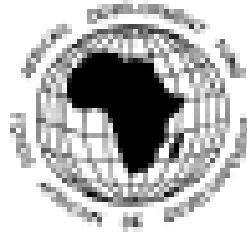


AFRICAN DEVELOPMENT FUND



GOVERNMENT OF SIERRA LEONE

SIERRA LEONE: LUNGI- PORT LOKO ROAD UPGRADING PROJECT

**SUMMARY OF THE ENVIRONMENTAL AND SOCIAL
IMPACT ASSESSMENT**

INFRASTRUCTURE DEPARTMENT (OINF)

DECEMBER 2008

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT SUMMARY

Project Name: Lungi-Port Loko road

Country: Sierra Leone

Project Number: P-SL-D00-004

1. Introduction

The Government of Sierra Leone (GOSL) has requested assistance from the African Development Bank (ADB) to finance the upgrading of the Lungi-Port Loko road. Compliance with Bank's environmental policy requires the following: i) the preparation of an environmental and Social Impact Assessment (ESIA) report and an Environmental and Social Management Plan (ESMP) and, ii) the preparation of a Resettlement Action Plan (RAP). These activities are to be undertaken to ensure that the proposed construction and operation of the road are environmentally sound and sustainable through out the project's life cycle. The EIA will analyze the environmental situation in the road corridor, the corresponding environmental and social impacts and mitigation measures and recommend corrective actions to be carried out during the construction and operational phases.

The scope of the ESIA report includes:

- An environmental impact statement;
- A Climate Change section;
- An analysis of potential impacts on Gender;
- A social and economic impact and mitigation measures.

Land acquisitions for road construction are also likely to cause social disruption and economic loss for communities along the road corridor. As such, it is important that disturbance and loss to the affected communities due to the project, and immediately in its zone of impact, are minimized through proper planning from a very early stage of the project. It is with this view that a base line, socio economic survey, has been initiated to identify the Affected Persons (AP) due to the widening and overlaying of the road, the degree of impact of the project on the affected communities and explore the possibility of minimizing these adverse impacts and also to come up with a (RAP) for the APs to ensure restoration of their livelihood.

The Framework for the RAP includes:

- Baseline Socio economic surveys;
- Legal framework for the Resettlement Action Plan (RAP);
- Institutional Arrangements for the Resettlement Action Plan (RAP);
- The determination of the type of Affected Population (AP), their number, assets under threat and compensation costs;
- Scope of the impact and mitigation measures;
- Public Consultation;
- Implementation Schedules;
- Monitoring and Evaluation; and,
- Costing for resettlement.

This Framework will be prepared based on a 60-m wide road, the number of assets to be disturbed, and a cut off day of December 31, 08, date after which any asset set up on the road and removed by the road construction, will not be compensated for.

2. Project Description

The project area is located in the Port Loko District of Northern Sierra Leone. The road alignment will start at Rotifunk and extends west to the outskirts of Port-Loko Town. The construction will include culverts, one bridge and drainage works. In addition, the project will acquire land and right-of-way for this physical work. It will include sensitization on STD-HIV/AIDS, Malaria and Road Safety.

3. Policy, Legal and Administrative Framework

The Sierra Leone Roads Authority (SLRA) has the responsibility for road building and upgrading. It is semi-autonomously responsible for the administrative control, planning, development and maintenance of all roads in the country. It receives most of its funds for road maintenance from the Road Fund. It reports administratively to the Ministry of Works, Housing and Infrastructure, which is responsible for submitting the Authority annual budget for parliamentary approval. SLRA contracts some 70% of all maintenance works to the private sector.

Legislation governing environmental issues is found as Acts and regulations of the various government line ministries or institutions. These are:

- The Environmental Protection Act 2000/2008 was signed as a legal document on 28th February 2000 and re-amended in 2008
- Following the enactment of this Act, a National Environment Protection Board was established within the Environment Department in 2000.
- The Convention on Wetlands came into force for Sierra Leone on 13 April 2000.
- Sierra Leone presently has one site designated as a Wetland of international importance, with a surface area of 295,000 hectares. Sierra Leone is now the 118th signatory to the Ramsar Convention. Part of the route may pass through this site.

