td>
<td>Soil analysis, crop production on controlled plots where possible</td>
<td>Monthly</td>
</tr>
<tr>
<td>Air Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Particulates, Emissions</td>
<td>Human Health</td>
<td>Nox, SOX, SPM., COX etc</td>
<td>Ambient Particulates, Emissions levels</td>
<td>Monthly</td>
</tr>
<tr>
<td>Social and Health Issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>General increased activity through the project</td>
<td>Incidence of HIV/AIDS through clinic records</td>
<td>Existing levels of HIV/AIDS</td>
<td>Yearly</td>
</tr>
</tbody>
</table>

FERMA
<table>
<thead>
<tr>
<th>Variable to be Monitored</th>
<th>Linkages</th>
<th>Indicators to be Considered</th>
<th>Baseline Data to be Considered</th>
<th>Monitoring Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water borne diseases</td>
<td>Drainage, irrigation</td>
<td>Health statistics at local clinics</td>
<td>Status of health re: water borne diseases</td>
<td>Monthly</td>
</tr>
<tr>
<td>Economic need from other natural resources (forestry, fishery)</td>
<td>Irrigation, drainage, conflicts</td>
<td>Harvest results, population size, area under forest cover, forest stand condition</td>
<td>Fishery population by species, forest stand volumes and areas</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Cultural Issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural sites</td>
<td>Cultural and social systems and community needs</td>
<td>Sites remaining</td>
<td>Inventory of sites</td>
<td>Yearly</td>
</tr>
<tr>
<td>Social systems</td>
<td>General community and individual member satisfaction</td>
<td>Community social structure</td>
<td>Current social structure and important aspects of structure</td>
<td>Yearly</td>
</tr>
<tr>
<td>Variable to be Monitored</td>
<td>Linkages</td>
<td>Indicators to be Considered</td>
<td>Baseline Data to be Considered</td>
<td>Monitoring Frequency</td>
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<td>--------------------------</td>
<td>---------------------------</td>
<td>------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Conflicts</td>
<td>Land and resource use</td>
<td>Number and nature of conflicts</td>
<td>Current conflict levels and number and nature of conflicts from RSDP</td>
<td>Yearly</td>
</tr>
</tbody>
</table>

Specifically, the issue of Social & health problems (new communicable diseases, sexually transmitted infections (STIs), HIV/AIDS) from influx of job seekers & post-construction demobilisation of large contingent of workers would be given adequate attention in view of its socio-economic implication when project implementation commences. This would be through Awareness campaign to enlighten the communities/field workers on the implications of drug and alcohol abuse, unprotected sex, prostitution and the need to sustain healthy lifestyle and behavior including the use of BCC/IEC materials.
7.5 RESOURCES FOR EMP IMPLEMENTATION

The resources required for implementing the EMP are basically personnel and finance. The key stakeholders the Road Sector Development Team (RSTD), the Federal Roads Maintenance Agency (FERMA), Federal Ministry of Works, Housing and Urban Development (FMW-HUD), the Road contractor, Federal and State Ministries of Environment, and to the communities.

7.6 INSTITUTIONAL ARRENGEMENT FOR IMPLEMENTING THE EMP

The overall objective of the project is to ensure that the project implementation is integrated harmoniously into the communities. The monitoring staff and personnel shall achieve the following objectives:

- propose management rules and specific measures that are compatible with sustainable development while implementing the project
- promote awareness to construction workers and the general public regarding environmental protection,
- execute concrete means of applying the EMP.

In the execution of the project, the RSTD will be responsible for the implementation of the mitigation measures through their contractor who would be accountable to the RSTD. This contractor shall have an Environmental Engineer on site who will be responsible for all environmental issues. Whereas the World Bank will monitor the execution/implementation of the project by RSTD. FERMA on the other hand will regulate the contractor work, while the EIA Division the Federal Ministry of Environment in collaboration with affected state Ministry of Environment will carry out regulatory monitoring to ensure that all agreed mitigations are actually implemented in line with regulatory requirements.

