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ACRONYMS / ABBREVIATIONS

ADC	Area Development Committee
ASFR	Age Specific Fertility Rate
CBO	Community Based Organization
CDR	Crude Death Rate
COMESA	Common Market for Eastern and Southern Africa
DADO	District Agriculture Development Office
DESC	District Environmental Sub-Committee
EAD	Environmental Affairs Department
EDF	European Development Fund
EIA	Environmental Impact Assessment
EPA	Extension Planning Area
ESIA	Environmental and Social Impact Assessment
ESCOM	Electricity Supply Commission of Malawi
ESAP	Environmental and Social Action Plan
ESMP	Environmental and Social Management Plan
GoM	Government of Malawi
KDC	Karonga District Council
MBS	Malawi Bureau of Standards
MoAWD	Ministry of Agriculture and Water Development
MoH	Ministry of Health
MoLMD	Ministry of Labour and Manpower Development
NAC	National Aids Commission
NEP	National Environmental Policy
NGO	Non Governmental Organization
NSO	National Statistical Office
RA	Roads Authority
RAP	Resettlement Action Plan
SADC	Southern Africa Development Community
TA	Traditional Authority
USA	United States of America
VAP	Village Action Plan
VDC	Village Development Committee
VSL	Village Savings and Loan
WRB	Water Resources Board

EXECUTIVE SUMMARY

With support from the World Bank, the Road Authority (RA) plans to rehabilitate the 45.9 Km of the M1 Road from Karonga to Songwe. The major works of the proposed project shall include rehabilitation and widening of the carriageway from Karonga M1 Roundabout to the expansion joint at the south end of the Songwe River Bridge at Malawi-Tanzania Border.

The scope and nature of works that will be undertaken before, during, and after construction makes the road project fall within an environmental classification of Category 1. The classification of category 1 means that there is need to carry out an Environmental and Social Impact Assessment (ESIA) and develop a Resettlement Action Plan (RAP) as required by the Environmental Management Act (1996), Environmental Social Impact Assessment Guidelines and the World Bank's Environmental Self-guard policies and in line with the Roads Authority Environmental and Social Management Guidelines for the Road sector. In addition the magnitude of the project is expected to trigger some of the World Bank Environmental and Social Safeguard Policies more especially the Environmental Assessment Policy (OP/BP 4.01) and Involuntary Resettlement Policy (OP/BP 4.12).

The total cost of the project is US$ 152,865,529 and this cost includes the estimated budget of US$ 1,208,675 for the ESMP and MP implementation.. The road has an economic design life of 20 years and a construction period of 30 months. It is expected that a total of 3000 people shall be employed.

In order to achieve the objectives of the ESIA, the consulting team used various approaches and techniques including use of secondary sources of data through the review of various relevant documents such as study reports, policies, legislations, and national strategies, regional and global protocols related to road construction projects. The ESIA concludes that the project is highly economical and a viable to the economies of countries in the Eastern and Southern Africa including Malawi. The ESIA identified positive impacts, as well as a number of environmental and social challenges that will emanate from the project that if not properly mitigated against will cause serious environmental and social damage to the environment of the project.

Positive impacts include improved road travel time which enhances increased trade between Malawi and Tanzania and within Malawi. Some of the identified environmental and social issues include the following:

- Loss infrastructure and property
- Loss of about 240 hectares of agriculture land mainly for people cultivating along and within the road reserve boundaries
- Increased level of wastes
- Loss of forests and trees species
- Siltation of rivers and streams
- Loss of cultural site mainly grave yards

- Increased levels of accidents
- Increased incidences of communicable diseases such HIV and AIDS and Ebola

With proper mitigation measures, these identified problems will not be as serious to cause permanent damage to the environment of the area considering that this is a rehabilitation project and the road works are going to follow the existing path. The ESIA therefore makes the following recommendations:

- The Roads Authority with support from the Karonga District Council and Ministry of Lands Housing and urban Development should compensate identified property owners that will be affected and compensate them in time in line with the World Bank Resettlement Framework
- The contractors should start the construction works soon after crops are harvested to minimize crop loss by the people
- The contractor should ensure that the borrow pits and the quarries are rehabilitated to restore the scenic views and reduce incidences of water logging
- The contractor should ensure that all different forms and types of wastes from the project are properly managed
- The District Forest Office should intensify law enforcement, awareness and civic education activities in order to minimize the impacts the impacts of this project on the protected areas of Nambatata and Karonga Escarpment Forest reserves
- The Karonga District Council and other stakeholders at districts level should be fully involved in the monitoring of the implementation of the Environmental Social Management Plan (ESMP) and Resettlement Action Plan (RAP)
- In order to minimise dispute and conflicts the village and district level dispute settlement mechanism which already exist in the project area need to be used
- In order to effectively implement the ESMP, the government will need to allocate an estimated amount of USD 1,208,675.00.
- The Ministry of Health and other stakeholders should increase civic education and awareness activities in order to reduce or minimize the spread of communicable disease
- Upon completion of the road works, there is bound to be increased levels of accidents more especially along the trading centres, therefore the National Road Safety Council and Road Traffic Directorate should strictly enforce the design speed limits of the road.
- The National Road Safety Council should ensure to strengthen civic education and awareness activities in order to minimize road accidents more especially along the trading centres.
- The Roads Authority should enforce the road boundary reserve adherence so that people should not encroach the road reserve again after construction.

CHAPTER 1.0 INTRODUCTION

1.1 Background

With support from the World Bank, the Road Authority plans to rehabilitate the 45.9 Km of the M1 Road from Karonga to Songwe. The major works of the proposed project shall include rehabilitation and widening of the carriageway from Karonga M1 Roundabout to the expansion joint at the south end of the Songwe River Bridge at Malawi-Tanzania Border. The Karonga-Songwe Road is a major and important trade route connecting many countries in the Eastern and Southern Africa trade corridor and has a lot of economic potential. Because of the scope and nature of works that will be undertaken before, during and after construction, the road project received an environmental classification of Category 1. The classification of category 1 means that there is need to carry out an environmental and social impact assessment (ESIA) and develop a resettlement action plan as required by the Environmental Management Act (1996), Environmental Social Impact Assessment Guidelines and the World Bank's Environmental Self-guard policies and in line with the Roads Authority of Malawi Environmental and Social Management guidelines for the Road sector.

The project is estimated to cost USD 151,656,854.00 and has an economic design life of 20 years and a construction period of two years. In addition about USD 1,208,675.00 will be required for the implementation of the Environmental and Social Management Plan and Monitoring Plan. It is expected that a total of 3000 people shall be employed.

The Roads Authority awarded a contract to MSV International Inc, USA in association with Ruo Consultants Ltd Malawi for the preparation of an Environmental and Social Impact Assessment (ESIA) for the project. The project proponent is Government of Malawi through RA. Details of the project proponent are as follows:

Proponent Name : Roads Authority

Postal Address: Private Bag B 346, Lilongwe 3, Malawi

Physical Address : Functional Building, Off-Paul Kagame Road, Lilongwe

Contact Person : The Chief Executive

1.2 Rationale for the Implementation of the Project

The rationale for the implementation of this project is specifically based on the following:

a) According to Economic Internal Rate of Return (6.75%), it is estimated that within 15 to 20 years, the project will generate between two billion to three billion USD of socioeconomic benefits to the areas along the road and offer jobs to 3,000 people.

b) At present, this road is in continuous deterioration due to increasing heavy traffic and costing the government a lot of money for routine and periodic maintenance. In addition, this road becomes impassable during the rainy season.

c) This project will strengthen flood fighting, rescue and evacuation capacity, to ensure the life and property security of residents.

d) The road links Malawi to Tanzania and the important port of Dar es Salaam and as such forms a vital link for the importation of strategic goods. The road forms part of the Common Market of Eastern Africa (COMESA) North South Corridor and it's an alternative link to the port for Zambia.

1.3 Rationale for Undertaking the Environmental and Social Impact Assessment

The requirement for undertaking the Environmental and Social Impact Assessment (ESIA) of this project emanates from the following reasons:

a) The project falls within the Prescribed and Gazetted list of projects that have a mandatory requirement to undergo an ESIA. The Environment Management Act (EMA) of 1996 requires that prescribed projects such as construction of roads undergo an ESIA before they are implemented. The Guidelines for ESIA in Malawi (1997) outline the activities for which ESIA is mandatory. On the basis of the aforesaid, ESIA is mandatory for this project.

b) The project has the potential to affect other operations being undertaken in the area and beyond through rerouting of vehicles thereby causing delays.

c) The project will involve extraction of about 80,000 cubic metres of soil for widening the road leading to damaged landscapes. Heavy machinery and equipment shall be used thereby posing occupation safety and health risks. The ESIA provides measures for mitigating risks arising from such operations.

d) Considering the scope and nature of works that will be undertaken before, during and after construction, the road project received an environmental classification of Category 1. The classification of category 1 means that there is need to carry out an environmental and social impact assessment (ESIA) and develop a resettlement action plan as required by the Environmental Management Act (1996), Environmental Social Impact Assessment Guidelines and the World Bank's Environmental Safeguard policies more especially the Environmental Assessment Policy (OP/BP 4.01) and Involuntary Resettlement Policy (OP/BP 4.12) and in line with the Roads Authority of Malawi Environmental and Social Management guidelines for the Road sector.

Therefore, this report constitutes accountability framework on the part of the developer to ensure that the project construction and operation works are undertaken following principles of sustainable development.

1.4 Project Description

The proposed road project is in Karonga District in the Northern Region of Malawi passing through Traditional Authorities Kyungu and Mwakaboko. Specifically, the road starts from Karonga M1 Roundabout to the expansion joint at the south end of the Songwe River Bridge at Malawi-Tanzania Border (Figure 1).

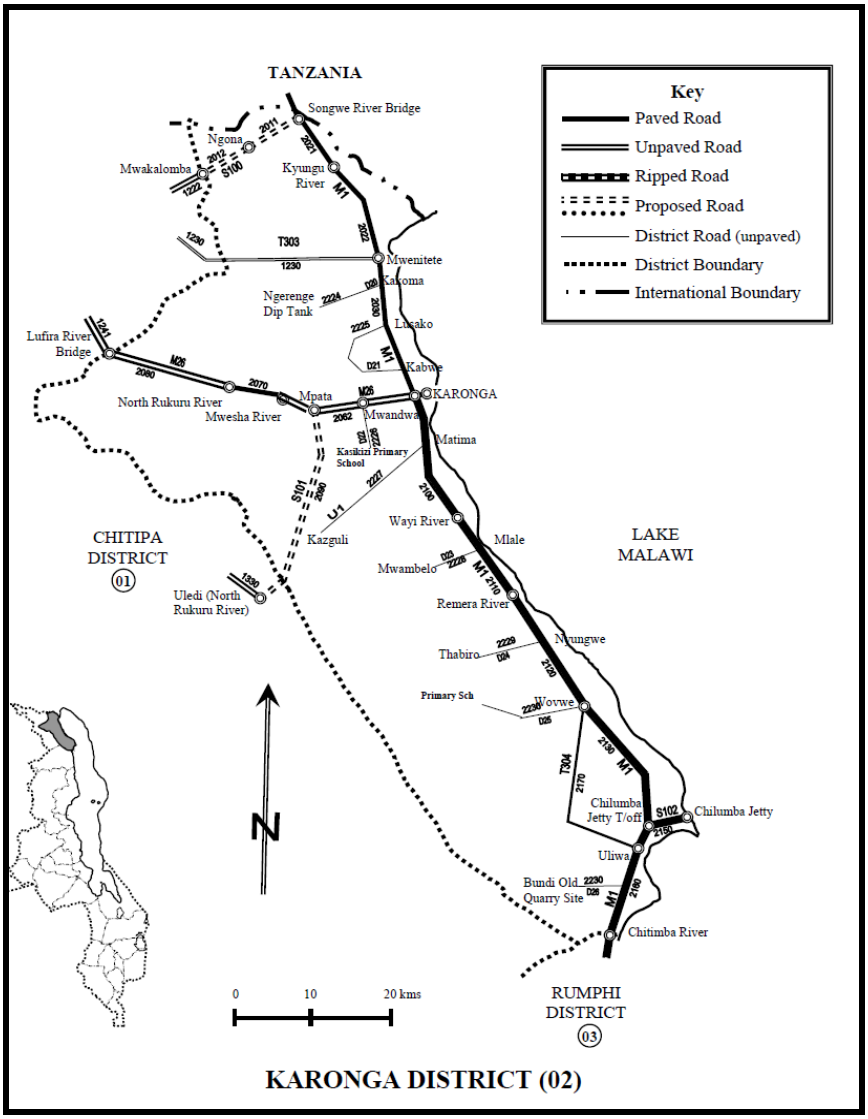

Figure 1: Sketch Location of the Project in Karonga District Road Network

The Karonga–Songwe Road was constructed between April 1987 and April 1990 with funding from the European Development Fund (EDF). In 2002, approximately 15 km of the road from Karonga Boma to Lufilya Bridge, was resealed. Currently the road is in fair to poor condition with some sections remaining in good condition.

Typical distress on the road listed in approximate order of severity, includes:

- Aged surface which shows significant stone loss and provides no effective seal. This has resulted in water ingress into the pavement leading to all forms of distress.
- Krebs on high embankments have retained water in the base leading to significant rut development combined with all other distress indicators in the outer wheel path.
- Uncut grass has encroached on the shoulders. This has led to reduced available width and danger to pedestrians and cyclists now forced off the shoulder.
- Significant edge break is noted on the shoulders, especially over embankments possibly resulting from livestock accessing the road.

CHAPTER 2.0 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This chapter outlines the policies, legislative and administrative framework to guide the implementation of the project.

2.1 National policy framework

2.1.1 Roads Authority Vision, Mission and Environmental Policy Statement

The RA policy statements state that by the year 2020, the Malawi public road network be developed and maintained up to a standard where all motorized and non- motorized reach every society in the country in adequate, safe, reliable, efficient, economic and in an environmental friendly manner at all times of the year. The principles underlining the policy are as follows:

- Comply with the relevant health, safety legislation in accordance with Section 13(d) of the Malawi Constitution and adherence to the environmental best practices for the roads sector;
- Prevent adverse environmental effects of road construction and ensuring that the infrastructure itself is environmental friendly through;
    - The inclusion of ESIA in the planning of the construction of roads and energy conservation;
    - Promotion of environmental protection and resource conservation;
    - Ensuring that roads do not impede drainage and cause water stagnation resulting in water pools that may become breeding places for disease vectors and pathogens;
    - Ensuring that drainage outlets do not become the primary sources of erosion;
    - Promoting the use of more energy-efficient and less polluting modes of transport Environmental and Social Guidelines
- Enforce environmental standards and specifications in line with MBS – ISO 14,000 series;
- Carry out on-site supervision on sites with consultants and contractors to ensure environmental due diligence; and that agreed environmental; health and safety standards designed to reduce associated risks during construction and operation, are being followed;
- Report on the compliance with environmental commitments, the status of the mitigation measures and the results of the monitoring programmes to consultants, contractors, stakeholder and members of the public; and get feedback on the requisite environmental performance information;
- Develop specified performance indicators to enhance the review of progress in implementing mitigation measures; and where necessary recommending remedial measures;
- Conduct training in ESIA and in safe and practical and efficient work procedures to minimize the negative impacts and enhance positive impacts by adopting the precautionary principle; the polluter pays principle and best available technology that entails the least environmental cost (BATNEEC)

- Prepare and implement environmental risk management and road safety plans;
- Prepare environmental guidelines and best practices for road construction, maintenance and environmental management for use in the sector;
- Compliment activities and endeavours of partners in the Transport Sector like Rail, Aviation and Marine Transport Systems.

The Statement provides policy direction and guidance for all roads activities including construction. The Karonga – Songwe (M1) Road will be constructed in compliance with this policy.

2.1.2 The National Environmental Policy, 2004

The overall goal of the policy is to promote sustainable social and economic development through the sound management of the environment and natural resources. The specific policy goals address issues of environmental security for health and wellbeing of people, sustainable utilization and management of the country's natural resources, long term self-sufficiency in food and energy, ecosystem integrity and sustainable environment and natural resources management. The policy promotes the rights of every person to a clean environment while also at the same time stating that every person has a duty to promote sustainable utilization and management of the environment and natural resources, including taking legal action against any person whose activities or omissions have or are likely to have adverse effects on the environment.

The policy recognizes the tradeoffs between economic development and environmental degradation and calls for the use of ESIA and environmental monitoring as tools for minimizing impact of development on environment. The Karonga – Songwe (M1) Road will integrate the principles of the environmental policy into the project so that rehabilitation is done in an environmentally responsible manner with the participation of all stakeholders.

2.1.3 National Land Policy, 2003

The National Land Policy of 2003 provides an institutional framework for democratizing land management and outlines procedures for protecting land tenure rights, land-based investments and management of development at all levels. It basically seeks to optimize utilization of Malawi's land resources for development.

The policy recognizes that in order for its provisions to be achieved, there is need to incorporate desirable principles of land use management, effective civic education and public appreciation of the constraints and tradeoffs that need to be made. For example, the choice between having a good road and protecting natural resources must be understood by the public. The objectives of the policy includes promotion of tenure reforms that guarantee security and instil confidence and fairness in land transactions e.g. compensation, promotion of a decentralized and transparent land administration and enhancement of conservation and community management of land resources. Chapter 9 of the policy deals with the protection of the environment and land resources. This policy will guide in making important decisions concerning compensations, resettlement and protection of

natural resources especially when preparing the Resettlement Action Plan (RAP) for the Karonga – Songwe (M1) Road.

2.1.4 National Forestry Policy, 1997

This policy aims at promoting sustainable contribution of national forests, woodlands and trees towards the improvement of the quality of life in the country by conserving the resources for the benefit of the nation and to the satisfaction of diverse and changing needs of Malawi population, particularly rural smallholders. The policy prevents unnecessary changes in land-use that promote deforestation, or endanger the protection of forests which have cultural, biodiversity or water catchment values. It also discourages establishment of any development activities in gazette forests unless proven to be environmentally friendly for which suitable intersect oral and local consultations will be conducted. Above all, the policy advocates the carrying out of environment impact assessment where actions are likely to have significant adverse impacts on important forests and other resources. The contractors for the Karonga – Songwe (M1) Road will take full advantage of provisions under this act to prevent unnecessary destruction of forests and related resources.

2.1.5 National Water Policy, 2004

The National Water Policy addresses all aspects of water management including development of water resources and service delivery conforming to the current global and regional trends and the requirements as reflected under the Millennium Development Goals. The overall policy goal is sustainable management and utilization of water resources in order to provide water of acceptable quality and of sufficient quantities, and ensure availability of efficient and effective water and sanitation services that satisfy the basic requirements of every Malawian and for the enhancement of the country's natural ecosystems. One of its objectives is promoting public and private sector participation in water resources management, development, supply and conservation. The policy is based on the premise that all people shall have access to potable water and adequate sanitation services to reduce incidences of water related diseases.