Government institutions are poorly resourced and have limited implementation and enforcement capacity. Local government is under the Ministry of Local Government and Rural Development. The Local and or Town Council is the highest political authority in the locality, with legislative and executive powers, and responsible for promoting the development of the locality and the welfare of the people in the locality with the resources at its disposal (the Local Government Act 2003).

4. Description of the Project Environment

Natural Environment

The road corridor which runs approximately west to east is on the coastal plain a strip about 40km. on an elevation of less than 15m above sea level. It is built up of marine, deltaic, and fluvial deposits of the Bullom Series. The topography is nearly flat with wide riverine swamps, and seasonally swampy area in a belt about 32-kilometer wide. This low lying, flat or very gently undulating grassland area, is said to be a former delta

formed by the merging of Mabole, Rokel and Panpana Rivers at a period of higher sea level.

The natural vegetation cover along the land part of the route will remain largely unaffected by the project. The natural vegetation cover of the area has been considerably modified by man, largely in connection with the development of agriculture. The wildlife population and native wildlife habitat have been impacted by various human activities including subsistence agricultural practices and hunting, and this has resulted in low wildlife diversity in the area along the project road. The project road corridor is neither contiguous with, nor in close proximity with any of nationally protected areas like National Parks, Wildlife Reserves or Controlled Hunting Areas.

Socio-Economic Environment

Health facilities are limited in the project area. Malaria, tuberculosis, intestinal worms, dysentery and cholera are the most common diseases afflicting household members.

Some of these diseases are water-borne and may be connected with the poor access to safe drinking water and sanitary means of excreta and refuse disposal in the settlements.

Many people are engaged in subsistence agriculture. Some of these may also join others to be engaged in various economic pursuits.

There is poor access to safe drinking water in most of these settlements. Some of the settlements have wells provided by NGOs. Most of the villagers depend on streams and other unsafe sources of water. Social and economic amenities are limited.

The major income activities in the villages are fishing, mangrove wood sales, and palm oil production. Sand processing comes as secondary occupation especially when there is high demand and the tides are low. All of these activities are done on very small scale to supplement proceeds from market gardening that is used to pay fees for children

Gender Issues

Women provide over 65% of the work force in food and agricultural production. The contributions of women to agriculture have nevertheless often been under represented, a major reason for their neglect by most agricultural development programmes in the country over the years. Thus women are marginalized and constrained in their access to production resources and extension services, which adversely affects their farming activities. In order to redress this situation, women and their needs must be mainstreamed in development, not only because of equity concerns but also from the realization that sustainable development cannot be achieved if the women are left in the fringes of development efforts.

In addition, there is a complete division of labour between men and women in the study area. Women are engaged in all aspects of swamp cultivation except for the more energy-demanding jobs such as land clearing and digging. In addition to this, women are dominant players in the cultivation of vegetables and other crops.

5. Stakeholders' Consultation and Project Alternatives

A new and shorter road to Lungi may increase the inflow of people to Lungi. The population pressure in Freetown at present cannot warrant a flow of people in search of new settlements at the Lungi end as people causing the congestion in Freetown are in the lower income bracket who cannot easily afford the cost of relocating to Lungi. All categories of people interviewed were happy to have a direct road link with Freetown and also an improvement on the ferry service.

The findings in this area show that the people are unhappy about the lack of infrastructure in their area (specifically roads). There are a number of villages without access roads and they currently have to transport their goods in small boats or along footpaths. The people in this area strongly favour the Waterloo – Pepel – Lungi link as it provides new infrastructure in their area and opens their region.