RSTD shall be represented by Social and Environmental Officer who will be responsible for the implementation of the EMP in close collaboration with FERMA, FMENV and the Local environmental regulating bodies. Alternatively, an independent consultant may be hired by the RSTD to implement the EMP. The consultant shall have professionals qualified in the following disciplines:

- Environmental Assessment & Monitoring
- Soil & Water Conservation
- Highways and Civil Engineering
- Public Health
- Sociology and Socio-Economics
The social and environmental specialist of the RSDT shall be responsible for the implementation of the environmental monitoring and the EMP. His/her responsibilities shall include:

- Coordinate, liaise with and monitor the contractors
- Compile and prepare periodic environmental reports for submission to the World Bank
- Review Environmental Monitoring reports from consultants in collaboration with Regulators
- Data Management

7.7 CAPACITY STRENGTHENING

Environmental Monitoring oversight responsibilities are vested in the Federal Ministry of Environment. The FMENV has environmental officers for monitoring issues; however, the capacity of the officers to cope is definitely not enough. The World Bank shall also carry out monitoring as one of its safeguard measures. The project shall also assist in the institutional framework and capacity enhancement of the State Ministry of Environment. State Ministries of Environment operate virtually similar structure as the Federal Ministry of Environment. The EIA Dept of the Ministry also has monitoring powers although the Federal Ministry of Environment carries out joint monitoring with the State Ministries as well as the Local Government Areas where projects are sited. Serious gaps exist in the ability of the State Ministries to monitor environmental issues arising from this project. To this effect the Project should train at least five officers from the RSDT, FERMA, State Ministry of Environment and Host L.G.A. A dedicated Monitoring desk for this road project should also be created in the Monitoring units of the State Ministry. Monitoring kits, personnel protective equipment should also be provided for the project. Table 7.2 shows the capacity strengthening measures.

Table 7.2: Institutional Capacity Strengthening Program

<table>
<thead>
<tr>
<th>Target Audience</th>
<th>Description</th>
<th>Application</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSDT staff</td>
<td>General environmental awareness seminar that will include ecological and social science principles, legal responsibilities, consequences of non-sustainable development, costs of poor environmental decisions, and introduction to the EMP process.</td>
<td>Personnel require appreciation of WB’s, Federal/State environmental policies, as well as, an appreciation for the need to support environmentally sustainable development.</td>
<td>Three days seminar</td>
</tr>
<tr>
<td>RSDT’s Environmental</td>
<td>An in-depth comprehensive course on environmental</td>
<td>The target audience will be responsible for EA review at</td>
<td>10 days workshop</td>
</tr>
<tr>
<td>Target Audience</td>
<td>Description</td>
<td>Application</td>
<td>Duration</td>
</tr>
<tr>
<td>-----------------</td>
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<td>-------------</td>
<td>----------</td>
</tr>
<tr>
<td>specialist, FMENV and State MOE environmental and social specialists</td>
<td>management including legal requirements, EMP methodology, Impact determination (methods) and mitigation analysis, public involvement methods, EMP preparation, monitoring techniques, preparation of EMPs, TORs, and other. Course will include field visits and classroom exercises.</td>
<td>the State level and for preparing TORs for EMP consultants as well as monitoring consultants’ work and final approval of EMPs. Target audience will also be responsible for conducting environmental audits on selected sub-projects and for periodic monitoring of sub-project implementation to ensure compliance.</td>
<td>Three day</td>
</tr>
<tr>
<td>LGA Staff</td>
<td>General environmental awareness seminar that will include ecological and social science principles, legal responsibilities, consequences of non-sustainable development, costs of poor environmental decisions, and introduction to the EMP process.</td>
<td>Local Government level staff requires an appreciation for the WB’s and Nigerian environmental requirements, as well as, an appreciation for the need to support sustainable development.</td>
<td>Three day</td>
</tr>
</tbody>
</table>

### 7.8 COST ESTIMATES
The cost estimates are based on the assumption that resource person/s (is) are likely to come from other parts of the country and therefore require travel allowances; participants of this training should could come from the collection or selection of members RSDT, FERMA, State Ministry of Environment and the affected L.G.As who should attend the exercise during the day only but will receive a per diem within the range of the estimated/ budgeted amount of about N562,500.00 per training session. It is proposed that the training programme will be implemented two times a year, over first four years of the project cycle. Thus, the total training cost is estimated at N4.5m for the entire period.
7.9 EMP BUDGET AND RESPONSIBILITIES
Based on available data, a sum of N750M will be allocated to the project (table 7.3). Of the total budget, it is recommended that at least 0.01% of the total budget will be allocated for environmental and social concerns by the proponent.