The protection and use of water resources has been accorded the highest priority over other uses by this policy. It is therefore important that the Karonga - Songwe road rehabilitation project will not significantly contribute towards the degradation and depletion of water resources in the zone of influence and that there shall be continued involvement of the general public in handling water use and management issues.

2.1.6 National Decentralization Policy, 1998

The national decentralization policy was approved in October 1998. The policy devolves administrative and political authority to the district level and integrates governmental agencies at the district and local levels into a single administrative unit. The highest administrative and political institution at district level is termed the District Council and is comprised of elected members with full executive powers and non-voting traditional and political leaders. The policy mandates local governments to regulate planning and development within their jurisdiction and also empowers them

to have by-laws that specify among other issues, how specific development projects should minimise or avoid environmental degradation. The Karonga – Songwe (M1) Road will have to fulfil the planning requirements of the relevant local authority.

2.2 National legal framework

2.2.1 Constitution of the Republic of Malawi, 1995

The constitution of the Republic of Malawi provides a foundation for environmental management in Malawi. Section 13(d) outlines the principles of sustainable development. The constitution aims to prevent the degradation of the environment, provide healthy living and working environment for the people of Malawi, accord full recognition to the rights of future generation by means of environmental protection and the sustainable development of natural resources, and conserve and enhance the biodiversity of Malawi. This implies that all activities undertaken in Malawi including road construction or rehabilitation should integrate the principles outlined in the Constitution.

2.2.2 The Environment Management Act, 1996

The Environment Management Act, enacted in 1996, provides the legal basis for the protection and management of the environment and the conservation and sustainable utilization of the natural resources. Section 24 of the Act outlines the ESIA processes to be followed in Malawi and requires that all project developers in both the public and private sectors comply with the process. The "Prescribed List for which ESIA is Mandatory" that is gazette under section 24 of the Act, sets out which activities must have an ESIA before they can be implemented. If a developer is proposing a "prescribed project", ESIA applies, and the developer needs to submit a project brief. With respect to roads sector activities, construction of new or expansion of existing highways and feeder roads require an ESIA. Activities associated with road works – quarrying and mining for aggregate material, for example, are also prescribed activities. Furthermore, projects that have the potential to affect national parks, water resources, cemeteries and historical sites (among other screening criteria) also require ESIA. The Act under section 26 (3) further requires that no licensing authority issues any license for a project for which an ESIA is required unless the Director of Environmental Affairs (DEA) has given consent to proceed due to completion and approval of a satisfactory ESIA report or due to non- requirement of an ESIA. Prescribed activities for which ESIA is mandatory are outlined in the Guidelines for ESIA (1997). In accordance with the prescribed activities, the construction of the Karonga – Songwe (M1) Road requires an ESIA before it can be implemented.

2.2.3 Land Act, 1969

The Land Act, 1965 (Cap 57.01) mainly deals with land tenure and land use issues. It recognizes that every person has a natural dependence on land and that it is therefore important that government provides for secure and equitable access to land as a multi-purpose resource and an economic asset by clearly defining issues of security of tenure. The land Acquisition Act (Cap 57.04) outlines procedures to be followed for land acquisition by individuals or government. The procedures include

the steps to be undertaken for government to acquire land starting from issuance of formal notices to persons with existing land interests to payment of compensations formal land ownership transfer. This has implications on the proposed project in that all land for the project should be acquired following formal land acquisition procedures and that the people who will lose property or will be displaced should be fairly compensated.

2.2.4 Malawi Forestry Act, 1997

The Forestry Act, 1997 provides for participatory forestry, forest management, research, education, forest industries and protection and rehabilitation of environmentally fragile areas. The act among other issues seeks to protect trees and other resources in forest reserves, conserve and enhance biodiversity, protect and facilitate management of trees on customary land, promote community involvement in the conservation of trees, promote sustainable utilization of timber and other forest produce and protect fragile areas such as river banks and water catchment. The road construction project will have to undertake measures to protect trees within the road alignment and limit the cutting down of trees to where it is absolutely necessary in consultation with relevant authorities and communities.

2.2.5 National Local Government Act, 1998

The act mandates local governments to regulate planning and development within their jurisdiction and also empowers them to have by-laws that specify among other issues, how development projects should minimize or avoid environmental degradation. The Karonga – Songwe (M1) Road will have to fulfil the planning requirements of the relevant local authority.

2.2.6 Water Resources Act, 1969

The Water Resources Act provides for the control, conservation, apportionment and use of water resources of Malawi. The Act vests ownership of all public water in the President while the control of all public water is vested in the Minister responsible for water affairs. The Act prohibits any person to divert, dam, store, abstract or use public water for any other purpose except in accordance with the provisions of the Act. Thus the project shall comply with this requirement by obtaining the necessary water user rights. The Act further prohibits any person to interfere, alter the flow of or pollute or foul any public water. Non-compliance is an offence. The Karonga – Songwe (M1) Road will put in place measures to prevent altering of flow or pollution of public water. The measures to be put in place will be outlined in the environmental management plan as part of the ESIA.

2.2.7 National Parks and Wildlife Act, 2000

The Act deals with protection and sustainable management of wildlife in Malawi. The Act prescribes the purposes and functions of National Parks and Wildlife Reserves and advocates the concept of a “wildlife impact assessment” before any activity can be carried out in these protected areas. The Karonga – Songwe (M1) Road will not pass through or near any protected area.

2.2.8 Town and Country Planning Act, 1988

The Town and country Planning Act (Cap 23.01) regulates land use planning and physical developments in Malawi. The act seeks to promote orderly spatial physical planning in order to optimize use of and service infrastructure and protect and conserve fragile ecosystems in space. This is achieved by guiding physical developments through provision of planning permission following appropriate scrutiny by local planning committees or the Commissioner for Physical Planning. The Act under Section 40 regulates development by prescribing screening for environmental and socio-economic implications for large-scale development projects before planning permission is granted. In view of the above requirements, the proposed project is a large scale development and will have to undergo screening before permission is granted. The current ESIA for the project is part of screening and development control. The Roads Authority will therefore have to submit the plans for this project to the relevant Karonga District Council for further scrutiny and granting of development permission in accordance to the provisions of this Act.

2.2.9 Occupational Health and Welfare Act, 1997

The Act regulates the requirements for adequate environmental health and safety measures within workplaces. This Act applies to this project because of its risky nature. Employees are prone to accidents and chemical and biological hazards including disease epidemics. Special precautions will therefore be taken by the contractor to have a safety policy and provide meaningful occupational health safety to all employees and the general public.

2.2.10 Public Roads Act (Cap. 69:02)

This Act provides for road standards, safety and classification. The proposed road will fully comply with the provisions of the Act by ensuring that appropriate infrastructure for public safety and road durability are taken into account. Such infrastructure include road signage, packing bays, bridges, road markings, road shoulders, drainage systems, road crossings and junctions, road reserves, vertical and horizontal alignments and others.

2.2.11 Water Works Act, 1995

The Act (Cap. 72:01) was enacted to provide for the establishment of the Water Boards and Water-areas; administration of such areas and development, maintenance and operation of water works. Section 3 establishes Water Boards for five areas including Northern Region Water Board. The Act makes it an offence if any person wilfully and negligently causes water pollution. The Act also empowers water boards to make bye-laws for regulation of water use and prevention of pollution. The project will take due consideration for the protection of the Northern Region Water Board water retaining infrastructure against siltation, pollution and damage. A consultation meeting was held with management of the Water Board to map out strategies for protection of the water extraction points and water pipelines running along the road.

2.3 World Bank Safeguard Policies

To ensure the social and environmental sustainability of the projects, the World Bank developed its Safeguard Policies, divided in environment, social, and legal areas shown in table 1 below. Likewise, the World Bank has a Public Disclosure Policy that is of cross-character and applies in all the Safeguards Policies.

Table 1: World Bank Safeguard Policies

Environmental Policies	**Social Policies**
OP/BP 4.01 Environmental Assessment OP/BP 4.04 Natural Habitat OP/BP 4.09 Pest Management OP/BP 4.36 Forest OP/BP 4.37 Safety of Dams	OP/BP 4.10 Indigenous People OP/BP 4.12 Involuntary Resettlement OP/BP 4.11 Physical Cultural Property **Legal Policies** OP/BP 7.50 International Waterways OP/BP 7.60 Projects in Disputed Areas
World Bank Additional Safeguard Instruments	
- Environmental, Health and Safety Guidelines - Environmental Assessment Sourcebook (and updates)	- WB Participation Sourcebook (1996) - Disclosure Hand Book - Electronic Resettlement Guidebook

Source: World Bank, Safeguard Policies.

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The Safeguard Policies pursue three objectives: (i) ensuring that environmental and social issues are evaluated in the preparation and decision-making process; (ii) reducing and mitigating the environmental and social risks of Bank-financed programs or projects; and (iii) providing mechanisms for consultation and information disclosure.

According to the agreements between the GoM and the World Bank, RA will comply with all the Safeguard Policies in the subproject or activities funded under the World Bank. A complete description of the World Bank's safeguards and their triggers can be found on the Bank's official Web site, **www.worldbank.org**.

2.3.1 Safeguards Policies triggered by the project

In this project and any other infrastructure and road projects, the environmental and social Safeguard Policies that are commonly triggered include the following:

- OP/BP 4.01 Environmental Assessment
- OP/BP 4.04 Natural Habitats
- OP/BP 4.10 Indigenous People
- OP/BP 4.11 Physical Cultural Property

- OP/BP 4.12 Involuntary Resettlement

Table 2 presents the common settings in which the safeguards are triggered and generic directions to comply with them. The policies that apply to each specific subproject will be decided on a case-by-case basis during the project cycle.

Table 2: Social and Environmental Safeguards Commonly Activated

Safeguard Policy	**Trigger settings and requests**
Environmental Assessment (OP/BP 4.01)	This safeguard is typically triggered in projects where the work will affect, temporary or permanently, the natural environment and/or society, through direct, indirect, or cumulative impacts. The project will develop the Environmental and Social Impact Assessment (ESIA), Environmental and Social Management Plan (ESMP), and others required by national law and the Bank's guidelines to ensure the social and environmental sustainability of the project and to obtain the respective environmental permissions.
Natural Habitats (OP/BP 4.04)	This safeguard is most likely triggered for projects located in a protected area or in a critical area from an environmental perspective. Depending on the negative impacts to the natural habitats (flora and fauna), these projects will require special studies to protect or preserve the species identified at risk of being affected. If a project can cause irreversible damages, it will be excluded from financing.
Indigenous or Vulnerable Groups (OP/BP 4.10	This policy is triggered when a project is located in recognized areas of indigenous or vulnerable groups, where a project benefits or affects these communities. The criteria to define these vulnerable groups are included in the Bank's OP/BP 4.10. In these cases an Indigenous or Vulnerable Group Plan (VGP) is required, in order to ensure an adequate consultation process and participation of these groups.
Physical Cultural Property (OP/BP 4.11)	This safeguard might be triggered during projects constructed in zones of recognized archaeological/cultural/physical potential. Investigations, Rescue, and the Chance Finds Procedures Plan are the most common instruments required in cases when the Policy is triggered.

Safeguard Policy	Trigger settings and requests
Involuntary Resettlement (OP/BP 4.12)	This safeguard is triggered when projects require the relocation of people or compensation is required because of project impacts on livelihoods or natural resources. The affectation could be minimal or substantial depending on whether houses or productive lands (legal or illegal) are impacted. These cases require a Resettlement Action Plan (RAP) developed in accordance with the Bank's guidelines.

Through the application of a safeguard screening criteria, using the Environmental and Social Screening Form, and the Resettlement Screening Form, this project triggered OP 4.01 and OP4.12.

2.4 Administrative Framework of the ESIA Process

Environmental Affairs Department (EAD) is the authority charged with administering the ESIA process and works with other institutions in the process. The Environmental Management Act (1996) sets out the powers, functions and duties of the Director of Environmental Affairs in administering the ESIA process. Figure 2 below illustrates this process.

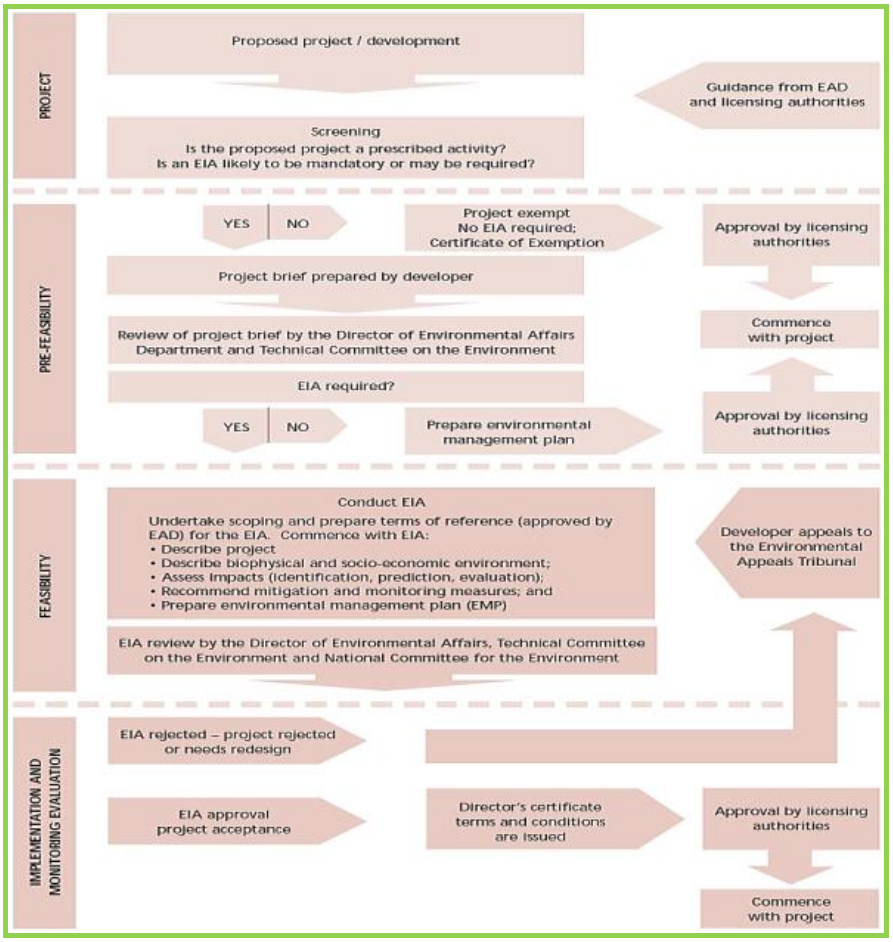

Figure 2: Administrative Framework of the ESIA Process

The Act under section 10 provides for the establishment of the National Council for the Environment (NCE) and the establishment of the Technical Committee on the Environment (TCE) under section 16. The NCE is a policy making body which advises EAD and the Government in general, on environmental matters while the TCE provides technical advice on environmental matters.

Through the TCE, member agencies are informed of projects being appraised, review projects, participate in formulating ESIA terms of reference, develop project approval terms and conditions and recommend course of action to the Director. The NCE provides policy guidance to EAD and based on recommendations from TCE will make recommendations to the Minister responsible for environmental affairs on approval or non-approval of ESIAs.

As provided for in section 26 of the EMA, a prescribed project cannot receive the required authorization to proceed from the relevant licensing authority unless and until the Director of Environmental Affairs (DEA) issues a certificate stating that an ESIA is not required or on the basis of an ESIA report that he has approved the project. Under the EMA, the DEA is empowered to require changes to a project to reduce its environmental impact and to reject a project if, in his view, it will cause significant and irreparable damage to the environment.

CHAPTER 3.0 PROJECT ALTERNATIVES AND ANALYSIS

There are two major options that were considered by the Roads Authority. These are 'Do nothing option' and 'Undertake the road upgrade option'. The environmental and social implications of each have been considered in selecting the project option.

3.1 Option 1: Do nothing

In this option it is expected that the RA will continue with routing maintenance activities to keep the road open. RA will repair the failed section near Iponga trading centre. With this option it is expected that there is going to be accelerated deterioration of the road where rutting already exceeds 20mm resulting in more failures and possible disruption of access to traffic. Congestion in the trading centres will increase and road safety will worsen.

3.2 Option 2: Undertake the Upgrading of the Road

Under this option the road will be upgraded it to a carriageway with sealed shoulders at a design speed of 80km per hour and 50 km per hour. Within this option, consideration was given to the technical options for rehabilitating the road as follows:

Option 2.1: Patch and reseal

Patch and reseal involves ripping and re-compact the base where rut depth exceeds 10mm and fill other ruts with slurry. Remove accumulated silt along Krebs and reopen chutes. Repair failed section near Iponga and reseal with 13 mm Cape seal. Repair road marking and reflective road studs as well as repair Armco barriers or provide new concrete "New Jersey'' barriers.

This option is expected to provide additional 10 to 15 years of life to existing pavement but no significant improvement to road safety and congestion in trading centres such as Mwenitete, Pusi, Iponga, Ighembe and others will increase. There will be need to implement general speed restrictions to 80km with 50km/hour in trading centres in order to reduce congestion and accidents.

Option 2.2: Patch, reseal and widening at trading centres

This option is the same as option 2.1 but the addition is to widen the road in order to provide 7 m carriageway and 2 m sealed shoulders as well as new bus bays in the trading centres mentioned above. This option can provide additional life expectancy of 10-15 years to the existing pavement and some improvement to the road. Congestion in the trading centres will be reduced thereby improving safety on the road.

Option 2.3: Complete reconstruction and widening with double surface dressing

This option will involve widening the road embankment to provide 7m carriage with 1.5m sealed shoulders throughout and 2m sealed shoulders in trading centres. Bus bays will be constructed in all the trading centres and along the road. The embankment will be raised in line with the hydrological analysis of the area.
This option will affect 36% of the road and will involve

- Ripping the existing base and resurfacing
- Ripping existing sub-base layer and stabilize as new selected sub-grade of 150mm
- Reuse the original base material as sub-base 150mm
- Import new granular base of 150mm

On the remaining 64% of the road, the works will involve:

- Ripping the existing base and surfacing and re compact as a new sub-base 150mm
- Import new granular base 150m

There will be need for 19/9.5 double surface dressing and road markings and reflective road studs. There will also be need to repair Armco Barriers or provide new concrete "New Jersey "barriers as well as widening existing walkways on bridges such as Rukuru, Lufilya, Kyungu, North Rukuru to 1.5m. With this option reseal will only be required after 10-12 years and general speed restrictions will be 100km/hr. and 50km/hr. in trading centres.

This option is expected to provide additional 20 years of more on the life of the road. Road safely is greatly going to improve due to reduced congestions in the trading centres.