The people of Lungi vehemently opposed the road from Waterloo. They listed the disadvantages of the bridge along the Waterloo axis (Option #8 and #11) as follows:

- The distance is long, 80 kms. This means higher transport costs and perishable goods from Lungi will be lost along the route.
- Elimination of business development along the current Freetown route.
- The Waterloo – Pemba – Lungi road only serves the interest of the elite traveling overseas and the airport personnel. This road will give marginal benefit to the local people as they will tend use the shorter Tagrin Point – Kissy route with their boats.
- The Lungi Bridge will only serve the interest of the rich. The benefit to the poor will be very little. This may widen the gap between the rich and the poor.
- Traders who would have otherwise stopped at Tagrin end will now directly take their wares to Freetown thereby eliminating the middlemen. This will bring some hardship to an already deprived area.
- Land prices at Lungi will increase rapidly. It is feared that more affluent people wanting to avoid the congestion in Freetown will go on to the other side of the estuary and buy up as much land as possible. As price of land increases the gap between the rich and the poor also increases. The number of absentee landlords will increase thereby making the local people servants of the new breed of elite settlers. This breeds social and political tensions, which will bear no good fruits.
- The bulk of the agricultural and mineral resources come from the south and east. It makes national economic decision to travel direct to Freetown rather than make a detour through Port Loko, Lungi and then to Freetown. The national benefit of the road will be small.

In conclusion, the people in the Lungi area support in principal a road-bridge link between Lungi and Freetown provided it is as short as possible (not like the proposed Waterloo – Pepel connection) and it does not attract a massive inflow of unskilled workers from Freetown.

They also expressed an immediate need for the upgrading of the existing ferry services so that their region can economically develop through improved movement of goods and services.

The people residing along the Waterloo – Tumba corridor support the longer route as it provides improved infrastructure in their area. However, the actual bridge crossings are of insignificant importance to them as their main trade is with Freetown and not Lungi. In general, the people in the study area feel neglected and therefore believe that the project road will open up their regions and facilitate further economic activities.

6. Potential Environmental and Social Impacts and Mitigation Measures

This section discusses major environmental issues and constraints on the physical, and biological environment. The socio-economic impacts of the proposed project are also discussed.

Beneficial and Positive Impacts

- Key potentially beneficial impacts associated with the project implementation are related to the post-construction phase and include significant reduction in transport costs, benefiting agricultural producers who export goods and import inputs to/from the project area and consumers who purchase goods brought into the area by road.
- Other beneficial impacts relate to improvements in travel conditions for vehicles, passengers and the many non-vehicular road users; improved access and reduced transport cost of public transport by providing conditions where more bus services are likely to operate; improved road safety and improved access to health services for all road users.
- The new upgraded road will now provide good opportunity for goods and services to move along the route. In addition, the increase flow of traffic and goods will ignite economic opportunities for the benefit of the people along the road.
- An upgraded road will provide opportunities for goods and services to move along the route.

Adverse and Negative Impacts

The nature of the proposed project is such that no adverse direct or indirect impacts are anticipated in respect of environmentally sensitive areas like National Parks, Wildlife Reserves, National Forest Priority Areas, land prone to erosion, or wetlands of national or international importance. During the operational phase, traffic levels are unlikely to be high enough to give rise to problems of noise, air pollution or crossroad access for pedestrians.

The principal potential adverse impacts mostly relate to the land acquisition requirement. Although over much of the length of the road, the proposed road can be accommodated on existing alignment, some houses will be affected. These will however be very few.

Several other negative impacts have been identified but they can be mitigated satisfactorily and residual impacts reduced to acceptable levels through adoption of the specified mitigation measures.

Construction phase impacts will also be mitigated by specific environmental protection clauses to be included in the contract documents, and enforcing compliance with them during construction.

7. Environmental and Social Management and Monitoring Plan

The ESMP which examines the actions to be taken to mitigate the environmental impacts of the construction and operation activities of the proposed projects is produced in the table below. The summary of the report has identified potential impacts that may occur during construction and operation. For an effective Environmental and Social Management Plan (ESMP) (see **Annex 1**), the following measures will be undertaken.

- The mitigation measures outlined in the must be adhered to through out the life cycle of the project
- SLRA should mandate all the stake holders to adequately and efficiently implement their responsibilities and report to SLRA for action.

8. The Impacts of Climate Change on the proposed project

The United Nations Intergovernmental Panel on Climate Change (IPCC) (2001) presents the following changes in climate in humid tropical areas which may likely have negative impacts on the proposed road.