**Budget and Responsibilities**

<table>
<thead>
<tr>
<th>Item</th>
<th>Budget (estimate)</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigation</td>
<td>N8.0m</td>
<td>Contractor</td>
</tr>
<tr>
<td>Management</td>
<td>N5.0m</td>
<td>RSDT</td>
</tr>
<tr>
<td>Capacity Strengthening</td>
<td>N4.5m</td>
<td>RSDT/World Bank</td>
</tr>
<tr>
<td>Monitoring</td>
<td>N3.0m</td>
<td>RSDT/FMENV/State Min Env</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>N20.5m</strong></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER EIGHT

8.0 REMEDIATION PLANS AFTER CLOSURE OF THE CONSTRUCTION PHASE

8.1 INTRODUCTION
From experience, it has been discovered that lifespan of any project is primarily hinged on a number of considerations, including: the design basis and construction materials; availability of raw materials and feedstock; acceptability of the end-product; maintenance and technological development. For this project, the lifespan of the current design is not less than 25 years. This, in effect, means that the road will be expected to be fully operational for at least 25yrs, and may be extended, if the route is considered still viable, useful and in good condition for the motorist and the general populace.

Though, the planned project is not expected to be decommissioned since it is a permanent infrastructure development. However, given the known and acknowledged fact that projects necessarily impact the environment, either positively and/or negatively during the construction phase, it is important to put in place plans to recover and/or restore the project site to its original state after the project construction phase is completed. This requires a good understanding of all the environmental components of the project on the ecosystem during the construction phase. It is therefore environmentally wise to take into cognizance, this component during the planning stage.

This section of the report provides an overview of the various decommissioning activities that will accompany this project after the construction phase and therefore need to be planned for even at this conceptual stage.

8.2 DECOMMISSIONING ACTIVITIES
8.2.1. Rehabilitation of Construction Activities

Construction Camps:-

Permanent camp;

- Concrete and compacted earth platforms
- Excavation for septic tank
- Access roads running into and through the camps

Concrete platforms will need to be broken up and rubble taken to an approved waste dump site or used to rehabilitate borrow pits. The exposed surface must be tested for contamination by
FMEnv accredited laboratory. If any contaminants are found, the contaminated soil shall be removed along with the concrete to a site acceptable to the ECO. Re-vegetation must take place. Access roads running into and through the camps and any other well-used thorough (whether pedestrian or vehicular), which have been denuded of vegetation and subsequently been compacted, are to be checked for any substantial spillage of contamination including oils and fuels will be re-vegetated.

**Temporary camps:**

Rehabilitation will be necessary in the following areas:

- Compacted earth and uncompacted earth platforms
- Access roads running into and through the camps

Compacted and uncompacted earth platforms will be rehabilitated according to the methods described above. Access roads will also be rehabilitated.

**Borrow Pits and Quarries**

Note that this will only be applicable where material has not been obtained from external sources.

Borrow pits shall be filled with as much excess cut material as possible but shall be kept free from other waste. They shall be covered in soil stockpiled either from the original excavation the borrow pit or from other sources, such as excess spoil material from the extensive areas of cut. If adequate amounts of fill material are available, excavation slopes should not be left steeper than 1:3, ripped and top soiled. Borrow pits/quarries must be closed and rehabilitated as soon as possible to reduce erosion and potential aesthetic impact of these areas.

**Stockpiles**

Once stockpiles have been removed the ground surface is to be inspected for compaction. Should it be required, the surface is then to be ripped and the revegetation process followed.

**Spoil Dumps**

Permanent spoil dumps could have to be established if required. The exact positions of these spoil dumps to be negotiated with the landowners, local administrators, and officials, and compensation paid as per the accepted procedure. No spoil dumps will be allowed in drainage areas where they will block drainage channels. Spoil material to be minimized through use in filling of erosion gullies, fill for road construction, storm water beams, stone pitching, and any other construction-related use. Spoil material shall be the last option. Permanent spoil dumps to be shaped 1 v: 3h, top soiled and vegetated. Care must be taken to ensure that the material is adequately compacted to allow safe access.
Re-vegetation Process

The basic re-vegetation steps, which need to be adapted to the project-specific environmental conditions, are detailed below.