Option 2.4: Complete reconstruction with asphalt concrete dressing
Complete reconstruction with asphalt concrete dressing is similar to option 2.3 but in addition will have a 40mm Asphalt surfacing. This option provides low maintenance cost over a period of more than 20 years of the design life of the road. The road surface will be smoother resulting in lower vehicle maintenance costs. There will be need to rejuvenate the spray after 10 years and reseal or overlay after 20 years. General speed restriction of 100km/hr. and 50 km / hr. in trading centres will be imposed. **Complete reconstruction with asphalt concrete dressing is therefore considered the best option.**

From above, the advantages of rehabilitating the road alternative far outweigh the disadvantages of the "No-Action" alternative. Even though the initial cost of the construction will be high, the accrued benefits to be derived from the "project development alternative" socially, culturally and economically supersede the "No-Action" alternative.

While it was considered that the environmental and social impacts of the considered road design alternatives were not significantly different, Option 2.4 was selected because of its low maintenance cost implications during the 20 year design period. This option will effectively lead to reduced congestion and improved road safety along the trading centres. It also provides for a smooth flow of traffic and the road users.

CHAPTER 4.0 APPROACH AND METHODOLOGY

The approach and methodology for carrying out the assignment was informed by the consulting team's understanding of the terms of reference. The consulting team used various approaches and techniques including use of secondary sources of data through review various relevant documents such as study reports, policies, legislations, and national strategies, regional and global protocols related to road construction projects. As prescribed by the ESIA Guidelines, the team conducted stakeholder consultations in all the trading centres and selected villages along the road. In addition, the ESIA team held consultations with traditional leaders and government officials at Karonga District Headquarters and Songwe border. The team took cognizance of need to constantly meet with Roughton International the Road Design consultant to share notes and ideas during the entire period of the project. Sections below outline the process steps for carrying out this assignment.

4.1 Review of relevant literature

The study team reviewed a number of policies, legislations, reports and various regional and global instruments that aim to promote and consolidate sustainable socio-economic development in the country through mainstreaming of the environmental considerations in planning and implementation of projects such as the Karonga Songwe Road. Key reports, policies and legislations that were reviewed include the Constitution of the Republic of Malawi of 1995, the National Environmental Policy (NEP) of 2004, the Environment Management Act (EMA) of 1996, the National Forestry Policy of 1996, the National Forestry Act of 1997, the National Land Policy of 2002, the National Land Act of 1965, the National Land Resources Management Policy and Strategy of 1998, the Water Resources Management Policy and Strategy of 1994, the Water Resources Act of 1969, the Resettlement Management Framework, Environmental and Social Management Framework, the World Bank's Environmental Policy, the Bank's Involuntary Resettlement Policy and the Environmental and Social Assessment Procedures (ESAP), Environmental Impact Assessment Guidelines and many others.

In line with the review of the policies and legislations and other relevant documents, the team paid particular attention to the various licences that the proposed project would require including (i) an Environmental Impact Assessment certificate; (ii) Waste and Hazardous Waste Licenses in accordance with section 38 and 39 of the EMA; (iii) a license to handle, store, transport or destroy waste arising from the road construction activities and the campsites; (iv) Air Pollution License in accordance with section 42 of the EMA; (v) Development permission from the Karonga District Council Planning Committees in accordance with section 13 (2) of the Land Act; (vi) a license from the Forestry Department under the Forestry Act for the developer to enter a protected area (a Forestry Reserve if there is any forest reserve) where he will cut down trees to pave way for the road; and (vii) Water Right for water abstraction for use on the road construction activities to be obtained under the Water Resources Act.

The review of relevant documents also informed the development of this ESIA report and assisted the team to have a thorough understanding of the social, economic and environmental situation of the project in relation to the national and regional situation.

4.2 Progress review meetings

During the process of carrying out this assignment, a series of meetings were organized between the ESIA consulting team and the Road Design consulting team to share notes and discuss other issues relating to the project. A series of meetings were also organized between the ESIA team and the Road Authority to discuss the progress of the work.

4.3 Stakeholder consultation

In line with the Environmental Impact Assessment Guidelines; Environmental and Social Management Framework and the Resettlement Management Framework, the team ensured that all those that have stakes in the project more especially the communities in the project area were consulted to give their views on the project. Specially designed stakeholder consultation data collection tools (checklist) were developed and used during the stakeholder consultation process. Apart from consultations with national level (Lilongwe), regional level stakeholders (Mzuzu), the consulting team conducted stakeholder meetings and interviews at district level and community levels (fig 3) targeting the Karonga District Council, traditional leaders, villagers in the project area, business owners, industries, transporters, cross border traders, and many other stakeholders. At community level, the consulting team conducted focus group discussions and individuals interview with the identified stakeholders. The list of stakeholders consulted during the assignment is summarized in Annex 1.

	
Consultations at TA Mwakaboko Headquarters	Consultations with the market committee at Pusi trading centre

	
Consultations with communities at Kiwi trading centre	Explosives storage house for the old quarry site at Benjamin village

Figure 3: Site visit in pictures

4.4 Data analysis and report submission

After the field visit to the project area and stakeholder consultations the team systematically analyzed the information and data collected in line with the terms of reference for the assignment. After the data analysis, draft ESIA, ESMP and Resettlement Action Plan were produced and submitted to the Roads Authority (RA) for their comments. Upon receipt of the comments, the consulting team produced final draft reports and submitted to the RA.

CHAPTER 5.0 BIOPHYSICAL, SOCIAL AND ECONOMIC ENVIRONMENT

5.1 Biophysical baseline conditions

The biophysical baseline environmental conditions in which the Karonga-Songwe road will be constructed are presented. The baseline conditions provide a bench mark for comparison of the before and after project impacts. The baseline data has been aggregated from the following biophysical and social-economic environmental parameters: landforms, soils, land cover and ecosystems, climate and hydrology and drainage. In general, the presentation of data on the biophysical environment and analysis has been biased towards how each of the above-mentioned factors influences the design and construction of the road and in turn be impacted by the road civil engineering works and these have specifically been explained in the presentation and analysis of each of the concerned environmental parameter. Below is the description and analysis of each of the biophysical environmental conditions.

5.1.1 Landforms

There are three types of landforms in the project area (See figure 4). The Karonga Lakeshore Plain which covers the area between Karonga Town to Mwangurukuru Trading Centre which is mainly flat and is covered by depositional area consisting of alluvial, lacustrine and colluvial deposits of Quaternary age and its altitude ranges from 473m to 550m above sea level (asl). To the north of this landform is the Songwe Valley which is characterized by floodplain and back swamps the latter being waterlogged almost the whole year. Both the Karonga Lakeshore Plain and Songwe Valley falls within the major relief unit of the East African Rift Valley Floor. The third landform is the Karonga Escarpment which consists of dominantly gneisses, and metamorphic rocks of pre-Cambrian age and is partly underlain by sedimentary rock. The altitude of this landform increases from east to west, starting from 500m above sea level where it borders the lakeshore plain up to 1,500m to the west (See figure 4). Hoe these landforms characteristic will affect the activities of the road are in twofold. The first being that the topography is mainly hilly to steeply dissected slopes which will promote flush floods. Flood waters could be dangerous to road construction works since they could kill workers and damage their property. Secondly, the resultant of back swamps and waterlogged condition of the above-mentioned landform also pose major challenge for road design and construction since they will require high embankments for keeping the road carriageway relatively dry thereby resulting into haulage of large amount of construction material. This will not only result into increased cost of the road construction but will also have an adverse impact by disfiguring an extensive area of the landscape.

Figure 4: Digital Elevation Model

5.1.2 Soils

The road passes through three exhibited major soil groups symbolized as: A1f1/2- ***Fluvic***; X2x2/4- ***Eutric- ferralic*** and A1v2 – ***Vertic*** (see fig.5). ***Fluvic*** soil group dominates since it occupies the greater part of the road segment at various section starting from Karonga Town through to Songwe

River. This group is characterized by continuously being rejuvenated through the deposition on the surface by sediments transported by flush waters. These soils are derived by alluvium and are mostly deep. They exhibit considerable variation in particle size (stratification) both vertically and horizontally which may pose design and construction challenges since within 20m radius these soils would have different compression ratios. ***Eutric-ferralic*** soil group are the second dominant and poses little design and construction challenges. However, ***Vertic*** soil group which are trans-versed at some sections near Fundi Trading Centre, and round Kasowa Trading Centre (see fig.5) of the road are problematic for the design as well as construction. These soils are also commonly known as Black cotton soils. ***Vertic*** soil group are characterized by relatively high clay content in the upper 18cm and develop wide cracks up to the depth of 50cm when drying. Cracking is caused by montmorillonitic clay minerals which shrink when dry and swell when moist. This seasonal shrinking and swelling causes a slow but continuous mixing of soil material. These soils will make road construction to be problematic since vehicles could get stuck into the mud. Road diversion will also become difficult to drive through and thereby affecting other road users. Detailed parameter values of each of these soil groups have been presented in tables: 3, 4 and 5 below.

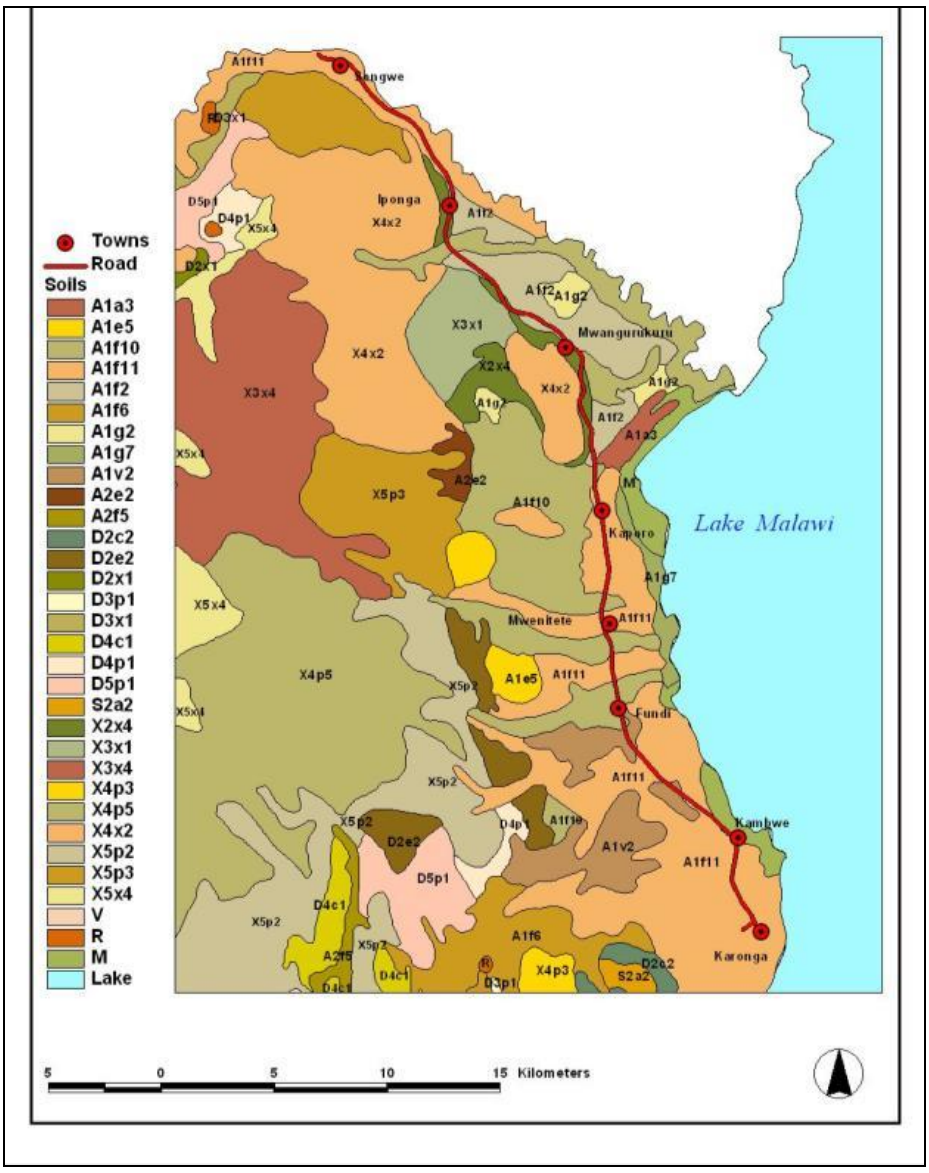

Figure 5: Soil Classification

Table 3: Properties of Fluvic Soil group

***Fluvic* Soil Group:** The dominant soil group through which the road passes			
Physical Soil Properties		**Chemical Soil Properties**	
Parameters	***Value***	***Parameter***	***Value***
Topsoil texture (0-30cm)	Sandy Clay Loam	Soil Reaction (pH)	5.5 to 6.5
Subsoil texture (>30cm	Sandy Clay to Clay	Salinity (EC in mmhos/cm)	0-2 (non saline)
Effective soil depth (cm)	>150cm	Cation Exchange Capacity (me/100g soil)	>10 medium to very high
Surface stoniness and rockiness	Non-stony and non-rocky	Nitrogen (%)	0.08-0.12 (Low)
Drainage class	Moderately well drainage	Phosphorus (ppm)	6-18 (low)
Frequency of flooding	Slight to moderate ponding	Potassium (me/100g soil)	>0.2 (medium to very high)
Dominant Slope Class they occur	0-2% (flat to almost flat)		
Equivalent FAO class	***Eutric Fluvisols***		

Source: Eschweiler, 1991 (1991): Land Appraisal Reports for Karonga ADD

Table 4: Properties of Eutric ferralic Soil group

***Eutric ferralic* Soil Group:** The second dominant soil group through which the road passes			
Physical Soil Properties		**Chemical Soil Properties**	
Parameters	***Value***	***Parameter***	***Value***
Topsoil texture (0-30cm)	Sandy Loam	Soil Reaction (pH)	5.5 to 6.5
Subsoil texture (>30cm	Sandy Clay Loam	Salinity (EC in mmhos/cm)	0-2 (non saline)
Effective soil depth (cm)	>150cm	Cation Exchange Capacity (me/100g soil)	>10 medium to high
Surface stoniness and rockiness	Stony and fairy-rocky	Nitrogen (%)	0.08-0.12 (Low)
Drainage class	Moderately well drainage	Phosphorus (ppm)	<6 very low
Frequency of flooding	None	Potassium (me/100g soil)	>0.2 (medium to very high)
Dominant Slope Class they occur	1-15%		
Equivalent FAO class	***Eutric Cambisols or Haplic lixisols***		

Source: Eschweiler, 1991 (1991): Land Appraisal Reports for Karonga ADD

Table 5: Properties of Vertic Soil group (also known as Black cotton soils)

***Vertic* Soil Group:** The least dominant soil group through which the road passes			
Physical Soil Properties		**Chemical Soil Properties**	
Parameters	***Value***	***Parameter***	***Value***
Topsoil texture (0-30cm)	Sandy Clay	Soil Reaction (pH)	5.5 to 6.5
Subsoil texture (>30cm	Sandy loam to Clay	Salinity (EC in mmhos/cm)	0-2 (non saline)
Effective soil depth (cm)	>150cm	Cation Exchange Capacity (me/100g soil)	>10 medium to very high
Surface stoniness and rockiness	Non-stony and non-rocky	Nitrogen (%)	0.08-0.12 (Low)
Drainage class	Moderately well drainage	Phosphorus (ppm)	6-18 (low)
Frequency of flooding	Moderate ponding	Potassium (me/100g soil)	>0.2 (medium to very high)
Dominant Slope Class they occur	0-2% (flat to almost flat)		
Equivalent FAO class	***Calcic vertisols sodic phase***		

Source: Eschweiler, 1991 (1991): Land Appraisal Reports for Karonga ADD

5.1.3 Climate

The road passes through two agro-climatic zones. The road segment from Karonga to Mwenitete Trading Centre passes through and agro-climatic zone with a length of growing period (LGP) of 150 to 165 days and mean annual rainfall of 800-1200mm while the temperature ranges from 22.5-25 degrees Celsius (Eschweiler, 1991).The other road segment from Mwenitete to Songwe River has the LGP of 225-240days and a mean annual rainfall of 1200-2000mm and the same mean annual temperature range as the other segment. The implication of these agro-climatic zones is that it is wetter from Mwenitete to Songwe River than the other segment and this will create design and construction challenges for the need to have the access water drained. In addition, the high frequency of rainstorms will disrupt road construction work and result into more time being spent in road construction than that indicated in the construction. It is important that these high frequency of rainy events should be considered when determining the period by which this road will be constructed. Detailed climatic parameters for each of these above-mentioned agro-climatic zones through which the road passes are presented in table 6 below.

Table 6: Climatic parameters of the Agro-climatic zones through which the road passes

	Karonga to Mwenitete Trading Centre Road segment	**Mwenitete Trading Centre to Songwe River Road segment**
Climatic Parameters	**Values**	**Value**
Length of growing period-LGP (days)	150-165 days	225-240days
Precipitation to Potential Evaporation ratio(P/PET)	1-1.3	>1.3
Mean temperature T-GP(^{o}C)	22.5-25 ^{o}C	22.5-25 ^{o}C
Mean annual rainfall-P-an(mm)	800-1200 mm	1200-2000mm
Number of dry months –Dm	7-8 months	5-6 months
Mean minimum annual temperature-T-m(^{o}C)	12.5-15^{o}C	12.5-15 ^{o}C

Source: Eschweiler (1991) Land Appraisal Report for Karonga ADD

5.1.4 Hydrology and Drainage

The road transverses through four major rivers: the Songwe River, Kyungu River, Lufilya River and North Rukuru River. Since the road passes through the Rift Valley Floor and to the west are uplands of Rift Valley Scarp Zones it is continuously subjected to cross-drainage and subjected to flush floods especially from Mwenitete Trading Centre to Songwe River (see fig. 6). The combination of cross-drainage, ***Vertic*** soils group and high rainfall from Mwenitete to Songwe River will lead to the design and construction of high road embankments in order to keep the carriageway well drained and thereby disfiguring the local landscape. These will lead to indirect and cumulative health impacts such as water ponding which could provide habitat for breeding of vectors such as snails and mosquitoes resulting to increased incidence of bilharzias and malaria respectively.

Figure 6: Hydrology

5.1.5 Land cover and ecosystems

Construction of the road will lead to clearing and grubbing resulting into the destruction of about 30 tree species which were planted by the Karonga District Forest Office as avenue trees and buffer strips along the existing road reserve. Further 25 tree species which are in the nearby Karonga North Escarpment Forest Reserve and Nambatata Forest will be under high threat for deforestation due to the influx of people who will come looking for employment and business opportunities during road construction leading to increased demand for forest products such as: fuel wood, building material, curios and charcoal (see table 7 and fig. 7). Of major concern are the eight endangered tree species, which have been highlighted and will require special permission from the Director of Forestry to be cut. Also important are the fourteen medicinal trees which will be subjected to high demand due to increased human population along the road area. Ultimately this will adversely impacts on ecosystem services such as provision of medicinal plants, timber, construction material and fuel wood to the future generation.