- 0.09 to 0.88 m sea level rise (central value 0.48 m), which is up to 8.0 cm per decade;
- Annual temperatures will increase by 2 to 6 degrees celsius by 2100 with more extreme hot days.
- Forecast significant increases in rainfall over most of the tropics.

In terms of road infrastructure, these translate to direct impacts such as:

- Extreme maximum temperatures and length of hot spells; so “concrete roads” are not the best option as they do not allow for expansion and contraction easily.
- Extreme rainfall events, influencing flood levels and potentially frequency of flooding, particularly in low lying areas, on the leg of the road closer to the Lungi airport.
- Available moisture (evaporation and rates of rainfall).
- Wet and dry cycles affecting water tables and surface and subsoil inundation cycles; if sediments underneath the road section are made of friable and permeable sediments, they could be prone to mudslides and landslides.
- Rising levels of salinity (primarily inland but also affecting coastal areas); and
- Sea level rise, which translates into a saline front pushing inland towards the road.

Construction Materials and Temperature impacts

Road surfaces in Sierra Leone are overlain with highly sensitive materials such as bitumen and cement based concrete. The seasonality of weather conditions in the country allows these materials to gradually change and often been repaired for a few decades. Climate change due to rise in temperature will have an effect the selected materials unless mitigation measures are proposed. If bitumen based materials are used,

higher temperatures are expected to result in the need for increased frequency of resurfacing due to the more rapid oxidation of the bitumen. Similarly, the use of asphalt with a high stiffness characteristic will result in an increasing stiffness with increasing temperature.

The proposed road project area is characterized by friable unconsolidated sedimentary materials that are of marine in origin. As widening and overlaying are expected to be done on these layers, they are likely to perform poorly under the effects of water as was observed during the field survey. With a distance of about 15 kilometers from Lungi to Port Loko along the coast, these lower layers are likely to be vulnerable to rising water tables or water levels if measures are not designed to minimize such impacts. Alternating wetting and drying characteristic of the country are expected to limit the performance of these friable lower layers of the proposed road.

Access Routes/Feeder Roads

Two major feeder roads were identified in the road corridor adjacent to the coast. Interview in three communities along these routes reveals that their settlements have been subject to flooding during the peak period of the wet season. Such events are likely to increase as a result of the predicted rise in sea level.

Salinity Impacts

The entire road corridor is characterized by rivers, streams and creeks that are estuarine and very saline. The use of saline water during construction could result in the accumulation of salt in the overlaid materials during compaction of granular base materials. The presence of such salt materials likely to cause shrinking and swelling as the soil parent material in the road corridor is mostly sandy clay. If mitigation measures are not developed the end result will be frequent repairs on the proposed road network.

Rising Sea Levels

Added to the above impacts, it is expected that increased storm intensity and storm surge could result in direct impacts to the proposed road infrastructure in the 10 to 15-kilometer stretch from Lungi. Considering the lifespan of twenty years and the worst case scenario of 0.5 cm for every ten years it is expected that sea level rise could result in a potential increase in flood levels in the segment 15 to 20 kilometers from Lungi.

Mitigation Measures

The following measures are summarily produced to address the above impacts. Manage salinity in design and construction of the proposed road by either dewatering or using fresh water during construction;

- Plant trees along the 10 to 20- kilometer stretch where such impacts are likely to be severe in order to reduce a concentration of salt in the dry season when the rate of evaporation is high.
- Minimize the use of salt water for construction;
- Use materials to spray salt water from between the lower and bitumen surfaces;
- Use a concrete bitumen material instead of the common one.
- Apply concrete bitumen pavement in the ten-kilometer stretch of the road from Rotifunk to Kumrabai where the coastal stretch exists.
- Increase the level of the road to about 50 cm above the planned height;

- Properly design drainage structures to minimize impacts of rainwater and guarantee the drainage of rainwater towards areas not prone to mudslides;
- Make provision for disaster preparedness for affected communities;
- The new road may increase the trade of charcoal and deforestation along the road, therefore alternate sources of energy such as biogas may be considered as pilot projects.