1. Prepare the area to be re-vegetated for topsoiling – this may require soil ripping and/or scarifying, and digging of steps or terraces. The scarification should take place to a depth of 150mm. If ridges are made, they should be about 100mm high and about 400mm wide.

2. Replace stored topsoil on the slope to be re-vegetated to a depth of between 75mm and 150mm (depending on the soil and slope conditions). The topsoil should be spread when it is dry by means of hand raking or mechanical balding and trimmed to a uniform thickness of not less than 100mm.

3. Apply seeds or grass sods according to the supplier’s specifications. The seed must be fresh, good quality seed as specified in the sod mix, certified by the supplier and free from contamination by seeds of other species. Seed harvested from the site may be substituted only with the approval of the ECO.

4. If the indigenous grass seeds are used, they should be placed close together and leveled put on each other. Gaps between the sods should be filled in with topsoil. If sods are obtained from land being affected by the road construction process, there may be enough sods for close packing. In this situation, the sods should be placed in about 1m wide and spaced up to 2m apart.

5. Mulch should be applied to protect the seeded area from erosion. The mulch must be excessively fresh and green or in an advanced stage of decomposition as it could smother growth. It must be applied to a depth and manner that will prevent erosion by wind and water, but not completely block out the rays of sunlight to the soil or prevent penetration by young plants.

6. Protect the revegetated area from excessive trampling and any other factor that might cause erosion or compaction. No construction equipment, trucks or heavy equipment should be allowed onto revegetated areas.

7. Ensure that suitable temporary and permanent drainage protection is installed parallel with the revegetation process.

8. Water the seeded/planted area on a regular basis (according to need, but on average of twice per week).

9. Institute an appropriate maintenance and monitoring program for a minimum year. This program should include, monitoring of the success of seed germination growth of the
plants, removal of invasive; weeds, replanting of areas revegetation has not been successful once the cause of the inhibiting factor have been identified and remedied, and repair of any funnels or erosion channel by the contractor must not allow erosion to develop on a large scale before implementing repairs.

Seed Mixes
Alternative seed mixes are provided for use under the various topographical condition of Nigeria. Vetiver grass (Vetiveria zizaniodes) for stabilization of steep slopes and erosion areas, are readily available, should a suitable indigenous mix not be available. The seeds applied by utilizing a combination of hand seeding with local labour (for minor work) and hydro seeding (for major grassing works). Vetiver grass (Vetiveria zizanioides) is not indigenous but is sterile and will not be invasive.
CHAPTER NINE
CONCLUSION

9.1 CONCLUSION
The Environmental Impact Assessment study has identified the environmental issues/impacts associated with project activities on the immediate/receiving environment. Thus, in order to minimize these impacts appropriate mitigation has been proffered. In addition, the project will provide social and economic opportunities capable of enhancing the economic growth of the two major towns and other neighbouring communities in particular and the country in general.

In view of the fact that all stakeholders shall be carried along during the project construction and operations and that there is no stern environmental, health, social or cultural issues that may warrant the cancellation of the proposed project, it is therefore strongly recommended that project can be embark upon as proposed while strictly adhering to the proffered mitigation measures. In addition, consultation with affected stakeholders should be sustained.

In order to measure and quantify the impacts of the development project on the receiving environment, the following monitoring objectives are established:

(i) Monitor alterations in existing physical, chemical, biological and social characteristics of the environment.

(ii) Determine whether any detected changes in environmental components are caused by the project or other natural occurrences.

(ii) Determine the impacts of non compliance with EIA and EMP requirements by the contractor(s), in particular to monitor emissions and discharges and ensure compliance with local, national and international standards.

(iii) Determine the effectiveness of the ameliorating measures

(iv) Highlight areas of concern unforeseen in the EIA and EMP and provide a basis for recommending further amelioration measures.
On the socio-economic impacts, potentially, the project will provide social and economic opportunities capable of enhancing the economic growth of the host communities in particular and the country in general.

Thus, in view of the fact that all stakeholders shall be carried along during the project construction and operations and that there is no stern environmental, health, social or cultural issues that may warrant the cancellation of the proposed project, it is therefore strongly recommended that project can be embark upon as proposed while strictly adhering to the proffered mitigation measures. In identifying the key impact indicators, priority is given to environmentally sensitive areas, and, in this regard, it is noteworthy that the entire project area falls under this category. Based on the results of baseline studies and consideration of FMENV limits, the following impact indicators are identified with the corresponding environmental components.