Table 7: List of plant species to be impacted by the Upgrading of Karonga-Songwe Road

Endangered Tree Species	**Uses**
Khaya anthotheca (Mbawa)	Timber
Afzelia quanzensis	Timber
Herocarpus angolensis	Timber
Breonadia salicina	Timber
*Colophospernum mopane (*Tsanya)	Charcoal
*Brachystegia boehmii (*Miombo)	Charcoal
Dalbergia melanoxylone	Curios
Pericopsis angolensis	Curios
Medicinal Plant Species	
Species Name	**Uses**
Allophyllus African	Medicine
Vachellia polyacantha	Medicine
Steganotaenia araliaceae	Medicine
Kigelia Africa	Medicine
Euphorbia tilirucalli	Medicine
Senna petersiana	Medicine
Dalbergia nitidula	Medicine
Melanthera albinervia	Medicine
Vernonia armyddalina	Medicine
Cynodon dactylone	Medicine

Capscum annuum	Medicine
Trichodesma psysaloides	Medicine
Dracaena steudneri	Medicine
Psorospernum febrifugum	Medicine
Fruit Trees	**Uses**
*Mangifera indica (*Yembe/ Mango)	Edible fruits
Tamarindus indica	Edible fruits
*Carica papaya (*Phapayi)	Edible fruits
Annoma senegalensis	Edible fruits
Anacardium occidentale	Edible fruits
Vanueria infausta	Edible fruits
Manhot esculenta (Viyao)	Edible fruits
*Mussa paradasica (*Matoke/ makombwi)	Edible fruits
*Uapaca kirkiana (*Masuku)	Edible fruits
*Cajanua cajan (*Ndozi)	Edible fruits
*Adamsonia digitata (*Buyu or Malambe)	Edible fruits
Common Trees	
*Syzygium cordatum (*Nyengere)	
*Trichilia emetic (*Mushunguti)	
*Breonardia salicina (*Mungwina)	
*Ficus cycomorus (*Chikuyu)	
*Faidherbia albida (*Msangusangu)	
Annona senegalensis	
*Gmelina arborea (*Malayina)	
Eucalyptus camaldulensis	
Eucalyptus tereticornis	
Toona ciliate	
Securinega virosa	
Antidesma vernosum	
Vitex payos	
Hyphaene petersiana	
Richardia braziliensis	
Oxalis chapmaniae	
Common Shrubs	
Solanum anguivi (Tungiza)	*Medicine*
Lantana camara	
Tithonia diversifolia	*Soil enrichment*
Agelatum cyzoides	
Clerodendrum capitatum	
Cassia petersiana	
Bidens pinnatipartita (Kopeda)	*Soil enrichment*

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Pteridium aquilinum(Black Fern)	
Diossotis prenceps	
Acalipha shirensis (Susuti)	
Clerodendrum grabram (Mpeuma)	
Buddleija salvifolia (Msumbuti)	*Soil enrichment*
Sida acuta (Masache)	*Making brooms*
Aeschynomene melophylla	*Soil enrichment*
Common Grasses	
Mussa paradasca (Nthochi)	Fruits
Panicum maximum (Msonthe)	Thatching grass

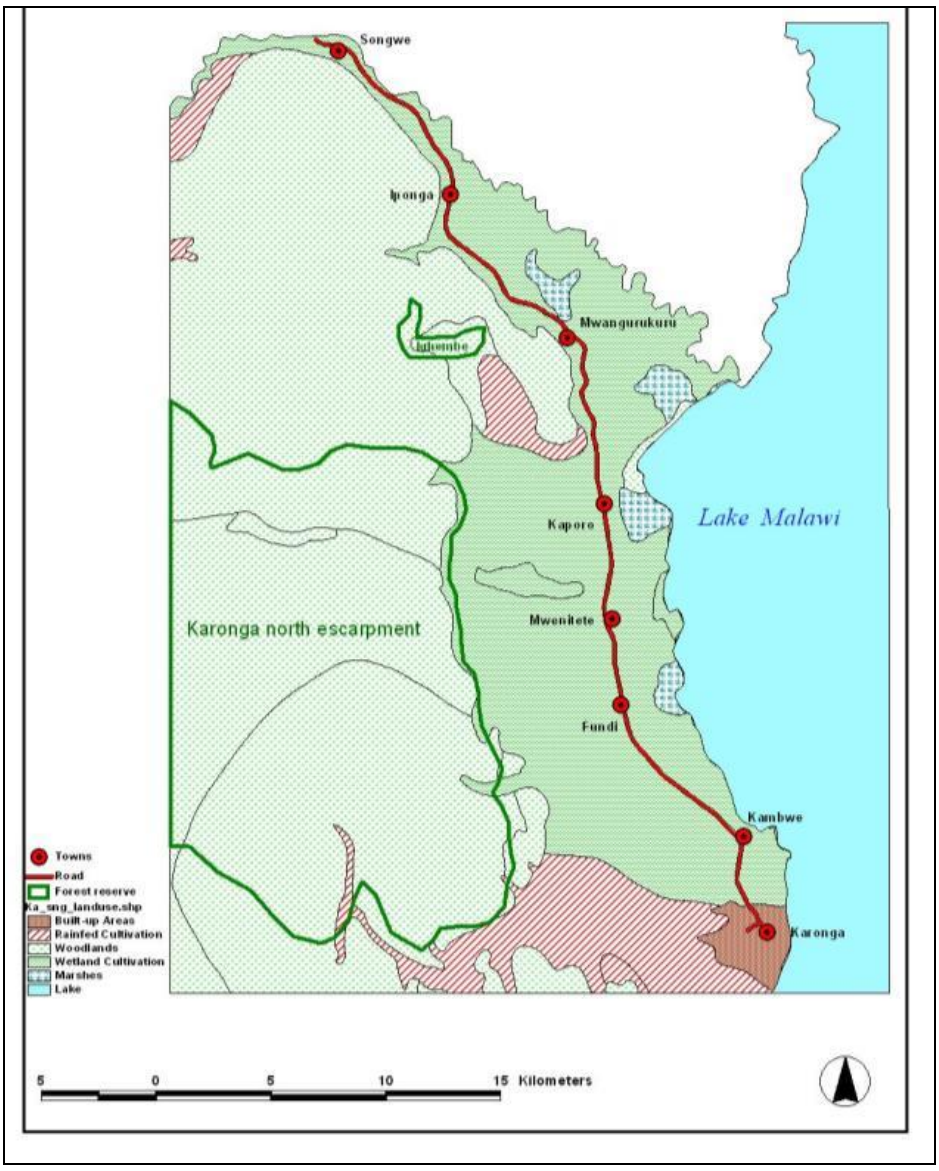

Figure 7: Land cover and Ecosystems

5.2 Social Environment

5.2.1 Demography and Settlement

In 2012 Karonga District had a projected total population of 307,216 (reflecting a 3.14% growth rate from 2008). This represents 2.07% of total population of the country. Table 8 below shows population distribution by Traditional Authority (TA) for the year 2013 (NSO 2008).

Table 8: Population Distribution by Traditional Authority

No.	TA	Male	Female	Total
1.	Township/Kyungu	23,285	24,086	47,371
2.	Kyungu	38,229	40,304	78,533
3.	Mwakaboko	11,070	11,781	22,851
4.	Wasambo	31,015	32,602	63,617
5.	Mwirang'ombe	16,545	16,909	33,454
6.	Kilupula	33,726	37,458	71,184
DISTRICT TOTAL		**153,870**	**163,140**	**317,010**

Source: NSO, 2008

40% of the population of the district resides in TA Kyungu, an increase of 1% since 2008. TA Kyungu covers a large portion of the district and is the commerce/trade centre. Karonga district has a relatively equal distribution by sex, with 49% male residents and 51% female (NSO, 2008). Distribution by gender has changed only slightly over the past 10 years, as Karonga was previously composed of 48% males (NSO, 1998).

Birth and Death Rates

Crude Birth Rate (CBR) is defined as the number of births that occurred in a particular calendar year per 1000 population. It is used as a simple measure for fertility rate. The CBR in Karonga District is 43.69, slightly below the national CBR of 44.14. Nationally, there has been a decrease in CBR from the year 2000. Karonga district has followed this trend and CBR has gone from 52 per 1,000 populations in 2000 to 43.69 per 1000 population in 2012, a 16% decrease. The decrease may be attributed to intensified family planning messages led by the Ministry of Health.

Crude Death Rate (CDR) is defined as the number of deaths that occurred in a given calendar year per 1000 population. In 2008, the CDR in Karonga was 23.43 deaths per 1000 population, higher than the national CDR of 21.79 deaths per 1000 population. Beginning in 2008, Karonga District improved considerably, reducing the CDR by nearly 50% (since 2000). CDR in Karonga dropped to 11.81 deaths per 1000 population and continues to fall while remaining below the national CDR.

Fertility Rate

Fertility rates/levels are important for population policies and programming. The Total Fertility Rate (TFR) refers to the total number of live births a woman would have given if she were subject to the current Age- Specific Fertility Rates (ASFR) throughout her reproductive years (15-49). ASFR show

the age pattern of fertility, which is high in ages 20 to 24 and lower in ages above 45 years. The TFR for the northern region is 5.7 births per woman, with the mean number of children born to women aged 40-49 being 6.5 children (DHS, 2010). It has been shown that as education and wealth increase, TFR decreases. Unfortunately, there is no district-specific data available for TFR. The average household size in Karonga district is 5.6 people per household (NSO 2008).

5.2.2. Labour and Employment

Labour and employment in Karonga district varies based on location (by TA) and can be categorized into a few types; skilled and unskilled, formal and informal, self-employed, seasonal, and what is locally known as ganyu (work for food). A substantial amount of people in the district are engaged in the buying and selling of agricultural produces; mainly rice, maize, beans and cotton. Other common occupations in Karonga are: civil servants, fishers, shop attendants, house servants/maids, minibus drivers and security guards.

According to District Labour Office estimates, 30,000 individuals are self-employed, 8,000 are involved in commerce, 7,000 are civil servants, and 800 work in local industry. The District Labour Office Collects statistics during annual inspections to local businesses. Over the past 5 years, there has been an average of 1,546 employees working in the formal, non-agriculture

5.2.3. Health

The health sector provides an array of clinical and educational services managed by the District Health Office. In addition to the services provided, the health sector holds and manages some of the key statistics related to the growth and development of the people of Karonga.

Life Expectancy

Life expectancy in Karonga District is currently at 58.14 years for males and 60.84 for females (PHC, 2008). The district is above the national average for life expectancy for both male and female, with Karonga residents living an average of 7 years longer as summarized in table 9.

Table 9: Life Expectancy by Gender, 2008 and 2010

	Karonga (2008)	**Malawi (2008)**	**Karonga(2010)**	**Malawi (2010)**
Male	54.3	52.5	58.1	51
Female	56.7	56.9	60.8	54

Source: PHC, 2008

There is a 4 percent increase in life expectancy from 2008 to 2010. Life expectancy appears to be increasing because of improved health and social services like: improved HIV/AIDS management that is provision of ART and other opportunistic infections treatment and increased access to healthcare and improved maternal and neonatal interventions.

Health Facilities and Service Utilization

Health Services in the district are provided through Health Posts, Dispensaries, Health Centres and Hospitals, which are distributed throughout the district. The district hospital is located in TA Kyungu. The aim of the health facilities is to provide the services to a population within 8 kilometre radius. The proportion of the population living within 8 kilometre radius of a health facility in Karonga has increased from 83 percent in 1999 to 92 percent in 2011.

The health key outcomes are: increased coverage of high quality Essential Health Package (EHP), strengthened performance of the health system to support delivery of the EHP, reduced risk factors to health and improved equity and efficiency in the delivery of quality EHP services. These services are provided at different levels as indicated above

HIV and AIDS

HIV and AIDS remains a challenge in the district and contribute to high morbidity and mortality. Prevalence in the district is 9.81% (2012), which is slightly below the national prevalence rate of 10.6% (DHS, 2010). Karonga District has the second highest prevalence rate in the Northern region after Nkhata Bay (10.1%). In addition to high mortality rates, the district has experienced an increased number of orphans and child-headed households in need of various forms of support, a shortage of skilled staff, overcrowding in hospital wards (due to HIV/AIDS related illness) and overstretching of available HIV and AIDS related services in the district.

Prevalence rates in the district according to the MoH Health Management Information System (HMIS) in individuals between the ages of 15 and 49 have come down from 10% in 2008 to 9% in 2012.

5.2.4. Water and Sanitation

Access to safe water remains a concern in Karonga district. According to the National Water Policy, all households must be within 500 meters to a safe water point. Additionally, there must not be more than 500 meters between water points (especially boreholes). Boreholes are a special case since water is abstracted from aquifers. The total number of water points in the district is 12,077 and average access to potable water supply is 70.3 percent (2012). Water points are distributed throughout all TAs. There is no standard distance for taps, but the emphasis is 120 people per tap. According to VAP data, there are approximately 7 households to each water point in the district. Table 10 below shows the distribution of the water points in the district for 2008 and 2012.

Table 10: Water Point Distribution by TA, 2012

TA	Number of Water Points 2008	Number of Water Points 2012
Kilupula	136	987
Kyungu	409	6,660
Mwakaboko	N/A	148

Mwirang'ombe	370	235
Wasambo	N/A	1,927
TOTAL	N/A	12,077

Source: District Water Development Office, 2012

5.2.5. Education

Karonga district has 162 public primary schools, five private primary schools, 22 public secondary schools, six private secondary schools and two colleges. The district is divided into 11 education zones each managed by a Primary Education Advisor (PEA). Improving the quality of education is a top priority of the District Council. The literacy rate for the district is 74.9 percent, slightly below the northern region average of 77 percent but above the national rate of 65.4 percent (IHS, 2010). Table 11 below shows the number of primary, secondary and tertiary/technical schools by TA for 2012 for the district.

Table 11: Distribution of Schools in Karonga District, 2012

TA	**Primary**	**Secondary**	**Tertiary/Technical**
Kilupula	27	2	0
Kyungu	64	11	2
Mwakaboko	15	1	0
Mwirang "ombe	13	2	0
Wasambo	43	6	0
Total	162	22	2

Source: Karonga District Education Office, 2012

5.3 Economic Environment

The economy of Karonga depends upon many industries and types of employment, including: agriculture, fisheries, forestry, mining, commerce and industry, labour and employment, and tourism.

5.3.1 Agriculture

This section covers activities that contribute to the economy of Karonga District through agriculture. It highlights the crops that are grown, area covered by the various crops, and the institutional set up for agriculture development in the district. The agriculture sector at district level oversees production, markets, farm holding, irrigation, and livestock.

The Karonga District Agricultural Development Office (DADO) is one of the 28 district level structures within the Ministry of Agriculture and Food Security. Karonga and Chitipa DADO are under the Karonga Agricultural Development Division (ADD), one of the eight ADDs in Malawi.

The area under Karonga DADO is 334,810 Hectares (Ha) of which 67,100 is arable land suitable for field crop cultivation. This represents 20% of total land area of the district. All this area is under

smallholder agriculture production as there are no registered estates in Karonga. There is increasing pressure on land as a result of overpopulation, and marginal lands like hilly areas and swamps are increasingly used for agricultural production. Irrigation farming has converted swampy areas into vibrant rice schemes, serving many farmers food and income needs. Administratively, the district is divided into six Extension Planning Areas (EPAs) that roughly cover the boundaries of Traditional Authorities.

There are a number of factors contributing to low agriculture production. Much of these factors relate to inappropriate agricultural practices which include: cultivation on marginal areas such as steep slopes along the mountains (exacerbated by shifting cultivation locally called "Visoso"), careless cutting down of trees (being fuelled by increased markets for fuel wood and charcoal, and burning of bricks), and cultivation along river banks. These inappropriate agriculture practices have led to increased rates of soil erosion and loss of soil fertility.

The DADO engages the farming community in effort to reduce and manage soil erosion through promotion of sustainable land management activities such as soil and water conservation, river bank protection, and compost manure application and conservation agriculture. The uptake of these technologies and practices has been a challenge. For example, area under manure application since 2009 has been less than 6000 Ha per year while less than 4000 farmers are practicing other soil and water conservation practices every year. The challenge is that animal manure is difficult to get because of the tethering method of livestock rearing where animals are also not housed in one place each night to accumulate the dung. There is need to step up the efforts with the support of local leaders and other stakeholders in order to improve on land management for increased productivity and environmental conservation.

5.3.1.1. Agricultural Production

Field Crops

Crop production in Karonga district is through rain fed agriculture and the major crops (grown by more than 5% of all farmers) for Karonga district include: maize, cassava, rice, cotton, ground nuts, sweet potatoes and pigeon peas. Minor crops (grown by less than 5% of the farming families) include: beans, finger millet, sesame, tobacco, sorghum, soya, sunflower, and ground beans. There is also gravity fed and residual moisture irrigation though it is at a small scale. The district has not yet fully utilized water from Lake Malawi which is on the entire eastern border of the district due to under developed irrigation systems in the district. While many crops are grown throughout the district, cassava is mainly grown along the lakeshore areas and concentrated in Vinthukutu EPA. Rice is grown in the irrigation schemes that were developed by the government in the early 1970s at Hara and Chonanga in Vinthukutu EPA, Wovwe in Nyungwe EPA, and Lufilya in Kaporo South EPA. Rice is also grown in all flood plains along main rivers especially in Kaporo North and Kaporo South EPAs. Cotton is commonly grown in Lupembe, Nyungwe and Mpata EPAs.

Production of Various Crops

Crop production refers to the growing of crops either for sale or domestic consumption. Production in tones is listed in Table 12 below.

Table 12: Production of various crops 2008 to 2012

Crop Type	Production in Metric Tons (MT)				
	2008	**2009**	**2010**	**2011**	**2012**
Maize	48,317	61,694	59,460	70,610	54,338
Cassava	273,463	276,567	289,360	302,422	317,936
Rice	15,258	27,093	28,559	30,370	29,973
Cotton	4250	3,717	826	1,974	9,480
Groundnuts	2,656	3,202	3,436	3,744	3,296
Sweet Potatoes	24,340	33,655	34,382	40,713	42,210
Pigeon Peas	290	375	389	399	435
Beans	512	560	573	581	576
Tobacco	693	1,179	1,251	883	78
Finger Millet	223	205	212	256	256
Sesame	21	138	118	113	98

Source: District Agriculture Annual Crop Production Estimates, 2008-2012

Maize and cassava account for about 60% of total crop area. These are main food crops for Karonga and as such are priority crops for all smallholder farmers whose main challenge is food security throughout the year. Area planted to rice and cotton has been increasing over the years because of the better prices farmers are getting when selling.

Horticultural Crops

Bananas and mangoes are the main horticultural crops grown in Karonga. Oil palm, cashew nuts, guavas, lemons, paw paws, pineapples, tangerines and oranges are also grown on a smaller scale. Vegetables like Chinese cabbage, tomatoes, onions and other leafy vegetables are grown across the district. Palm oil is processed to cooking oil and soap using simple mechanism. There is potential for improvement with investment in processing equipment and increasing number of palm oil trees.