9. Resettlement Action Plan

The Resettlement Action Plan addresses the issues of involuntary displacement of families, loss of properties as well as livelihood that would result during the implementation of the proposed project.

Acquisition of land for the widening and overlaying during the construction of the Port Loko road are likely to cause social disruption and economic loss for communities in the project affected areas. As such, it is necessary that disturbance and loss of property due to the project implementation are minimized through proper planning from a very design stage of the project. Bearing this in mind, a baseline socio economic survey has been initiated to identify the affected households due to the widening of the road, the extent of the impact of the project on the people & community within the road corridor and explore the possibility of minimizing the adverse effects and also to come up with a Resettlement Action Plan (RAP) for the affected people to ensure restoration of their livelihood.

This section presents a framework for the RAP on the basis of the pilot base line socio economic survey already undertaken. It also includes the various activities to be undertaken during the implementation of the project to minimize its adverse impacts including:

- Policy and Legal Framework for addressing the adverse impacts
- Land Acquisition
- Impacts on structures
- Impacts on agricultural land
- Efforts to minimize resettlement
- Socio economic characteristics of the affected house holds;
- Resettlement options and procedures, including a survey of all affected persons and the compensation type for each and all affected persons;
- Action Plan;
- Cost and Budget.

10. Public Consultations

These have been carried out in two-fold: a public one in Port Loko where the road project was presented and environmental, cross-cutting and climate change issues were presented. Small-group consultations took also place along the road and were more specific to gender issues, HIV Aids and related health and social issues. The Port Loko workshop was attended by 100 persons and at least 40 % were women. At the end of the event, a number of questions on climate change issues were asked and factual answers given.

The audience praised the project and the road which is expected to promote among other services trade of agricultural products to Freeport. The attendees expressed cooperation with the government and offered to work with the government to make this project a feasible project.

One major recommendation of this Stakeholders meeting is the determination of all actors including the populations to work together to minimize the negative impacts and to maximize the positive impacts of the road, withstanding if these are environmental, social or gender ones. The Topic relating to property acquisition/ resettlement was handled by SLRA on behalf of the Government of Sierra Leone. The prime moment of the workshop was the question and answer/comments session of the workshop, wherein participants expressed their desire/need for the project and how this project will benefit. However, concern was also raised that the issue of compensation of people affected by the project be handled carefully by the Government of Sierra Leone.

These issues rose by stakeholders and other interested organization during the Public Consultation will be taken into consideration in the design of the final mitigation plan including the ESMP. This includes attention given to increasing community participation in decision making, improved community relation, increasing employment targeting youth groups in the road corridor, and development within the area as a whole.

The conclusion from the various contributions is that the road project is a priority of the Government and people of Sierra Leone and the Bank stands a chance to contribute primarily to improving the lives of people within the project area.

One key message that came out clearly from this event is the unlimited cooperation of the inhabitants of the area towards the government and their willingness to be very tolerant and collaborative to speed up the completion of the road project.

11. Costs and Budgets

Cost of Mitigation Measures

Many of the mitigation measures will also be funded by government and other agencies and NGOs as part of the social and developmental programmes for the area. An attempt has been made to draw up a budget for three years of the program specifically for the Environmental part of the project. .

Item Cost Area: Year 1 to 3

**Independent Environmental
monitoring and advisory
services = US\$ 25,000**

**Operational mitigation
measures during construction
phase of project = US\$ 175,000**

Public health and sanitation = US\$ 25,000

Information/awareness/capacity building/demonstration programs = US\$ 125,000

Total: US\$ 350,000

Cost of Replacement of Houses and Water Wells

An approximate estimate of the houses and families to be affected by the project is provided. Some houses are located just outside the clear and grub limits of construction but within the road ROW itself. The final decision on their relocation or left as is will rest with SLRA. According to the present assessment, a total of 275 houses 6 water wells will need to be replaced. The relocation of these houses will require a Resettlement Action Plan (RAP) to be implemented. This will be in accordance with Bank procedures. An assessment is however made of the total cost of replacing the houses and wells as given:

Houses 250 * 3500 = US\$ 875,000

Water wells 6 * 5000 = US\$ 30,000

Design/Consultancy services (for RAP) = US\$ 45,000

Total: US\$ 950,000

12. References

Maps

1. Mapping at 1:50,000 scale for the project areas [paper copy and in digital form]. The maps are in UTM Project Zone 29 North, WSG 1984 for the Freetown to Port Loko area maps 040, 041, 050, 051, 052, 061, 062;
2. Map – in paper and digital form - titled Rokel River Overlook [produced by DACO/SLIS – Sierra Leone Information System for the African Development Bank (ADB) – this map, with “coarse” satellite imagery background, shows the area of Freetown, Waterloo, Songo, Port Loko, and Lungi [i.e. the area covered by 2 of the 3 “projects” being studied.
3. Satellite image in digital form [14m pixel size] covering all Sierra Leone [downloaded from internet], vintage circa 2000 or 2001.
4. • The 4 Geological maps covering all Sierra Leone at 1/250,000 scale – in paper and digital form.
5. • Road map of Sierra Leone at 1:396,000 scale, including map of Freetown and environs.

Documents

1. BCEOM French Engineering Consultants 10 July 2005 SIERRA LEONE Lungi-Port Loko, FINAL ENVIRONMENTAL AND SOCIAL ASSESSMENT REPORT, June 2006
2. Road Design manual [received from SLRA on 2 June 2005]3 .
3. A4 volume titled “Improvement of Freetown – Conakry Highway, draft report, Review of Pavement Design, by Wallace Evans, March 1993;
4. Rehabilitation of Masiaka – Makeni Highway, Tender Dossier Volume I, August 2002, SLRA, Supervisors Re. DIWI in Association with Techsult;
5. Rehabilitation of the Masiaka – Bo Highway, Engineering Report, for SLRA by Tecsult & Company, November 2004;
6. Goderich – Waterloo Rural Coast Road, Contract Documents Volume I (Wallace Johnson Bridge to Kent Junction), 1989.
7. “A New History of Sierra Leone” by Joe A.D. Alie
8. “Groundwater in Sierra Leone - Prospect and Challenges; August 1999”, by Berisford O.A. Davies.

9. Sierra Leone Encyclopedia 20042, version 1.3 March 2005 [prepared by the Development Assistance Coordination Office (DACO)].

Various information from the internet, World Bank Data, information on the railway line to Pepel Island, Country facts, Sierra Leone Government Department websites.

13. Conclusion

The nature of the roads projects works and the environmental setting of the project are such that many of the adverse impacts which are typically associated with road construction projects are not expected to occur in connection with the present project because it is an existing road requiring road upgrading primarily within the existing centerline, thus avoiding or reducing many of the adverse effects which are normally associated with new road construction. No serious adverse direct or indirect impacts are anticipated in respect of environmentally sensitive areas like National Parks, Wildlife Reserves, National Forest Priority Areas, land prone to erosion, or wetlands of national or international importance.

During the operational phase, traffic levels are unlikely to be high enough to give rise to problems of noise, air pollution or crossroad access for pedestrians. However, the construction and operation of this will lead to a variety of changes in the local and wider environment. Many of the effects will be beneficial, particularly the impact at a regional level of increasing the reliability of road transport and the potential to develop the local economy through improved infrastructure and employment opportunities. The potential beneficial impacts associated with project implementation are also expected to lead to improved quality of life, particularly for those communities who live on or close to the road. There will nevertheless be adverse effects, which result from increasing the carriage width and at some locations, due to alignment improvement.

Many of these effects will be short-term and reversible nature and stem from ground disturbance, operation of equipment and housing of the labour force, but very few that will lead to permanent change.

These adverse impacts are capable of control within acceptable limits, provided that the recommended mitigation measures are adopted. Therefore, if the mitigation and benefit enhancement measures recommended in this EIA report are implemented properly, there are no environmental grounds for not proceeding with implementation of the project in the form in which it is presently envisaged, since the long-term benefits of project implementation outweigh the largely short-term adverse impacts associated with construction, all of which can be mitigated satisfactorily.