Table 10.1 Environmental Indicators

<table>
<thead>
<tr>
<th>Environmental Components</th>
<th>Impact Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric</td>
<td>Particulates, Volume discharged, CH₄, H₂S, SOₓ, NOₓ, CO, heavy and trace metals, and HC.</td>
</tr>
<tr>
<td>Soil</td>
<td>Texture, pH, Total Organic Carbon, Nutrients, Heavy metals</td>
</tr>
<tr>
<td>Water Quality:</td>
<td>DO, COD, BOD, pH, Nutrients, Turbidity, TDS, TSS, Heavy metals, Hardness</td>
</tr>
<tr>
<td>Aquatic ecology</td>
<td>Diversity, Abundance, Benthic Fauna</td>
</tr>
<tr>
<td>Socio-Economic</td>
<td>Economic and Health status</td>
</tr>
</tbody>
</table>

The EMP reveals no profound environmental and social impacts that could result from the periodic maintenance of the Kurfi – Charanchi road. The impacts identified are minor, non-cummulative and site specific that could be easily managed to acceptable level.
REFERENCES


FEPA (1991) Federal Environmental Protection Agency, Guidelines and Standards for Environmental Pollution Control in Nigeria. 238 pp


Shell International Exploration & Production HSE-MS Manual Part 5, 1999

World Bank (WB) Operational Policies 4.01.


World Bank (WB) -Environmental, Health and Safety Guidelines for Waste Management Facilities


ANNEX 1

Summary of World Bank Environmental and Social Safeguard Policies

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

- **Natural Habitats (OP 4.04).** The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. The Bank does not support projects involving the significant conversion of natural habitats unless there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs. If the environmental assessment indicates that a project would significantly convert or degrade natural habitats, the project includes mitigation measures acceptable to the Bank. Such mitigation measures include, as appropriate, minimizing habitat loss (e.g. strategic habitat retention and post-development restoration) and establishing and maintaining an ecologically similar protected area. The Bank accepts other forms of mitigation measures only when they are technically justified. Should the sub-project-specific ESMPs indicate that natural habitats might be affected negatively by the proposed sub-project activities with suitable mitigation measures, such sub-projects will not be funded under the FRDP.

- **Pest Management (OP 4.09).** The policy supports safe, effective, and environmentally sound pest management. It promotes the use of biological and environmental control methods. An assessment is made of the capacity of the country’s regulatory framework and institutions to promote and support safe, effective, and environmentally sound pest management. This policy will most likely not apply to FRDP.
• **Involuntary Resettlement (OP 4.12).** This policy covers direct economic and social impacts that both result from Bank-assisted investment projects, and are caused by (a) the involuntary taking of land resulting in (i) relocation or loss of shelter; (ii) loss of assets or access to assets, or (iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or (b) the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons. The RPF report discusses the applicability of this policy in detail.

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

• **Forests (OP 4.36).** This policy applies to the following types of Bank-financed investment projects: (a) projects that have or may have impacts on the health and quality of forests; (b) projects that affect the rights and welfare of people and their level of dependence upon or interaction with forests; and (c) projects that aim to bring about changes in the management, protection, or utilization of natural forests or plantations, whether they are publicly, privately, or communally owned. The Bank does not finance projects that, in its opinion, would involve significant conversion or degradation of critical forest areas or related critical habitats. If a project involves the significant conversion or degradation of natural forests or related natural habitats that the Bank determines are not critical, and the Bank determines that there are no feasible alternatives to the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs, the Bank may finance the project provided that it incorporates appropriate mitigation measures. Sub-projects that are likely to have negative impacts on forests will not be funded under FRDP.
• **Cultural Property (OP 11.03).** The term “cultural property” includes sites having archeological (prehistoric), paleontological, historical, religious, and unique natural values. The Bank’s general policy regarding cultural property is to assist in their preservation, and to seek to avoid their elimination. Specifically, the Bank (i) normally declines to finance projects that will significantly damage non-replicable cultural property, and will assist only those projects that are sited or designed so as to prevent such damage; and (ii) will assist in the protection and enhancement of cultural properties encountered in Bank-financed projects, rather than leaving that protection to chance. The management of cultural property of a country is the responsibility of the government. The government’s attention should be drawn specifically to what is known about the cultural property aspects of the proposed project site and appropriate agencies, NGOs, or university departments should be consulted; if there are any questions concerning cultural property in the area, a brief reconnaissance survey should be undertaken in the field by a specialist. FRDP will not fund sub-projects that will have negative impacts on cultural property.