5.3.1.2. Irrigation

The irrigation sector is in line with the National objective of poverty reduction through promotion of irrigation technologies in order to achieve food and economic security in the District. Irrigation schemes are categorized into four namely; Mini scale which is greater than 0.1ha but less than 10ha, Small scale which is greater than 10ha but less 50ha, Medium scale which is greater than 50ha but less than 100ha while the last category is large scale irrigation scheme which is greater than 100ha. There are 24 sites under mini scale with 641 beneficiaries, Small scale has 17 sites and 1908

beneficiaries, Medium scale has4 sites benefiting 270 beneficiaries, and large scale has also 4 sites benefiting 3426 beneficiaries.

5.3.1.3 Livestock

The livestock sector in Karonga is promising owing to good climate for livestock production and availability of feeds and pastures. There is also a ready market to promote the commercialization of livestock and its products. Various species of livestock are kept by farmers across the district.

Livestock population has increased rapidly in Karonga over the last seven years due to a number of factors. For beef cattle and increase of over 40% is a result of the increased crop production with input subsidies has led to more stover from crop residues being made available for feeding livestock. Better market prices also acted as an incentive for improved management. Goats have also increased by over 200% due to several initiatives from government and NGOs for pass-on programmes. Better management and disease control with provision of drug boxes to most farmer groups has helped sustain population growth. Pig population trebled over the period, but major losses occurred in 2010 to 2012 due to African swine fever outbreak. The disease is not curable and has no vaccination. It came from the cross-border trade and relationships with farmers on the Tanzanian side.

5.3.1.4 Fishery

Karonga is a lakeshore district with access to Lake Malawi, the largest fish habitat in the country. As of 2012 over 5,000 individuals were involved in fishing and fish related activities. Small-scale fishing dominates fishing activities and contributes over 60% of animal protein for the people of Karonga. Small-scale fishing also plays a major role in the district's economy and provides income as well as employment opportunities. However, current landings from capture fisheries are dwindling. The situation has been aggravated further by high population growth and the resultant increase in fish demand. To restore the fish production from capture fisheries, Karonga district has embarked in aquaculture, which has the potential to supplement the fish production in the district.

5.3.2 Mining

The mining sector is an area of great potential for the economy of the district. There are two major types of minerals that are being mined in Karonga District: **Uranium** at Kayerekera, some 40 kilometres directly west of the district headquarters along the Karonga to Chitipa road. **Coal** is mined at the same Kayerekera, Nkhauti 16km off the Karonga to Chitipa road at Mpata, and Mwaulambo some 20 kilometres north of the boma. Table 13 below shows minerals produced by type in the area. All of the mines in the district are open-pit mines. It is important to note the difficulties in obtaining information from mines at district level, as the sector has not been devolved. Specific information on each mine is available through the Ministry of Mines at central government.

Table 13: Mineral Produced by Type, 2012

Location by TA	Mineral type	Ownership	Reserves	Mining area size (ha)	Production rate
Kilupula (C)	Coal	Eland Co.	0,6 million tonnes	18km2 *	*
Kyungu	Uranium (U3O8)	Paladin Energy	11,500 t	157 km^2	1.5 t/yr
Kyungu	Coal (C)	Nkhauti Trading	*	*	*
Kyungu	Coal (C)	MALCOAL	*	84.7km2	*

*** indicates missing data**

Source: Eland Coal Mine, Paladin Africa, 2012

5.3.3 Commerce and Industry

Being a border town with Tanzania, Karonga has a wide range of commercial activities which range from banking, wholesale, retail, hardware and market activities.

5.3.3.1 Type and Size of Business Establishments

In Karonga district there are many types of business being conducted. These are categorised by small, medium, and large scale businesses. They range from large to small shops, wholesalers/distributors, retailers, liquor and market vending. The size of the business is determined by the Karonga Revenue Collectors. Clear definitions of business size are being worked on by the revenue collection office. The distribution is represented in Table 14 below. There is a lack of comparison data due to constraints at the council.

Table 14: Businesses in Karonga District, 2012

TA	Small Scale	Medium Scale	Large Scale
Kilupula	29	8	0
Kyungu	123	645	186
Mwakaboko	41	18	0
Mwirang'ombe	151	12	3
Wasambo	270	26	4

Source: Karonga Revenue Collection Register, 2012

Most of the established businesses are found in TA Kyungu, the boma centre. The number of businesses in TAs Kilupula and Mwakaboko appears low, partially due to a lack of registration and lack of well-established markets. As previously mentioned (in mining section), Karonga has a few large-scale companies that are not registered with the council for revenue generation as they are registered with Central Government.

- Paladin Africa which mines Uranium
- Eland Coal Mine
- Nkhachira/MALCOAL Coal Mine

- Nkhauti Coal Mine

There are very few major industrial activities taking place in Karonga for example there is a cotton ginnery at Ngara which is under construction, a big rice mill at Katili and a lot of small scale millers of maize and rice. Other business ventures practiced in the district include handicrafts in the form of mat and basket weaving, tinsmith, tailoring, carpentry and joinery.

5.3.3.2 Cross Border Trading

Cross-border trading along the road is a major economic activity. Most of the items involved in cross border trading are as follows: clothes, petrol/diesel, cooking oil, and household items from Tanzania and sugar, beer, maize and rice from Malawi. Many Tanzanians operate businesses on permanent resident basis in Karonga. There is a problem with the smuggling of goods into and across the border. Although the Malawi Revenue Authority is doing its best to regulate the situation, it is not difficult to see that there is a lot more work to be done.

5.3.3.3 Banking and Credit Facilities

There are several specialized lending and financial institutions operating in the district.

Banks

A number of banks have opened their branches within the township as represented in the table below. The primary clients for the banks in Karonga are individual personal savings account, small scale business enterprise, and employees of various organizations. In particular some of the banks opened their branches here mainly targeting Paladin Africa and other cooperate companies following Paladin Africa and its employees. See Table 15 below for a complete list of banking institutions. Almost all banks in the district offer loans to clients depending on availability of surety (collateral) the clients have. Interest rates vary with the banks but not at a large margin depending on the base lending rate of the Central Bank. These interest rates range from 36-46% per year. Also banks give interest to those having saving accounts with interest rates ranging 4 – 12% per year.

Table 15: Banks and their locations as of 2012

TA	Location	Bank
Kyungu	Karonga Town	FDH Bank First Merchant Bank Inde Bank Malawi Savings Bank National Bank of Malawi NBS Bank OIBM Bank Standard Bank
	Kayerekera	Standard Bank (1 day/wk.)
Mwakaboko	Songwe Border	NBS Bank National Bank

Wasambo	Uliwa Market	Malawi Savings Bank
Songwe Border		National Bank

Source: Karonga District Council, 2012

Banks in Karonga are concentrated in TA Kyungu, as Karonga boma is the centre of commerce in the district. In addition to the permanent bank facilities, OIBM bank offers satellite services at Uliwa and Songwe on a weekly basis.

Micro Finance Institutions

The credit institutions operating in Karonga are as follows:

- Malawi Rural Development Fund (Mardef)
- Malawi Rural Finance Company
- Savings and Credit Cooperatives (SACCOs)
- Blue Financial Services
- Green Wing
- Pride Malawi
- FINCA
- MicroLoan Foundation (30 groups)
- Wasambo Micro loan Foundation

Microfinance institutions are not well distributed in the district as they are concentrated in TA Kyungu. Access to microfinance is limited in most of the district. To counter this issue, stakeholders have promoted Village Savings and Loans (VSL), Community Savings Investment Promotion Groups, and cooperatives in a number of TAs.

5.3.4 Tourism

The World Tourism Organization defines a tourist as: a person who is travelling and staying outside of his usual environment for more than twenty four (24) hours and not more than one consecutive year for leisure, business and other purposes not related to the exercise of an activity remunerated from within the place visited.

Tourism Potential

Karonga is now developing in the tourism industry. The area has several sites of great potential for tourism. The areas include the natural and cultural heritage sites. The current major tourism attractions in the district include the Karonga Museum and Lake Malawi; Minor attractions include Stevenson Road and the African Lakes Company Trading post. Karonga's tourism potential is unique as it is an entry and exit point for visitors travelling to and from Malawi. Other areas in Malawi benefit from big events and festivals on Lake Malawi. Upgrading of beaches and accommodation could allow Karonga to benefit during this time as well.

Tourism Sites and Facilities

Karonga district has a number of sites dedicated to attracting and serving tourists (see Table 16 below for details).

Table 16: Tourist Sites in Karonga District, 2012

Beaches	Karonga has a number of beaches that are current tourist destinations as well as sites that have been identified as suitable for high-class hotels.
Karonga Museum	Karonga Museum contains articles of both cultural and natural history, it was opened in 2004.
Malema Site	The Malema excavation site is where the oldest human kind has been found about 2.5 million years old.
Mkungwe Hot Spring	About five hot spring sites are known to exist in Karonga District. These comprise the Mkungwe 1 and 2, Mwakenja, North Rukuru and Vua.
Mlare Craft Centre	The only centre of its‟ kind in the district where hand crafts are made by the local communities and sold to the visitors. The facility is run by Mlare Craft Making Association (MCMA). Plans are underway to have more activities for tourism.
Mwakashunguti Excavation Site	This is the site where the dinosaur (Malawisaurus) was excavated 15Km west of Nyungwe.
Mines	There are six mines in the district: Kayerekera Uranium, Malco, Mwaulambo, Nkhauti, Ngara Coal mines, and lima at Uliwa. There is need to promote these mines as tourism sites. Negotiations are in process with stakeholders to start arranging trips to these tourism sites.

The tourism sector has seen tremendous improvements in standard of accommodation as the industry strives to provide seamless service. Number of tourism establishments has also sharply increased (50%) over the past 5 years. There are currently 51 tourism establishments in the district, as compared to less than 25 in 2007 (District Tourism Office, 2013). The presence of new businesses in the area (specifically mines) has contributed to this increase.

5.5 Infrastructure and Utilities

5.5.1 Roads

There are forty-nine existing roads in Karonga District (Table 17 below). Roads in Karonga District are categorized into four types: main roads, district roads, secondary roads, and tertiary or feeder roads. As of 2012, Karonga has 7 main roads, 14 district roads, 4 secondary roads, and 28 tertiary roads amounting to 589.7 km of roads between 2008 and 2012, Karonga District added 57.1 km of roads, 29 of which were constructed in 2011 and 2012 through Publics Works programmes.

The distribution of roads in Karonga district appears to be uneven, with 47 percent of all roads existing in TA Kyungu. TA Kyungu contains the district capital (Karonga town) and is where a large

proportion of the districts‟ population resides. TA Mwakaboko has less than 1 percent of all roads, partially due to the challenging terrain (it is a flood plain). There are plans to develop more roads in rural areas where new primary and secondary schools are being opened, yet these plans have not been realized due to lack of funds.

Table 17: Number of Roads in Karonga District by TA, 2012

TA	Total No. of Roads	Total km of Roads	No. of Main Roads	No. of District Roads	No. of Secondary Roads	No. of Tertiary Roads
Kilupula	9	72.1*	1	5	1	2
Kyungu	23	239.7*	2	6	0	15
Mwakaboko	3	16*	1	0	1	1
Mwirang'ombe	6	34.5*	1	2	0	3
Wasambo	12	92.4*	2	1	2	7
District Total	49***	589.7**	3***	14	4	28

* Note: this distance does not include the km of the Songwe to Chitimba road

** This distance does include the km of the Songwe to Chitimba road

*** There are 3 main roads total in the district, 1 of which passes through all TAs, making the total appear negatively skewed

Source: Karonga Public Works Office, 2012

5.5.2 Power/Energy

Power is supplied to Karonga district by ESCOM. Nationally, 21.2 percent of Malawians have electricity within 100 metres of their household, slightly higher than the district average of 20.3 percent (IHS3, 2012). 3.1 percent of residents have electricity in their household, up from 0.4 percent in 2005. The proportion of the population with access to electricity needs to improve substantially in an effort to reach Millennium Development Goals.

The electric power supply in Karonga District is managed by ESCOM from the Wovwe Mini Hydro Power Generation Plant. This mini – hydro plant produces 11000 Volts, then stepped up to 66000 Volts by step up Transformer which are later transmitted to Karonga via Uliwa substation and terminates at Karonga Substation where it is further stepped down from 66000 Volts / 33000 Volts / 11000 Volt by step down Transformers respectively. Total installed capacity from Wovwe Generating Station is 4.5mw but available power is 3.5mw, 0.5mw is for spinning machine. Karonga is now being connected to the Grid System, supplied by Malawi's Main Hydro Power Stations Nkula / Tedzani / Kapichira hydro plant situated along the Shire River in Districts Mwanza and Chikhwawa. A 132000 Volts are transmitted on transmission line from Nkula to Chintheche main Substation in Nkhata Bay District. From there a 66000 Volts is transmitted to Telegraph Hill Substation via Bwengu and Livingstonia Substation to Uliwa Substation, where it gets Synchronized with Wovwe power supply.

5.5.2.1 Supply and Demand of Electrical Power

ESCOM provides services to approximately 8400 residents and businesses in the district from two main substations, the Karonga and Uliwa substations. As of 2012, ESCOM provides electricity to approximately 3% of households in Karonga district - that is roughly 1536.4 Households have access to electricity (VAP, 2013). This means there are around 50,000 households have no access to electricity and hence their sources of energy are limited to firewood and/or charcoal. Using the average of 6 persons per household it means a total of 298,000 people are dependent on charcoal and fuel wood as a source of energy for cooking.

5.5.2.2 Other Sources of Energy

In addition to electricity, other sources of energy are used in Karonga households such as wood, charcoal, gas, and paraffin. Details are not available by district, but in Malawi, wood is the fuel most commonly used for cooking, reported by 85 percent of households. Use of wood is more common in rural areas (94 percent) than in urban areas (37 percent). Twelve percent of all households interviewed use charcoal for cooking, including 53 percent in urban areas and 4 percent in rural areas. Among all households interviewed, 98 percent use solid fuel for cooking. Almost all households in rural areas and 90 percent in urban areas use solid fuel. Ninety-eight percent of households using solid fuel for cooking reported usage of an open fire or stove without a chimney..

CHAPTER 6. ENVIRONMENTAL PLANNING AND DESIGN

6.1 Introduction

This section discusses the major environmental and social design and planning elements that need to be considered in designing and planning of the project. The intention of this section is to guide design team and contractor in avoiding or minimizing certain negative impacts, capturing potential benefits, compensating for residual impacts, and general impact management. It is expected that in the designing and implementation of this project a balance against potential damage to sensitive environment and social needs will be achieved.

6.2 Determination of the size of Road Reserves:

This is a road rehabilitation project and the road reserve shall remain unchanged however it will involve moving some infrastructure that have been constructed within the road reserve. Ensure that the road reserve is adequate for any future expansion activities of the road. The road reserve will also facilitate number of things including passage of power lines and water reticulation, enhancing visibility for drivers and promoting scenic roadside views.

6.3 Construction and General Operations

Health and safety procedures will be seriously considered. The contractor will ensure that standard precautions for safety procedures are taken into consideration to prevent accidents, and spillages of oils other toxic substances. The contractors will prepare contingency plans for containing and treating accidental spillages which are going to be adhered to and monitored. Stockpiles and excavations are expected to be sprinkled with water in order to reduce dust generation especially on windy days. Sediment and other pollutant traps will be located at drainage exists from the workings.

6.4 Reinstatement to original landform

It is expected that once extractions from burrow pit areas are completed, the burrow pits are going to be backfilled to return the ground surface to its original landform and if not possible should be drained. The contractor will ensure that backfills are free of foreign materials that could degrade and pollute groundwater and affect the soil texture and structure. In line with the waste disposal guidelines this will require that toxic materials are removed and disposed of safely. The contractor will ensure that the backfills are adequately compacted to prevent erosion of surface materials and to avoid settlement and creation of depressions in which water could collect and become breeding ponds for malaria causing mosquitoes.

It is also important to replant the areas with trees and grass to prevent erosion and create a vegetation cover comprising indigenous grasses, shrubs and trees. The contractors will need to work with closely with the Karonga District Forestry Office and Agriculture office to advice on the types of seedlings to be propagated and planted. The project area has experienced forestry, community development and agriculture extensions officers and other extension officer who will need to be engaged to advise on the process. Use of local community participation in the exercises need to be promoted since they have traditional knowledge of what suitably grow in the area.

6.5 Gravel Pits, Quarry Sites and Sand Pits

There is need to take extra care in sourcing raw materials such as gravel, quarry stones and sand for the construction of the road. Rock aggregates and all the hard rock required for the road will be sourced from an existing Ighembe quarry 27.1 km from Karonga town. It is expected that an area of 4 hectares will be affected for sourcing of quarry and all the hard rock. The project is also expected to require up 4 borrow areas of 2 hectares each. All borrow pits need to be fully rehabilitated soon after the completion of any the road segment in order to minimise environmental and social impacts. The contractor will need to ensure that sand mining is controlled and all mining sites be fully rehabilitated before decommissioning the project.

6.6 Roadside Drainage Structures

The contractors should ensure that the drainage structures are constructed and positioned to allow for adequate drainage since most parts of the project areas is water logged. In order to minimise water logging and flooding the contractor will need to construct appropriate drainage systems to avoid water retention on the road surfaces and sides. Where necessary check dams will need to be constructed more especially in steep slope side drains sections to reduce velocity of runoff water and minimize soil erosion. The contractor should provide for road crossing structures for pedestrian and cyclists as well as livestock through provision of crossing points.

6.7 Water Abstraction

The contractors will need to give due consideration to the abstraction of water for construction purposes to ensure not to affect the water needs of the people and livestock in the area. Since the project area has rivers such as North Rukuru, Lufilya and others, water abstraction rights needs to be sought from the Water Resources Board (WRB).

6.8 Planning of Camps and Waste Disposal Sites

Prior discussion with the Karonga District Council and the Traditional Leaders in the areas is required before placement of the labour camps and waste disposal sites which will require about 4.0ha and 0.5ha respectively. The general principle is to allocate the labour camps on land of low community value not very close to existing settlements to minimize conflict and avoid transfer of impacts caused by camps to these settlement areas. Labour camps for the project are expected to be sited towards the centre of the road project and the contractor need to ensure that pulling down or rehabilitation during and at the end of the project is easy. There will be need to site the labour camp near a reliable water supply but where it will not interfere with the local community water supplies.

Retention bunds should be constructed around fuel and oil storage areas and all drainages and effluent should be treated before being discharged into the drainage system. Since Karonga does not have a waste management plan, the contractor will need to discuss with the Council to identify an appropriate site for dumping and follow national waste management guidelines in waste disposal. It is estimated that the contractor will need 0.5ha of land for waste disposal. It is advisable to engage the traditional leaders and Karonga District council before deciding the actual location of the waste dumping site.