This study has shown that Lungi - Port Loko Road communities are poor, but are blessed with tremendous agricultural resource, which if properly exploited can lift the communities up to higher incomes. The new upgraded road will now provide good opportunity for goods and services to move along the route. In addition, the increase flow of traffic and goods will ignite economic opportunities for the benefit of the people along the road.

The study also clearly shows that NGOs and other development agencies have concentrated efforts in Loko Massama chiefdom and inadvertently neglecting the Maforki and Kafu Bullom ends. This will now be corrected in view of the improved accessibility to those chiefdoms.

Annex 1 : Environmental and Social Management Plan for the Lungi – Port Loko Road Project

1- Design Phase

ACTIVITY	ENVIRONMENTAL IMPACT ISSUE	MITIGATION MEASURES	LOCATION	RESPONSIBILITY		TIME FRAME AND COSTS	
				Implementation		Supervision	Costs
1.1 Mitigation and Monitoring and Implementation Time Table	All Impact Issues	Prepare Time Table Produce summary of EIA Incorporate measures set out in Time Table Assign roles and responsibilities	Through out project corridor	Contractor	SLRA	Before construction starts	
1.2 Land /property acquisition	Acquisition and resettlement	Public consultation Compensate affected communities Realign road to minimize impacts	The road as defined in the resettlement plan	Contractor and affected communities	SLRA	Middle and end of land and property acquisition	
1.3. Plan to use materials	Loss of farmland for borrow pits and dumpsites	Prepare proper materials plan Identify appropriate sites to minimize impacts	The road as defined in the resettlement plan	Contractor	SLRA	Before construction	
1.4 Inadequate environmental technical capacity	Poor input of issues in the bid document	Short term training in ESMP	SLRA	Environmental expert	SLRA	Before construction	

2- Construction

ACTIVITY	ENVIRONMENTAL IMPACT ISSUE	MITIGATION MEASURES	LOCATION	RESPONSIBILITY		TIME FRAME
				Implemen tation	Supervision	
2.1 Clearing of the existing right of way	Loss of vegetation Loss of access	Only remove vegetation that directly impinges on permanent works Provide safe passage for pedestrians Remove trees and replant according to plan	Various construction sites	Contractor	SLRA	During construction
2.2 Construction 2.2.1 General	Loss of Topsoil Dust emission Disposal of earth works Soil erosion Noise pollution Air pollution Contamination of material wastes Local flooding Borrow soils Quarry areas Pollution from discarded asphalt	Distribute excess top soil Maintain stockpiles Suppress dust Dispose of spoilage Control erosion Minimize noise Monitor noise	Through out project area and construction sites, crushing plant, rock quarry sites, and burrow pits.	Contractor	SLRA	During construction
2.2.2. Overlaying	Runoff from hydrocarbons Soil contamination	Regularly inspect borrow pits	Along road corridor	Contractor	SLRA	During construction
2.2.3 Haulage	Disruption to road users	Collect and dispose of spilled materials Provide safe passage to users	Along road corridor	Contractor	SLRA	During construction

3- Operation

ACTIVITY	ENVIRONMENTAL IMPACT ISSUE	MITIGATION MEASURES	LOCATION	RESPONSIBILITY		TIME FRAME
				Implementation	Supervision	
3.1 Road Traffic	Traffic Noise, Air Pollution, Increased Road accidents	Noise protection Introduce emission testing programmes Reinforce traffic police laws on speed limit Provide enhanced road signs and markers Ensure adequate crossing signs	Along road corridor	SLRA	SLRA	Through out project life cycle
3.2 Activities of local road users	Increased poaching on SLRA ROW Decline in quality of road surface	Train voluntary road traffic wardens	Along road corridor	SLRA	SLRA	Through out project life cycle
3.3 Activities of drivers	Social problems such as prostitution and drug abuse	Introduce parallel programmes	Along road corridor	Local beneficiaries SLRA	SLRA	Throughout project life cycle
3.4 Inadequate maintenance	Blocking of drains Decline of road surface Landslips	Adopt performance maintenance contracts	Along road corridor	SLRA	SLRA	Through out project life cycle