• **Projects on International Waterways (O 7.50).** The Bank recognizes that the cooperation and good will of riparians is essential for the efficient utilization and protection of international waterways and attaches great importance to riparians making appropriate agreements or arrangement for the entire waterway or any part thereof. Projects that trigger this policy include hydroelectric, irrigation, flood control, navigation, drainage, water and sewerage, industrial, and similar projects that involve the use or potential pollution of international waterways. This policy will not apply to FRDP.

• **Disputed Areas (OP/BP/GP 7.60).** Project in disputed areas may occur the Bank and its member countries as well as between the borrower and one or more neighbouring countries. Any dispute over an area in which a proposed project is located requires formal procedures at the earliest possible stage. The Bank attempts to acquire assurance that it may proceed with a project in a disputed area if the governments concerned agree that,
pending the settlement of the dispute, the project proposed can go forward without prejudice to the claims of the country having a dispute. This policy is not expected to be triggered by sub-projects. This policy is unlikely to be triggered by sub-projects to be funded by FRDP.
ANNEX 2
SOCIO-ECONOMIC IMPACT ASSESSMENT QUESTIONNAIRE

(A) PERSONAL INFORMATION

1. Name of Local Leader__________________________________________
2. Type of Leader (e.g. Village Head, Women Leader, etc):___________
3. Age (in years): Below 21 ______ 21-40 ______ 41-60 ______; more than 60 ______
4. Name of Town/Village________________________________________
5. Proximity of household/town to proposed Landfill _______ and _____
6. Local Government Area_______________________________________
7. Ethnic Origin______________________________________________
8. Sex: Male__________ Female__________
9. Ethnic background__________________________________________
10. Education qualification: no formal education____ functionally literate____
    primary_____, secondary______ tertiary______
11. Number of children: ______ Male:_______ Female_______
12. Number of other dependents______ Male_____ Female______
13. Total No. of people in household Male_____ Female______
14. Residential Status:______ Tenant____ migrant____ indigene____
15. (a) If tenant or migrant____ what is the name of your home
    village?______
    (b) Distance of home village from here: less than 20km;____ b/w
    20 – 50km____ more than 50km _______
    (c) Why did you move to this community (e.g. for employment)__
(d) Condition of living since settling here: sane;____ better;____
worse;_____ I don’t know____

(e) For how long have you lived in this community________

(f) Future plans:____ relocate in future;___ live permanently
here;___ I do not know (give reasons for answer)____________

(g) Relationship with other dwellers: Friendly____ Not friendly __

I don’t know___

(B) ECONOMIC SCENARIO

17 What are the usual income-generation activities of the people in this community
(see below). Also indicate the gender and generation mainly involved in each
activity.

<table>
<thead>
<tr>
<th>No.</th>
<th>Activity</th>
<th>Gender* M/F/B</th>
<th>Generation C/Y/A/B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Crop farming (list common crops)</td>
<td></td>
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<tr>
<td>2.</td>
<td>Trading</td>
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<tr>
<td>3.</td>
<td>Livestock rearing (list common ones)</td>
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<tr>
<td>4.</td>
<td>Fishing</td>
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<td>5.</td>
<td>Hunting</td>
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<td>-----------------------------------------------------------------</td>
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<tr>
<td>6.</td>
<td>Processing (garri, local gin, fufu, etc)</td>
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<tr>
<td>7.</td>
<td>Handicraft (pottery, weaving, tailoring)</td>
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<tr>
<td>8.</td>
<td>Collection of sea products (periwinkle, crayfish etc)</td>
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<tr>
<td>9.</td>
<td>Collection of forest products (fruits, vegetables, firewood etc.)</td>
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<tr>
<td>10.</td>
<td>Artisanship (carpentry, blacksmith, bricklayer etc)</td>
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<tr>
<td>11.</td>
<td>Civil service/teaching</td>
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<tr>
<td>12.</td>
<td>Company worker</td>
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<tr>
<td>13.</td>
<td>Other specify</td>
<td></td>
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</tbody>
</table>