6.9 Safety and public health

It is expected that the contractor will follow occupation, safety and health precautions standards during the construction of the road. The list below though not exhaustive provides some of the areas that need to be considered. The contractor needs to ensure that

- Adequate road signs to warn pedestrians and drivers of construction operations and diversions are constructed
- Provide for speed limit for construction vehicles
- Hoarding around deep excavation and noise emitting plant operations
- Fencing around plant and fuel storage facilities, periphery of construction sites and plant operating sites
- Follow standards and procedures for storing and handling of toxic materials
- Contain any spillage materials to avoid pollution of the ground and surface water:

6.10 Labour Force for the project

In order to minimize conflicts the contractor will need to recruit local people in particular from the project area. This will be a training ground for the local people who may not have not been employed elsewhere. Promote intensive use of labour for such pieces of work like grubbing, drawing of water, hand knapping of masonry stone and construction of masonry structures, filing of gabion boxes, painting road surface markings and vegetation planting schemes on earthworks and others. Promote and employ women to work in the project as one way of strengthening their position in the society.

CHAPTER 7.0 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

7.1 Introduction

The rehabilitation of the Karonga Songwe Road is expected to have both positive and negative impacts at the designing, construction and decommissioning stage of the project. These impacts are going to be more during the construction and decommission of the road project than during the designing phase. This section of the report presents the identified potential impacts of the project and their social, economic and environmental impacts at each stage of the project.

7.1.1 Impact Identification, Prediction and Analysis Methods

The rehabilitation of the road is expected to cause environmental stresses of various magnitudes, importance, probability and duration which could be exerted at different phases of the project. This ESIA has predicted and analysed the impacts to determine the extent of change likely to be brought about by the project using a number of characteristics including the following:

Magnitude / extent: the measure in general degree, extensiveness or scale of impact.
Nature of Impacts: Whether positive, negative, direct or indirect, cumulative, etc.
Duration: the period of time over which an impact may occur and remain on site, from once-off to total life.
Likelihood: probability or certainty of an impact occurring before mitigation is applied.
Timing: The stage at which the impact occurs, whether during construction, operation or decommissioning or whether immediate or delayed.
Significance: a measure of the importance of a particular action on the environmental factor in relation to its characteristics and based on specific standards, criterion or accepted policy. This helps the decision maker to focus on specific impacts likely to bring about adverse change to the environment and people and provide practical solutions.
Irreversibility: An indication of whether an impact can be reduced reversed or stopped.

7.1.2 Impact Evaluation and Interpretation Criteria

After identifying the positive and negative environmental impacts of the proposed project an analysis to determine the extent and significance of impacts was carried out in line with the phases of the road which include designing, construction, decommissioning and operation phase. The aspects considered in the analysis included magnitude; significance; probability of occurrence; and duration of impacts.

Magnitude: a measure of the general degree, extensiveness, or scale of impact, was scored at three levels i.e. household level, local level and regional level.

Significance: a measure of the importance of a particular action on the environmental factor in the specific instance under consideration was scored using values ranging from +3 to -3. A score of 1 represents low/ minimal impact, 2 moderate impact and 3 representing a high impact. Negative impacts were assigned a minus sign and positive impacts are given a plus sign.

Probability of occurrence: provides an estimate of the probability of an impact occurring before mitigation is applied. The impacts were rated according to the following scale:
Possible - impact may occur but it is not likely; *Probable* - the impact is very likely to occur; and
Definite - impact is unavoidable

Duration: refers to the period of time over which an impact may occur, from once-off to continuous for the life of the project. Duration of impacts was considered in terms of the following criteria:

- Short Term (less than 5 years);
- Medium Term (between 5 and 10 years); and
- Long term (over 10 years)

7.2 Identified Positive environmental and social impacts

7.2.1 Increased trading activities

The rehabilitation of the road shall have a significant positive economic impact of the area and the district as well as the country in general since accessibility and motorization of traffic will be improved. The improved accessibility of the road will enhance business activities at the border, along the road, in all the trading centres. Flow of business activities between Malawi and Tanzania is going to improve due to increased traffic which will boost the countries revenue collection through increased taxes. Road side vending is going to increase and more people are going to construct various business houses such as eco-tourist lodges, bars and other agro processing activities. The increased flow of traffic will promote the growth and development of agro-based industries in the district. Increased business activities will lead to improved employment opportunities along the road and the district. Increased business activities along the road and in the various trading centres along the road will provide better trading and employment opportunities for local people in the area. The increased flow of traffic between Tanzania and Malawi will result into the growth of the Karonga Town and all the trading centres along the road which will lead to the emergency of small, medium and large scale enterprises.

Enhancement Measures: In anticipation it is important for the Karonga District Council to consider re-planning or zoning to allow for increased and improvement of social and economic amenities in the project area. This will not only discourage illegal developments along the trading centres and but also promote further economic activities in the project and the Karonga centre. The ministries responsible for industry, trade, tourism, health, agriculture and others need to reposition themselves to prepare for the increased economic activities of the area.

The increased economic activities will demand bring with it other social and economic challenges such as prostitution, theft, road accidents, diseases such as HIV and AIDS and others. It is therefore very important for the District Council to strategically position itself in order to prepare for these expected challenges and impacts that may arise due to the rehabilitation of the road.

7.2.2 Increased job opportunities

The road construction project is expected to recruit about 3000 people mostly from the local area. This will further boost the economic activities of the area since many people are going to have a sustained source income for the up liftment of their households. The people employed for this project will require goods and services from within the area creating a cycle of economic activities and growth. Increased job opportunities means increased buying power by the local people leading to more revenue in terms of taxes for the government..

Enhancement measures: It is imperative therefore that the Karonga District Council develop a robust physical development plan to sustain the job opportunities that will be created by the implementation of the project.

7.3 Identified negative environmental and social impacts during construction

7.3.1 Loss of agricultural lands more especially along the road reserve boundary

From Karonga Round About to Songwe Border, villagers are cultivating and grazing inside and along the road reserve because they are fertile and usually moist covering an area of about 240 hectares. It is expected therefore that during the construction of this road many of these villagers will be significantly affected because they are going to lose these farming and grazing areas which they have been using. In addition it is estimated that about 4.0 ha of land will be required for the establishment of the campsite. People revealed that they know that they are growing crops in the road reserve but they grow crops and graze their livestock because they are usually fertile and moist during dry seasons. It is expected that these people or families are going to lose these gardens where they are now growing crops like maize, rice, banana, fruit fruits and others. However, they are aware that their activities are taking place within the road reserve and any time a project comes they will be affected. It was noted that most of the fruit trees and banana growing along these road reserves are naturally regenerating but people have been benefitting from them.

Mitigation measures: Construction of the road should be done during the dry season when many people have harvested their crops to minimize the loss to their crops and grazing land. The RA need to conduct awareness meetings to inform the people along the road as to when the road construction works are going to start so that those who are cultivating and graze animals along the fertile sides of the road reserve should stop.

7.3.2 Destruction of forest and trees species

It is expected that the construction of the road will significantly affect a number of tree species due clearing for road construction and influx of people into the area as a result of the improved road access. Table 7 has identified a number of tree species that are going to be significantly affected due the rehabilitated of the road. The improvement of the road is also going to affect various fruit tree species that people have planted within the road reserve and are deriving livelihoods out of them. As already alluded to above people are aware that once the road is going to be rehabilitated their fruit trees which are within the road reserve are going to be affected. What they are expecting is to be made aware of when some construction works will start so that they can transplant some of the fruit

and banana tree since they are within the road boundary. Such fruit trees include mangoes, various types of citrus, bananas and others.

The improved access to the road will also put pressure on Karonga Escarpment and Nambatata Forestry Reserves. The anticipated increased influx of people into the area as a result of the improvement of the road would mean more firewood, charcoal and building materials from these forest reserves.

Mitigation measures: Before commencement of the project, the District Forestry Office should ensure that community awareness activities are organized on the need to conserve and manage the forests and trees in the two forest reserves as well as increase its law enforcement and patrolling activities in the two forestry reserves to ensure that the people do not encroach and start cutting down trees wantonly. The DFO should work closely with the people in the areas more especially the traditional healers to identify the medicinal tree species that are endangered so that they can be replanted. There will be need to plant avenue tree along the road at 20 meter from the road centre line where necessary. It will also be important for the contractor not to cut down the trees unnecessarily during the construction of the road to ensure that the tree species are preserved.

7.3.3 Loss of human settlement, infrastructure and other liabilities

The road project will serious affect infrastructure and human settlements more especially along the trading centres such as Pusi, Mwenitete, Iponga and others. As already alluded to, the project will require an estimate of 4.0 ha of land for the campsite and additional 0.5ha for waste disposal. There are such liabilities such as electricity poles, telephones lines, water pipes and others that will need to be removed and replaced.

Mitigation measures: Properties and infrastructure that is going to be affected during the construction of the project have been identified and valued; the affected owners are going to be compensated in line with the World Bank Safe Guard Policy Guideline and Resettlement Management Framework. The organizations such as Electricity Supply Commission of Malawi (ESCOM), Northern Region Water Board need to be informed and involved to ensure that they shift their poles and pipes before the road construction starts. It is important that the RA should work closely with the Karonga District Council to ensure that the people affected are properly identified and compensated before the construction of the road starts to reduce and avoid conflicts. The affected people should also be made aware of the start date of the project to enable them move some of their valuable properties before they are demolished

7.3.4 Improper Waste Disposal

Different types of wastes are expected to be produced at various stages of the road project and types of activities as summarized in table 18 below.

Table 18: Summary of types of waste and their characteristics

Project Activity	Anticipated types of waste	General characteristics of waste
Detailed engineering designing of the road	None	None
Construction and operation of the campsites	• Domestics solid waste from campsites	• Food remains, packaging materials such as plastic papers, glass, cans, wood, rags, metals glass etc. • Building materials, debris • Trees and debris from clearing the camp sites
	• Effluent from wash bays, bathrooms etc. • Oils and paints • Gases and smoke	• Washrooms containing soaps and detergents, • Septic tank liquid waste and antiseptics, • Oils from vehicles and other machinery, paints, insecticides, pesticides etc. • Fumes from construction vehicles • Dust from moving vehicles during clearing of campsites
Clearing of vegetation along the road	• General solid waste and oil spills • Gases and smoke from moving vehicles	• Tree branches and trunks, leaves, grass, top soil, sand rocks and pebbles • Smoke and gases from moving vehicles • Smoke from burning debris, cooking • Tree branches, trunks, leaves, grass, soils, rocks, sand, pebbles • Stock piles of materials
Cut and fill to remove top layer and construction or road related infrastructure	• Gases, dust and fumes from blasting and mining of quarry • Excavation of gravel sub-layers and fill materials	• Carbon dioxide, monoxides, sulphur, nitrogen compounds, particulate matter, etc. from operation of machinery and vehicles. • Waste water
Excavation of gravel sub-layers and other fill materials	• Gases, waste water	• Operation of machinery and vehicles (Carbon dioxide, monoxides and other gases, particulate matter, runoff
Blasting and mining of quarry and gravel	• Gases, dust, fumes, oil spillage	• Sulphur,, nitrogen, and other gases, smoke, fumes, oil spillage, pebbles, Carbon dioxide, monoxides, etc.
Construction of temporary reservoirs	• Negligible	• None
Application or drainage of excess water from	• Runoff, oil spillage	• Runoff can contain high levels oils, , smoke etc.

Project Activity	Anticipated types of waste	General characteristics of waste
the road		
Transportation of soil, quarry and other materials	• Gases, oils, dust	• Carbon dioxide, smokes, air contamination
Construction of road related infrastructures	• Solid waste, gases, oils	• Stone aggregates, oil leakages into streams and rivers, CO2, carbon monoxides, silt, stones, particulate matter, cement metal, timber, etc.
Application and compaction of base layer and sub base	• Gases, oils, runoff, particulate matter	• Carbon dioxide, monoxides, nitrates, cement, soil dust
Construction of road shoulders and drainage systems	• Oil spillage, run off, gases	• Carbon dioxides, monoxides, , cement, tax, concrete blocks pieces, bricks etc.
Landscaping and rehabilitation of degraded sites including borrow pits and detours	• Gases, particulate matters, oil spills	• Carbon dioxides, monoxides, smoke, soil dust etc.
Decommissioning and operation	• Demolition wastes, general solid waste, waste water	• Debris (sand, bricks, timber, metal, plastics, oils, lime, obsolete or damaged materials, explosives, runoff

7.3.4.1 Impacts of waste on soils

Wastes from the rehabilitation of the road will have impacts on the soils upon which many people along the project area depend for their rice, maize, banana and fruit growing as well as grazing areas. People grow their crops along the road and therefore the wastes will have serious impacts on the fertility of the soils along the road. Some of wastes will be non-biodegradable which if not disposed of properly will render the areas along the road useless for farming and grazing activities. Some of the activities that may affect the soils along the road project include:

Clearing and excavation- this removes the top soil and vegetation making it prone to soil erosion both during dry and wet seasons. The runoff from the road can cause siltation of streams and rivers affecting fish breeding ground considering that the streams and river along the road provide a very good ground for fish breeding. Clearing and excavation may cause accelerated or uncontrolled sedimentation in the water courses and road side drains as well as affect the growth of the various tree species which have medicinal values.

Storage and disposal of waste materials (asphalt, oils, fuel, oils, sand, cement act). Very often if these materials are spilled on the soil contamination is strong and recovery is difficult. Careless storage and dumping of these types of waste may lead to permanent damage of the soil structure along the road project which in turn will affect the agriculture and livestock activities of the people of the area.

Creation of barrow pits and quarries- excavations of borrow pits loosen up the soil and exposes it is to erosive agents such as rain and wind. The borrow pits if not maintain will affect the scenic value of the area, cause accidents as well as become breeding grounds for mosquito carrying malaria.

Movement of vehicles and other heavy construction machinery has a serious effect on soil structure and texture. Movement of heavy machinery can cause compaction of soil outside the road alignment.

Mitigation measures: In order to reduce and minimize the impacts of waste on the soil, the contractors are advised to limit clearing activities of the road to the areas within the road reserve. The drainage systems collecting water from the road should discharge to natural lines in order not to cause erosion. Unwanted wasted should be carefully disposed of in designated place only. The contractors should ensure construction of erosion and sedimentation control mechanism such as diversion banks and filtration structures. Where necessary, rehabilitation and planting of avenue trees and grass on all slopes and unstable areas is a must. The borrow pits, quarry sites sand pits and others should be fully rehabilitated at the end of the project in order to mitigate the negative impacts of the same.

7.3.4.2 Impacts of waste on water quality

Rehabilitation of the road can lead to the contamination of the streams and rivers such as Rukuru, Lufilya, Kyungu and others. Contamination of these streams and rivers can have a serious environmental effect on the fauna and flora along the streams and rivers. These streams are high productive areas for the people in the areas since it is where they grow their crops such as rice, bananas, maize, cassava, fruits and graze their animals. These rivers are also fishing grounds as well as breeding ground for fish from Lake Malawi. As identified in table 19, different activities of the road contraction will generate different types of wastes that if not careful handled can end up contaminating the rivers and streams. Effluent and run off from the camp sites and storage areas can contain high levels of pollutants including human wastes, asphalt compounds, inorganic and organic pollutants, fuels, oils, lime, cement and other elements.

If not properly handled, these elements and particles will affect the water quality in the rivers due to siltation which affect the aquatic life or in some cases cause flooding due to waste overload. Rivers such as Lufilya, North Rukuru, and Kyungu are already prone to flooding and therefore care must be taken during the rehabilitation of the road.

These are main rivers emptying their water into Lake Malawi, and as already alluded to are breeding grounds for the Lake Malawi fish. The road project crosses these main rivers and provides the main point where contamination and pollution will take place. It is also highly likely that the water used for the rehabilitation of this project will be abstracted from these rivers. It is therefore recommended that the Constructor seek guidance and authority from the Water Resources Board so that they can obtain a Water Right certificate before any construction start in the project.

Mitigation Measures: Negative impacts on the rivers and streams can be mitigated by storing materials outside drainage lines so as to minimize sedimentation, ensuring that construction activities take place during dry season when precipitation is at the lowest levels. It will also be necessary to

maintain the original geometry and geomorphology of the river cross points and plant vegetation in order not to disturb them. Since Karonga District does not have a dumping site, there is need for the contractors to discuss and agree with the Karonga District Council to designate some areas where waste can be dumped. It is important therefore to ensure that waste is dumped in those designated places in order to reduce negative impacts.

7.3.4.3 Impacts of waste on air quality

The road rehabilitation project will have serious impact on the air quality and some of the pollutants of the air have been identified in table 19. Some compounds such as asphalt are associated with certain gastro-intestinal disorders in people according to health officers. In all road construction projects transportation of materials and equipment generates a lot of dust and various other emissions which stimulate respiratory reactions in people and livestock. Blasting at the quarry can also cause a lot of noise and dusts and flying stones which may be hazardous to people in the area. Though the dust from quarrying and vehicular transport may be short term to people in the areas, their impacts can be serious when they cause respiratory diseases. There are a number of gases as identified in table 19 that may be produced during the construction of the road and cause discomfort amongst people. Apart from the gasses, various offensive odours that are going to be produced from the industrial actions such as burning of waste, blasting and others.

Mitigation measures: The impacts will be on both the workers, villagers close to the project sites and environment. It is necessary during the construction phase of the project for the contractor to provide masks to its workers more especially those working near heavy machinery. Ensure that regulation provided under the Environmental Management Act and other regulations are followed during the implementation of the project. Ensure that trucks transporting materials such as sand, asphalt and others are fully covered in order to minimize dust. The work areas such as detours should always be watered and construction works generating a lot of noise should never be carried out between 18.00 h ours and 06.00 hours. Ensure that vehicles and machinery are routinely maintained to reduce noise.

It is expected that after the completion of the road rehabilitation traffic is going to increase along the road. Being the major trading route, it is expected the government will put measures and enforce regulations to ensure that road worth vehicle are being driven along the road. Planting of avenue trees along the road will also act sinks for the gases that are going to be produced by moving traffic.

7.3.4.3 Waste management plan

The Karonga District Council does not have a district waste management strategy or plan and properly designated dumping site. However the project will require an area of about 0.5ha for waste disposal. This will require the Karonga District Council to designate a waste dumping site for the project to ensure that waste generated from the project are properly disposed of. Considering that the district is growing it is necessary for the district council to develop a waste management strategy and plan. In the absence of district level waste management strategy or plan, the Karonga District Council should be guided by the national waste management guidelines that have to be followed when disposing of various types of waste from the road project.

It will also be important for the contractors to follow and government to enforce the SADC rules on traffics emissions and adopt more stringent air quality standards used at regional level in order to minimize the impacts of pollution from the moving trucks.