* M = Male; F = Female; B = Both sexes

** C = Children, Y = Youth; E = Elderly; A = Adult

18. What is your estimated monthly income (N): Less than N1,000____
    N1,000 to 10,000________ N10,000 to 50,000________
    N50,000 to N100,000______ More than N100,000________

19. How much do you save monthly? _______ No savings;________
    Less than N1,000 ___________ less than N5,000 ___________
    less than N10,000______ more than N10,000_________
20. Where do you save your excess money? No savings;______
    in the house;_____ Esusu group;____ in the bank;____
    (others specify)_______

(C) INFRASTRUCTURE/HEALTH

21. Which of the following do you have in this community and what is the condition of
    the facility, if present?

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Facility</th>
<th>No/ Availability</th>
<th>Condition</th>
<th>Distance to the proposed Pipeline</th>
<th>If not available, how far is the nearest facility (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Access Road</td>
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<tr>
<td>2.</td>
<td>Public transport</td>
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<tr>
<td>3.</td>
<td>Local market</td>
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<tr>
<td>4.</td>
<td>Primary school</td>
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<tr>
<td>5.</td>
<td>Secondary school</td>
<td></td>
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<tr>
<td>6.</td>
<td>Dispensary/health</td>
<td></td>
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</tbody>
</table>
7. centre

8. Electricity

9. Potable water supply

9. Others (specify)

22. Which of the following types of houses is common in this community (Enumerator to note)? Mud and wattle thatch: ____ mud and wattle zinc: ____ Earth block/Thatch: ____ Earth Block/Zinc: ____ Cement Block/Zinc: ____ Cement Block/Asbestos: ____ Timber Wall/Thatch: ____ Timber Wall/Zinc ____

23. Which of these items are commonly owned by households in this Community?

- Electric fan [ ]
- Electric Kettle [ ]
- Gas/Electric Cooker [ ]
- Refrigerator [ ]
- Television [ ]
- Bicycle [ ]
- Air Conditioner [ ]
- Motorcycle [ ]
- Motor Car [ ]
- Radio [ ]
24. No of Rooms in the House

25. Type of House (To be indicated by Interviewer) Bungalow ( ) Blocks of Flats ( ) Duplex ( ) Huts ( )

26. Type of roofing materials used in the house Thatch ( )
Iron Sheet ( ) Asbestos ( ) Long Span Aluminum ( )
Tile ( ) Others (specify) ( )

27. Type of Building Materials Used in the house

Thatch/Bamboo [ ] Mud [ ] Cement [ ] Burnt Brick [ ] Wood [ ]
Others specify [ ]

28. Type of Toilet: None [ ] Pit [ ] Bucket [ ] Hand flush [ ]

29. From which of the following sources is your water supply?

Rain [ ] River [ ] Stored run-off [ ] pipe borne [ ] borehole [ ] well, etc [ ]

30. How is water from each of these sources treated before use? [ ]
31. How is solid waste disposed off?  Burning_____; Burying ____; dump _______ throwing in running/stagnant water ____

32. How is human waste disposed off?  Pit latrine_____; defecation into water channel _____ defecation into surrounding bushes_____ pail systems____; pit toilet_____; VIP-ventilate latrines_____  
   Any other (specify)_______

33. What are the common diseases and pests found in this community (especially the last 3 years)____________________________

34. Specify any form of disease or pest that is found only in this community and not in neighbouring ones ____________________

35. Why are the above diseases common in your locality?   ___________

36. What has been done by the village or Govt. to reduce the presence of above mentioned diseases and pests?   ____________________

37. Where do people suffering from various diseases normally go for cure?  Churches_____ Native doctors____ dispensary/Health centre/Hospital ____

38. Which of the above places are frequently visited for disease cure? ___
39. Are you aware of this project?  Yes [ ]  No [ ]