In general waste management requires concerted efforts by the contractor, district council, RA and local communities to ensure that that waste generated from this project are properly management and disposed off in designated areas that will be agreed between the contractor and the Council. It is a fact that waste management will be handled by the contractors under the guidance of the Roads Authority and the various stakeholders mentioned. It will be necessary for the RA to strengthen its monitoring role or engage other institutions such as NGO to monitor compliance to waste management standards the contract during the project period.

7.3.5 Loss of cultural sites such as graveyards

There are five graveyards that were identified along the road project which are likely to be significantly affected by the rehabilitation of the road. The construction of the road may necessitate exhuming remains of people and reburied to nearby grave yards or re-alignment of the road.

Mitigation measures: There is need for the Karonga District Council to engage the traditional leaders in the project area to discuss the relocation of the graveyards before the construction of the road. Consent of the relatives and traditional leaders will need to be obtained before relocating the graveyards.

7.3.6 Spread of communicable diseases and conflicts

It is obvious that there is going to be an increased migration of people from other areas to the project in search for employment and the contractors are going to recruit people both from within and outside the project. The disparities of income levels between the local people and the workers may be a cause for wife or husband grabbing which may lead to increased levels of HIV and AIDS in the project area. The wife or husband grabbing may lead also to fights between the workers and the villagers.

Mitigation measures: There is need to increase HIV and AIDS awareness and behaviour change interventions in the project area both during and after in order to minimize the spread of HIV and other communicable diseases in the district. The district council needs to engage the local leaders in the area to raise aware about the project in order to prepare the local people about the impacts of influx of migrant workers and consequences of HIV and AIDS. The Health Centres along the Karonga Songwe Road and Karonga Hospital need also to be prepared for the increased load or pressure due to the increase in population as result of the road project.

7.3.7 Increased occupation health and safety risks

Construction projects always have a direct occupational health and safety risks to the employees and people around the project areas. Dangerous operation take place during road construct including blasting of rocks, handling of hazardous waste and other inflammable materials. If not well manage these can cause serious injuries to people who may result as a result of human errors or accidents. During road construction people are exposed to various types of risks including flying stones,

moving vehicles, oil leakages, fumes, dusts, toxic emissions and other chemical substances, noises, strong smells which can lead to accidents and deaths in the project area. Wrong combination of chemicals, selection of equipment, poor planning and coordination of activities can lead to serious accidents in the project area. The exposure of communities and workers to dusts, noises and other particles may lead to injury, diseases which may cause death.

Mitigation measures: There is need for the RA and the contractors to provide and install adequate road signage in visible places for the people to see. There is need for the contractors to provide adequate sanitation systems in the workers camps so as to reduce or control the spread of diseases.

The contractor needs to provide protective materials to all its employees and impose their use. The contractors need to provide such materials as protective masks, reflective ware, dust protection masks, leather boots, and hard hats for workers in places quarries and other dangerous places. Close supervision of the workers to ensure that they are putting on protective clothing is necessary and ensure that workers are standing away from dangerous places during such as activities as blasting. Need for the development of comprehensive work place safety regulations by the contractors cannot be overemphasized.

7.4 Impacts during decommissioning of the road project

During decommissioning of the project there are a number of negative impacts which include increased levels of waste due to demolition of campsites, loss of aesthetic value of a number of places due to barrow pits and quarrying, loss of jobs by many people, loss of business by traders amongst many others. There is also going to be increased influx of business people to settle along the rehabilitated road which may lead to loss of trees and forests. The increased business activities along the new road and growth of the Karonga town may lead to opening up of the two forest reserves Nambatata and Karonga Escarpment Forestry for firewood and charcoal. Flow of traffic along the road may lead to increased incidences of communicable diseases such as HIV and AIDS, Ebola and others.

Mitigation measures: During decommissioning, the contractors is expected to follow proper waste disposal management systems to ensure that all the debris, left over materials, oils, cement, building materials are properly disposed of at agreed waste disposal sites. All the stockpiles of remaining materials such as soil, stones, and others are removed and borrow pits are rehabilitated. The contractor need to ensure that proper signage on the road is put and other road infrastructure such as waiting bays, walk ways and others are constructed and repatriation payment for the workers are paid to enable some of them move back to their homes.

7.5 Identified impacts when the road is in operation

The opening of the road will bring a lot of economic and social impacts including improved flow of traffic, growth of the Karonga town centre and other trading centres, increased business opportunities and improved revenue generation by the Malawi revenue Authority. However there are anticipated negative impacts that have been identified and discussed (Table 19) below.

7.5.1 Loss of employment opportunities

The road construction of going to provide employment opportunities to many people in the district and outside the district and therefore its closure will mean many of them will lose such opportunities. The loss opportunities by many people may lead to increased cases of theft, vending which may lead to encroaching into the road reserve again more especially in the trading centres.

Mitigation measures: The district council and civil society organizations should intensify their efforts to encourage people to invest and open businesses. The CSO should encourage people to open village banks such as Village saving loans scheme (VSL) which will enable them invest and generate financial resources to continue to do business. The district council should also encourage other financial institutions to invest in the project area so that many people have access to financial services and credits.

The Road Authority should intensify awareness campaigns to encourage people take care of the road and the road infrastructure at the same time refrain from enforcing into the road reserves.

7.5.2 Increases road accidents

The RA has been design for 100km/hr. and 50km/hr. (trading centres) speed limits. If these are not enforced there is bound to be increased levels of accidents along the road more especially along the trading centres and from livestock crossing the road since the area has considerable amount of livestock.

Mitigation measures: Planting of avenue trees and grass along the road will help reduce livestock from crossing the road thereby reducing accidents caused by crossing livestock.

In addition the Road Traffic Department should ensure to enforce the designed speed limits and punish the offenders. The Road Safety Council need to intensify their civic education and awareness campaigns in order to reduce traffic accidents along the road.

7.5.3 High incidences of HIV and AIDS and other communicable diseases

It is expected that once the road is rehabilitated, there is going to be increased flow of people and traffic into and through the district rendering the people in the area vulnerable to communicable diseases such as HIV and AIDS as well as Ebola. The increased diseases incidences will cause an increased pressure in the existing Health centres such Iponga and Karonga Hospital as well others.

Mitigation measure: The government through the Ministry of Health with support from the NGOs and faith organizations should intensify civic education and awareness activities in the area to inform people about the communicable diseases and how they can be avoided or controlled. The increased flow of people into the district may also require that the Ministry of Health place additional members of staff in the health centres in order to handle the increased workload.

7.5.4 Increased air pollution and Green House Gas Emissions

The rehabilitation of the road will mean increased flow of vehicle carrying goods and services cross border into Tanzania and other countries. In addition, there is going to be increased farming activities which will result into increased production of greenhouse gases that may have an effect on the

climate. Increased traffic is also expected to increase the levels of noise coming from the vehicles and people passing through the road.

Mitigation measures: Planting of avenue trees and grassing all the landscaped areas will minimise the impacts of air pollutions from the moving traffic. In addition the Roads Authority should enforce SADC standards on pollution from vehicles in order to minimize the impacts of the air pollution. The Malawi Government should ensure that vehicle coming and operating into the country are fully serviced.

7.6 Assessment of Environmental Impacts

Table 19 that follows presents the assessment of the identified impacts. The impacts that are deemed significant are consequently presented in the Environmental Management Plan (EMP) in which mitigation measures have been recommended.

Table 19: Potential environmental and social impact matrix for the proposed road project

Project activities	Expected impacts	Extent or magnitude	Likelihood	Duration	Overall significance
Designing phase	None	None	None	NA	NA
Construction phase					
Camps and storage sites	Air, water, and water pollution; poor sanitary conditions;	Definite	Definite	Short and medium	-2
	spread of communicable diseases such as HIH and AIDs and Ebola	Definite	Definite	Short and medium	-2
Land clearing	Loss of vegetation and top soil	Definite	Definite	Short term to medium	-1
Cut and fill operations	Siltation of streams and rivers	Definite	Definite	Short to medium	-1
Paving of shoulders and carriage way	Air pollution	Definite	Definite	Short terms	-1
Construction of bridges	Siltation of rivers and streams	Definite	Definite	Short to medium	-3
Extraction and hauling of materials	Air pollution and land degradation	Definite	Definite	Short terms	-1
Drainage and road infrastructure	Soil erosion and siltation	Definite	Definite	Short to medium	-2
Burrow pits	Poor sanitary	Definite	Definite	Long term	+1

Project activities	Expected impacts	Extent or magnitude	Likelihood	Duration	Overall significance
	conditions; loss of aesthetic value				
Waste dump sites	Water, soil, air, water pollution; land degradation; loss of aesthetic value	Definite	Definite	Long term	+1
Asphalt plants and quarries	Water, soil and air pollution; noise	Definite	Definite	Medium	+2
Water reservoir construction	Incidences of water borne diseases	Probable	Probable	Short term	-1
General impacts	Stream flow disruption	Probable	Probable	Short term	-3
	Pollution of ground water	Possible	Possible	Short terms	-1
	Destruction of forests and tree species	Possible	Possible	Short to medium	+1
	Destruction of endangered species	Possible	Possible	Medium to long term	+1
	Increases of Communicable diseases	Probable	Probable	Short and medium	+1
	Social cultural conflicts	Possible	Possible	Short terms	-2
	Loss of agricultural and grazing land	Possible	Possible	Medium and long term	+2
	Increased job opportunities	Possible	Possible	Short terms	-2
	Occupation health and safety hazards	Possible	Possible	Short to medium	+1
Decommission and operation phases	Waste from demolished campsites	Possible	Possible	Short terms	+1
	Stockpiles of sand, soil, stones, etc.	Possible	Possible	short terms	-2
	Influx of settlers to do business	Possible	Possible	Medium terms	-3
	High incidences of communicable diseases	Possible	Possible	medium	+2
	Increased road accidents	Possible	Possible	Long-term	+1
	Loss of tree species and forests	Probable	Probable	Long-term	+2
	Loss of employment opportunities	Probable	Probable	Medium term	-1

Project activities	Expected impacts	Extent or magnitude	Likelihood	Duration	Overall significance
	Loss of aesthetic value	Possible	Possible	Long term	-2
	Poor sanitation due to borrow pits	Possible	Possible	Long term	+1

CHAPTER 8.0 ENVIRONMENTAL SOCIAL MANAGEMENT PLAN (ESMP)

8.1 Introduction

This section of the report presents the environmental management plan for the identified impacts of the projects. The environmental management plan summarizes the identified environmental issues and the mitigation measures and strategies against the impacts to ensure that the impacts are minimized, reduced or reversal. The ESMP has also outlined a monitoring plan and key responsibilities and stakeholders responsible for ensuring that the key recommendations and strategies are implemented as summarized in table 20.

Table 20: Environmental and Social Management Plan (ESMP)

Phase of the road and Expected Impacts	Proposed mitigation measures	Responsible authorities for implementation	Recommended period for implementation	Cost estimates
Preconstruction phase of the road				
Loss of property such as builds and land	• Identify and value the property and land affected • Organise meetings with local leaders and property owners • Compensate the affected people Notify people when to move and monitor progress	RA, Karonga District Council, traditional leaders, Ministry of Lands, Karonga District Commissioner	Prior to commencement of construction works	MK353,524,000.00
Construction/Rehabilitation phase of the road				
Loss of about 240 hectare of agricultural and grazing land more especially along the road reserve	• Organise awareness meetings with local leaders and people in the project area to stop people from farming along the road reserve • Start construction works immediately after crops have been harvested	KDC, RA, TA DADO, DEO, Contractors	Immediately constructors move into the project area	K1,000,000.00

Phase of the road and Expected Impacts	**Proposed mitigation measures**	**Responsible authorities for implementation**	**Recommended period for implementation**	**Cost estimates**
Contamination of streams and rivers by oils, bitumen spillages and other hazardous wastes	• Identify a waste dumping sites where waste from the project could be dumped • Provide drip pans at dispensing points • Provide adequate bund wall to contain oil spillages • Dispose construction wastes in designated places • Promote good sanitation and hygiene in the camp sites	KDC, Contractor	Before construction works and throughout the project During and after the project	K240,000.00
Siltation of streams and rivers	• Construct proper drainage structures to reduce erosion • Incorporate erosion control measures • Conduct regular water quality monitoring • Plant trees along the river lines	Contractor, DFO	During design and construction of the road and throughout the project	K20,000,000.00
Increased air pollution from emissions from vehicles, machinery, waste disposal sites, campsites etc	• Enforce SADC emission standards • Machine operators should be provided with personal protective equipment such mouth caps, • Regular maintenance of vehicles and machinery	Road Traffic and Road Safety council, Contractor	Throughout the project	K250,000.00

Phase of the road and Expected Impacts	Proposed mitigation measures	Responsible authorities for implementation	Recommended period for implementation	Cost estimates
Increased levels of GHGs which may cause climate change	• Enforce regulations against procurement, sale and use of fuels and oils not meeting the MBS specifications • Uncontrolled burning of waste should be prohibited	RA, MBS, Contractor	Throughout the project	K350,000.00
Contamination of soils by oils, fuels and other hazardous substances	• Proper waste disposal in designated areas • Separation and treatment of hazardous waste before disposal • Oil and fuel collection systems to be fitted in all storage and refuelling areas including maintenance workshops • Enforce ban on use of pesticides and chemicals containing dangerous substances	Contractor	Throughout the project	K1,500,000.00

Phase of the road and Expected Impacts	**Proposed mitigation measures**	**Responsible authorities for implementation**	**Recommended period for implementation**	**Cost estimates**
Loss of forests and tree species along the project area	• Do not remove trees unnecessarily along the project area • Minimize clearing of trees and forests around the borrow pits • Carefully plan the road works not to affect the standing trees in the road alignment • Seek formal request of protected trees from the Director of Forestry before clearing such as Mbawa • Replant trees and grass	Contractor, RA	During and after construction works	K20,000,000.00
Deforestation and encroachment into Nambatata and Karonga escarpment forest reserves	• Conduct civic education and awareness activities • Strengthen law enforcement to control bushfires, charcoal burning and wanton cutting of trees from the forest reserves	DFO	During construction and decommissioning of the project	K15,000,000.00
Loss or disturbance of cultural sites such as graveyards	• Discuss with the affected relatives to relocate their graves • Or re-align the road away from the grave yards	Road Designer, RA, Contractors, KDC	During the design and construction phase	K20,000,000.00

Phase of the road and Expected Impacts	Proposed mitigation measures	Responsible authorities for implementation	Recommended period for implementation	Cost estimates
Increased safety and health risks for the workers, people around the project, travellers	• Provide protective clothing to workers • Put road signage on all the dangerous places • Proper rehabilitation of the road kerbs and auxiliary areas • Ensure that all operations are closely supervised	Contractor	During the entire period of the project	K16,000,000.00
Increased HIV and AIDS and other communicable diseases amongst workers and local people	• Conduct civic education and awareness activities • Increase access to ART services by those affected by HIV and AIDS	CBO, NGOs, MoH	During construction and entire period of the project	K25,000,000.00
Decommissioning and operation of the road				
Loss of employment by the employees of the contractors	• Provide terminal pay to the workers on time • Establish and promote village banks	Contractor CBO, NGO	Decommissioning of the project	K12,000,000.00

Phase of the road and Expected Impacts	**Proposed mitigation measures**	**Responsible authorities for implementation**	**Recommended period for implementation**	**Cost estimates**
Increased accidents due to speeding of vehicles	• Increase road signage on the road • Enforce speed limit according to the design of the road • Increased road safety awareness and civic education • Construction speed humps at all the trading centres • Provide for Zebra crossing in busy places of the road	Contractor Road Traffic Directorate Road Safety Council	During construction and operation of the road	K21,000,000.00
Increased HIV and AIDS and other communicable diseases amongst workers and local people	• Intensify civic education and awareness activities on HIV and AIDS • Increase access to ART services in the project area	CBO, NGOs, MoH	During and after decommissioning of the project	K5,000,000.00
Increased air pollution and GHG emissions due to increased flow of traffic	• Enforce emission control standards on vehicles • Promote conservation farming	Road Traffic, MoAWD	Entire period Entire period	K18,000,000.00
Total estimated costs				**K528,864,000.00 (USD 1,175,253.00**

8.2 Objectives of the environmental management plan

The main aims of the EMP are to:

- Recommend relevant mitigation measures that will minimize the negative environmental and socio impacts of the project
- Identify appropriate institutional mechanisms and frameworks responsible for the implementation and monitoring of the mitigation measures
- Recommend measures that enhance environmental sustainability and benefits
- Put in a place a plan for monitoring and managing the impacts of caused by the road project
- Specify the timeframes and resources required for the implementation of the plan

Table 21: Environmental and Social Monitoring Plan.