40. If yes, what are the sources of information ______________________

41. If no, interviewer should tell the respondent about the project

42. How do you think this project will benefit this community during the construction phase?

<table>
<thead>
<tr>
<th>Item</th>
<th>Very Minimal</th>
<th>Minimal</th>
<th>Great</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in in-migration</td>
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<tr>
<td>Increased income</td>
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<tr>
<td>Job opportunities</td>
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<tr>
<td>New/ Improved Facilities (road, schools, etc)</td>
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<tr>
<td>Improvement in living standards</td>
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<tr>
<td>Changed in style of dressing</td>
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<tr>
<td>Improved social life</td>
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</table>

43. How do you think the project will benefit this community during the operational phase?

<table>
<thead>
<tr>
<th>Item</th>
<th>Very Minimal</th>
<th>Minimal</th>
<th>Great</th>
<th>Don’t Know</th>
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<tbody>
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<tr>
<td>Improved social life</td>
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44. How do you think the project will adversely affect this community during the construction phase?

<table>
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<tr>
<th>Item</th>
<th>Very Minimal</th>
<th>Minimal</th>
<th>Great</th>
<th>Don’t Know</th>
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<tbody>
<tr>
<td>Overpopulation</td>
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<tr>
<td>Occupational change</td>
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<tr>
<td>Sex imbalance</td>
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<tr>
<td>Out-migration</td>
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<tr>
<td>Inflation</td>
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<tr>
<td>Reduction in agricultural products</td>
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<tr>
<td>Destruction/encroachment on land</td>
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<tr>
<td>Pressure on social infrastructure</td>
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<tr>
<td>Loss of farmland</td>
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<tr>
<td>Item</td>
<td>Very Minimal</td>
<td>Minimal</td>
<td>Great</td>
<td>Don’t Know</td>
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<tr>
<td>Pollution of drinking water</td>
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<td>Loss of wildlife species</td>
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<tr>
<td>Ground water contamination</td>
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<tr>
<td>Deforestation</td>
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<tr>
<td>Sexual laxity</td>
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<tr>
<td>Alcoholism</td>
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<tr>
<td>Increased Crime</td>
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<tr>
<td>Discrimination against new migrants</td>
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45. How do you think the project will adversely affect this community during the operational phase?
<table>
<thead>
<tr>
<th>Topic</th>
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<tbody>
<tr>
<td>Pressure on social infrastructure</td>
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<tr>
<td>Loss of farmland</td>
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<tr>
<td>Pollution of drinking water</td>
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<td>Ground water contamination</td>
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<tr>
<td>Deforestation</td>
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<tr>
<td>Sexual laxity</td>
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<tr>
<td>Alcoholism</td>
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<tr>
<td>Increased Crime</td>
</tr>
<tr>
<td>Discrimination against new migrants</td>
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</tbody>
</table>
ANNEX 3
LIST OF EMP PREPARERS

The following list represents the EMP Report Preparers and their various roles:

Team Leader: Ibrahim Jauro

<table>
<thead>
<tr>
<th>S/N</th>
<th>SPECIALIZATION</th>
<th>CONSULTANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Air Quality/Noise &amp; Radiation</td>
<td>Mr. J. Dalyop/ Mohd Umar</td>
</tr>
<tr>
<td>2.</td>
<td>Soil/Agriculture/Land Use/SIA</td>
<td>Dr. Alhassan Mohammed</td>
</tr>
<tr>
<td>3.</td>
<td>Geology/Hydrogeology</td>
<td>Dr. Ogirima Onimisi</td>
</tr>
<tr>
<td>4.</td>
<td>Pavement Study</td>
<td>Engr. Sani Abdullahi</td>
</tr>
<tr>
<td>5.</td>
<td>Biodiversity/Wildlife</td>
<td>Jubril Lawal</td>
</tr>
<tr>
<td>6.</td>
<td>Vegetation/Forestry</td>
<td>Mr. Hussain Bala</td>
</tr>
<tr>
<td>7.</td>
<td>Health Risk Assessment/ Waste Inventory</td>
<td>Dr. I Sule</td>
</tr>
<tr>
<td>8.</td>
<td>Geo Referencing</td>
<td>Mr. J. Dalyop</td>
</tr>
<tr>
<td>9.</td>
<td>Computer Analyst</td>
<td>Mrs. Bolalle Olowo</td>
</tr>
<tr>
<td>10.</td>
<td>Report Reviewers</td>
<td>Dr. A. Mohammed/ Ibrahim Jauro</td>
</tr>
</tbody>
</table>