Expected Impact	Proposed mitigation measures	Monitoring indicators	Principal monitoring authority	Frequency	Cost estimates/Anually
Loss of property and land	• Identify and value the property and land affected • Organise meeting with local leaders and property owners • Compensate the affected people • Notify people when to move and monitor progress	• No. of properties valued • No of meetings; • No of people compensated; • No. of complaints raised and resolved	RA, KDC	Monthly	K 72,000,000.00
Loss of agricultural and grazing land	• Organise awareness meetings with local leaders to stop farmers from farming along the project areas • Start construction works immediately after crops have been harvested	• No. of meetings and affected farmers	RA, KDC	Monthly	K3,000,000.00

Expected Impact	Proposed mitigation measures	Monitoring indicators	Principal monitoring authority	Frequency	Cost estimates/Anually
Contamination of stream and rivers by oils, bitumen spillages and other hazardous wastes	• Identify waste dumping sites where waste from the project will be dumped • Provide drip pans at dispensing points • Provide adequate bund wall to contain oil spillages • Dispose construction wastes in designated places • Promote good sanitation and hygiene in the camp sites	• No. of dump sites designated • Water quality	RA, KDC WRB	Monthly	K2,880,000.00
Siltation of streams and rivers	• Construct proper drainage structures • Incorporate erosion control measures • Conduct regular water quality monitoring • Plant trees along the river lines	• Water quality	KDC, WRB	Quarterly	K4,800,000.00

Expected Impact	Proposed mitigation measures	Monitoring indicators	Principal monitoring authority	Frequency	Cost estimates/Anually
Increased air pollution from vehicles, machinery, waste disposal sites, campsites etc	• Enforce SADC emission standards • Machine operators should be provided with personal protective equipment such as mouth caps • Regular maintenance of vehicles and machinery	• Air quality data • Certificate of fitness for vehicles	MBS,RA	Monthly	K3,000,000.00
Climate change due to increased levels of GHGs	• Enforce regulations against procurement, sale and use of fuel not meeting the specifications • Uncontrolled burning of waste should be prohibited	• Air quality data	EAD	Annually	K3,000,000.00

Expected Impact	Proposed mitigation measures	Monitoring indicators	Principal monitoring authority	Frequency	Cost estimates/Anually
Contamination of soils from oils, fuels and other hazardous substances	• Proper disposal of waste in designated places • Separate and treatment of hazardous waste before disposal • Proper maintenance and disposal of oils from vehicle and machinery • Enforce ban of use of such pesticides and chemicals containing dangerous substances	• Soil quality measures	KDC, EAD, RA MBS,	Quarterly	K1000,000.00
Loss of forests and tree along the project area	• Replant trees along the road reserve • Minimize clearing of trees and forests around the borrow pits • Carefully plan the road works not to affect the standing trees in the road alignment • Formal request of protected trees from the Director of Forestry before clearing	• No of tree species planted and saved	RA, KDC	Quarterly	K2000,000.00

Expected Impact	Proposed mitigation measures	Monitoring indicators	Principal monitoring authority	Frequency	Cost estimates/Anually
Deforestation and encroachment into Nambatata and Karonga escarpment forest reserves	• Conduct civic education and awareness activities • Strengthen law enforcement to control bushfires, charcoal burning and wanting tree cutting from the nearby forest reserves	• No. of illegal activities reported	KDC,DFO	Quarterly	K4,000,000.00
Loss or disturbance of cultural sites such as graveyards	• Negotiate with affected people to relocate their graveyards • Or re-align the road away from the grave yards if possible	• No. of graves relocated	RA, KDC	Quarterly	K4,000,000.00
Increased safety and health risks for workers, people around the project and travellers	• Provide protective clothing to workers • Put road signage on all the dangerous places • Proper rehabilitation of the road kerbs and auxiliary areas • Ensure that all operations are closely supervised	• No accidents and health hazards reported	RA, KDC, MoLMD	Every month	K12,000,000.00

Expected Impact	Proposed mitigation measures	Monitoring indicators	Principal monitoring authority	Frequency	Cost estimates/Anually
Increased HIV and AIDS and other communicable diseases amongst workers and local people	• Conduct civic education and awareness activities • Increase access to ART services in the project area	• No of people accessing ART services	MoH	Monthly	K6000,000.00
Decommissioning and operation of the road					
Loss of employment	• Provide terminal pay to the workers on time • Establish and promote village saving banks	• Reduced destitution	KDC	Quarterly	K400,000.00
Increased road accidents	• Increase road signage on the road • Enforce speed limit according to the design of the road • Increased road safety awareness and civic education	• No of accidents reported	RA, RTD	Half yearly	K2,000,000.00
Increased HIV and AIDS and other communicable diseases amongst workers and local people	• Intensify civic education and awareness activities • Increase access to ART services in the project area	• No of cases of new infections	MoH	Monthly	K12,000,000.00

Expected Impact	Proposed mitigation measures	Monitoring indicators	Principal monitoring authority	Frequency	Cost estimates/Anually
Increased air pollution and GHG emissions from moving vehicles	• Enforce air pollution control standards on vehicle • Plant trees along the road reserve to act as carbon sinks	• Levels of GHG emissions	EAD	Annually	K500,000.00
Total					K132,580,000.00 USD 294,620.26

8.3 Institutions responsible for the implementation of the ESMP

Various institutions have been identified in Table 19 for the implementation and monitoring of the implementation of the ESMP. However, in line with the Environmental Management Act (EMA) the key institutions responsible for the implementation of the ESMP are the Environmental Affairs Department (EAD) and the Roads Authority (RA) who are to ensure that the ESMP is implemented and monitored. The Roads Authority through its Environmental Planning Unit is responsible for planning, implementation and monitoring of all the environmental mitigation measures as identified in Table 19. The Roads Authority is responsible for ensuring that that the contractors fully comply with its commitments to ensure that the mitigation measures are implemented. In line with the EMA, the Roads Authority will report to the EAD. The EAD is expected to collaborate and advise Roads Authority and other government institutions in relation to the mitigation measures identified in the ESMP. The contractor has all the obligations to ensure that that the mitigation measures are comply to and implemented. At district level it is the Karonga District Council which has the biggest responsibility through its District Environmental Subcommittee (DESC) to ensure that the contractors is complying to avoid or minimize environmental, social and health impacts during the rehabilitation and operation of the road construction.

It is also through this District subcommittee through which disputes arising from the project will be channelled and resolved. The project area already has established village level dispute settlement mechanisms that are also responsible for the handling grievances that may emanate during the construction of the project. Normally disputes will be raised through the traditional leaders and local committees in a particular project area through to the DESC. The ESAI team found that there are already dispute settlement mechanisms such as Civil or Crime Protection Committees that exist within the villages, trading areas and towns which are going to be used during the project period. These dispute settlement structures are fully functional and need to be used during the project period.

8.4 Responsibility for Monitoring and Supervision

Monitoring the implementation of this ESMP is going to be done at national, district and community levels by such relevant authorities as described below.

8.4.1 National Level Monitoring

The key departments and institutions at national level will include Environmental Affairs, Department of Lands, Malawi Bureau of Standards (MBS) and Roads Authority who are going to work closely with other relevant governments departments and organizations to monitor the overall implementation and management of the ESMP. The EAD will be responsible for ensuring implementation of the ESMP and auditing compliance while the Department of Lands will ensure that all the necessary compensation procedures have been followed and are complied to. On the over hand the MBS will ensure that the contractor is applying internationally and national approved

standards in terms of chemical and other pesticides used during the contraction of the road. The national level stakeholders will provide an institutional framework for feedback to the contractor and the World Bank as the financier of the road project.

It is expected that monitoring will determine whether the mitigation measures undertaken by the contractor and other agencies responsible for implementation of activities are being carried out. It is expected that during and after the project environmental audits will carried to ascertain compliance to the standards and recommendations set in the ESMP. The contractor is expected to employ a robust internal mechanism to oversee the planning, implementation and monitoring and compliance to the mitigation measures. The RA is also expected to regularly monitor compliance and make recommendations to the contractors for corrective measures and changes as well as provide regular feedback to the EAD and other national stakeholders.

8.4.2 District Level

The Karonga District Council (KDC) through its District Environmental Subcommittee will (which comprise technical heads of relevant departments of the council) be responsible for ensuring that the district has a waste management plan to be able to guide the contractor on waste management issues and also monitor implementation of the ESMP by the contractor. The DESC will need to regularly visit the project area to inspect compliance and advice for changes where necessary. It is also the DESC that will provide regular feedback to the RA on what the contractor's actor in relation to the ESMP for the project. The KDC through the DESC will work closely with civil society organizations (CSO) and other institutions at district level to ensure that issues of encroachment into protected areas, HIV and AIDS, conflicts between workers and villagers are minimized.

8.4.3 Community Level Monitoring

It is expected that the Area Development Committee, Area Executive Committees, Village Development Committees, Village/Civil Protection Committees and the various extension workers both from the government and CSO will be responsible for monitoring implementation of the ESMP by the contractor and the various institutions that have been identified to be responsible for implementing certain activities. The community level institutions will provide regular feedback to the KDC on the progress on implementing the ESMP by the contractor to ensure that necessary measures are addressed to ensure that the planning, monitoring and implementation of the ESMP is adhered to.

8.4.4 Reporting Mechanisms

Various institutions and structures are identified at all levels including community, district and national level levels. In addition, all these structures have grievance mechanisms which are used in case of a conflict. It is expected therefore that the various committees at village level, will report to the ADC through the district development committee and through to the national level structures on the implementation of the ESMP. The ESMP has identified the frequency of reporting which may be changed during the course of implementing the project depending issues that may arise.

As an execution agency the Road Authority is expected to utilise the identified structures to ensure smooth implementation of the ESMP.

CHAPTER 9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

The rehabilitation of the Karonga Songwe road is an important undertaking for the country and the COMESA and SADC Regions. Apart from improving the national economy the project will strengthen the economic ties between the various economic regions of Africa. The road project is expected to facilitate trade between Tanzania and Malawi as well as the rest of the Eastern and Southern Africa Countries.

Just as any other construction project, rehabilitation of the Karonga Songwe road is likely to have a number of positive and negative environmental impacts during the all the phases of the project in particular during construction, decommissioning and operation phases. A number of key negative environmental and social impacts have been identified including the following:

- Loss infrastructure and property
- Loss of agriculture land mainly along the road reserve
- Increased level of wastes
- Loss of forests and trees species as a result of constructions works and the influx of people into the area and increased demand for charcoal and firewood
- Siltation of rivers and streams
- Loss of cultural site mainly grave yards hat are within the road reserve
- Increased levels of accidents due to speeding of vehicles
- Increased incidences of communicable diseases such HIV and AIDS and Ebola

With proper mitigation measures, these impacts will not be as serious to cause permanent damage to the environment of the area considering that this is a rehabilitation project and the road works are going to follow the existing path. It is expected that the identified mitigation measures will be implemented to ensure that the benefits for which this road was designed for road are realized.

9.2 Recommendations

There are a number of recommendations that the ESIA team is proposing including the following:

- The Roads Authority with support from the Karonga District Council and Ministry of Lands should compensate identified property owners that are going to be affected and compensate on time in line with the World Bank Resettlement Framework
- The contractors should start the construction works soon after crops are harvested to minimize crop loss by the people
- The contractor should ensure that the borrow pits and the quarries are rehabilitated to restore the scenic views and reduce incidences of water logging

- The contractor should ensure that all different forms and types of wastes from the project are properly managed
- The District Forest Office should intensify law enforcement, awareness and civic education activities in order to minimize the impacts the impacts of this project on the protected areas of Nambatata and Karonga Escarpment Forest reserves
- The Karonga District Council and other stakeholders at districts level should be fully involved in the monitoring of the implementation of the Environmental Social Management Plan (ESMP) and Resettlement Action Plan (RAP)
- In order to minimise dispute and conflicts the village and district level dispute settlement mechanism which already exist in the project area need to be used
- In order to effectively implement the ESMP and the RAP, the government will need to allocate an estimated amount of USD 1,208,675.00 .
- The Ministry of Health and other stakeholders should increase civic education and awareness activities in order to reduce or minimize the spread of communicable disease
- Upon completion of the road works, there is bound to be increased levels of accidents more especially along the trading centres, therefore the National Road Safety Council and Road Traffic Directorate should strictly enforce the design speed limits of the road.
- The National Road Safety Council should ensure to strengthen civic education and awareness activities in order to minimize road accidents more especially along the trading centres.
- The Roads Authority should enforce the road boundary reserve adherence so that people should not encroach the road reserve again after construction.

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ANNEXES

Annex 1 List of people and groups consulted

NAME	DESIGNATION	PHONE NO.	PLACE
P. Maseko	Physical Planner	0881114245	Karonga Boma
Wezi F Gausi	DPP	0888352783	Karonga Boma
F Valeta	MRA Deputy Commissioner	0888877252	Songwe Border
S Pikani	MRA deputy Manager	0882391123	Songwe Border
Petros Nyirenda	Greel Freight Clearing Clerk	0995710063	Songwe Border
TA Mwakaboko	Chief	0998922968	TA Mwakaboko compound
GVH Mwakaboko	Mwakaboko	0992930674	TA Mwakaboko compound
Rameck Mwandumbikira	Nduna		TA Mwakaboko compound
Jackson Ndambo	Nduna	0993016933	TA Mwakaboko compound
Moffat Mweseghe	VDC Chair	0996631658	TA Mwakaboko compound
Morden Mwaseghe	Mwakaboko		TA Mwakaboko compound
Simon Banda	Chief messenger	0998033889	TA Mwakaboko compound
Mzac TD Nyirenda	Member of Pusi	0999322926	Pusi
William Pusi Munthali	Member of Pusi	0999467203	Pusi
Kelvin M Nyirenda	Secretary	0999623755	Pusi
Mwachirwa Mponda	Mponda VDC Chair	0994846438	Mponda
Abudala Zimba	Mponda	0999168095	Mponda
Suzen Kuyokwu	Chairlady	0999183340	Mponda
Babu Boko	Secretary bucha	099994066	Mponda
Daud Mwakalinga	Mponda	0996079411	Mponda
P.G.V.H. Gweleweta	G.V.H	0992618542	Kaporo trading centre
Anthony K Mwazionde	V/H Mwangulu	0995168649	Kaporo trading centre
V/H Mwangulu	V/H	0999246928	Kaporo trading centre
V/G Yotamu	V/H	0996185111	Kaporo trading centre
V/H Dingayeni	V/H	0997337605	Kaporo trading centre

NAME	DESIGNATION	PHONE NO.	PLACE
C.B Mwakuongha	V.D.C Chair	0999949375	Kaporo trading centre
John Mwandobo		0996678895	Kaporo trading centre
Fenson Komba		0992707226	Kaporo trading centre
MYD Nyirongo		0999276635	Kaporo trading centre
Yoka Mwalwayo		0994233642	Kaporo trading centre
Bless Kawonga		0998033586	Kaporo trading centre
Fitamishe Mwamwabi		0996337365	Kaporo trading centre
Ndamiyo Mwangalaba		0992892433	Kaporo trading centre
Harry Sambo		0993063023	Kaporo trading centre
Daniel Mghogho		0999756785	Kaporo trading centre
Kondwani Msopole		0999670813	Kaporo trading centre
Elton Msiska		0993578620	Kaporo trading centre
Leonard Mwangairo		0995168643	Kaporo trading centre
Mputi Kiyokwa		0999467863	Kaporo trading centre
Thomas Mughogho		0999433615	Kaporo trading centre
Sekani Msukwa		0996668054	Kaporo trading centre
Guan Kasungula		0993008037	Kaporo trading centre
Twasime Kumwenda			Kaporo trading centre
Joice Kumwenda			Kaporo trading centre
Convet Mwanembako		0993942540	Kaporo trading centre
Worren Chisiza		0992879677	Kaporo trading centre
Brain Mkumbwa		0999717453	Kaporo trading centre
Boss Mnyoni		0999268280	Kaporo trading centre
Bestar Ngunga		0995168612	Kaporo trading centre
Duncan Mvula		0994153174	Kaporo trading centre
Alick Mwakimbala		0993009388	Kaporo trading centre
Gift Mkumbwa		0994612788	Kaporo trading centre
P.Mtambo			Kaporo trading centre
C. Malongo		0999920568	Kaporo trading centre
Sam B Kayira		0999397354	Kaporo trading centre
G Sanga		0994623412	Kaporo trading centre
S.Mwakasungula		0992007354	Kaporo trading centre
A.Mwalaba		0999199272	Kaporo trading centre
M.Mack		0999199272	Kaporo trading centre
P Mkumbwa		0999433612	Kaporo trading centre
B Mwanyongo		0995933322	Kaporo trading centre
R Simbeye		0999632331	Kaporo trading centre
Samson		0992707200	Kaporo trading centre
Mwiza nyirenda		0998171776	Kaporo trading centre
D.D Chingaipe	O/C Police kaporo police post	0999137040	Kaporo trading centre

NAME	DESIGNATION	PHONE NO.	PLACE
Maurice Kalulu	Customs officer Kaporo MRA station	0888463459/0993994188	Kaporo trading centre
AB Mwakasungula	Chairman PP	0999251090	Cultural and meseum centre Karonga
Wezi Kayira	Tour guider	0998600810/0884242430	Cultural and meseum centre Karonga
Enson Kayenge	AGDLO Labor Office	0994483034	Karonga Boma
Norman Mwachipoka			Benjamin Chawinga Village Quarry
Godfrey Sibakwe		0997914495	Benjamin Chawinga Village Quarry
Medson Kaseghe		0997014434	Benjamin Chawinga Village Quarry
Ndamiyo Kalinga	Chairman , camp site owner, Songwe Busnessman Mwandenga business and development group	0999799869	Nyasi village, near Songwe
Reaga	member, Mwenitete Business Committee	0994580559	Mwenitete
Isaac	Member, Mwenitete Business Committee	0995438823	Mwenitete
Thomas	Member, Mwenitete Business Committee	0996350102	Mwenitete
A Salemba	Treasure, Mwenitete Business Committee	0994854170	Mwenitete
Albert Mwakighonja	Member, Mwenitete Business Committee		Mwenitete
Moses Mwenitete	Member/secretary, Mwenitete Business Committee	0994236694	Mwenitete
Archbord Mwemba	Chairman, Mwenitete Business Committee	0999114374	Mwenitete
Cosmas Kamwana	Officer in charge immigration	0999757305	Songwe Border
Watson white	Senior i migration officer	0999481000	Songwe Border
Innocent Muhariwa	Officer in charge police	0999102672	Songwe Border
Clifford Kabwilo	In charge border	0999349261	Songwe Border
T.W Tenganani	Station officer	0995832952	Songwe Border

Annex 2: Issues Raised During Public Consultations

Main issue	How the issue will be addressed
1. What will happen to people are plying trade and cultivating within the road reserve	A separate exercise will be undertaken to assess all properties within the reserve. At that moment the people shall be advised accordingly. Those people should not get worried as the exercise will also involve the DC and Chiefs to ensure that their interest are safeguarded.
2. When will the construction works begin so that the affected people begin to prepare?	The project is in the planning phase as such the actual dates for implementation are not yet known. However people should continue to lead their normal lives as adequate notice will be given to the project affected people.
3. Should people continue with cultivation of crops?	When the project is about to be implemented, people will be given adequate notice prior to implementation. The notice will be given enough to allow for ripening and harvesting of crops.
4. What will happen to structures that are outside the 30 metre-buffer zone but the road diversion passes very close to their buildings to extent that it will affect their buildings because of vibrations?	In such instances those structures will be considered. These are referred to as 'near misses'.
5. Some people have plans to rehabilitate their buildings i.e. from being thatched houses to roofing with corrugated iron sheets. Should the project be abandoned al together?	People can rehabilitate their houses so that they live a comfortable life. But this should not happen after the assessment/ cut-off date.
6. Will the value of the property be calculated depending on what was spent when the property was being acquired or the present value of the property?	The value of property will be calculated based on the present value.
7. What will happen to graveyards that will be affected by the project?	Much as the contractors will try as much as possible not to affect such areas, in an event that a graveyard has been affected, the contractor will discuss with traditional leaders on the preferred option. The options in such situations include relocating the graveyard, diverting from the originally proposed direction etc.
8. After getting compensated, will the affected people be free to get back to their places after the construction works have been completed?	Once the affected people have been compensated, there will be no need for such people to move back to their places, especially those who are within the road reserve area. Those outside the road reserve area may move

Main issue	How the issue will be addressed
	back after the affected piece of land has been rehabilitated by the contractors.
9. What will be done to ensure that accidents do not occur to road users during the construction period	Road safety signs shall be provided especially in places of high probability of accidents occurrence.
10. Shall the surrounding community be employed to work for the contractor.	The contractor shall consider that based on skills. But where specialized skills are not a necessity, local communities.

Annex 2 ESIA Terms of Reference

List of Acronyms

EMA	Environmental Management Act
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
RA	Roads Authority
RAP	Resettlement Action Plan
RMF	Resettlement Management Framework
TORs	Terms of Reference
USA	United States of America
WB	World Bank

ESIA Terms of Reference

1.0 INTRODUCTION

1.1 Background

With support from the World Bank (WB), the Road Authority (RA) plans to rehabilitate the 45.9 Km of the M1 Road from Karonga to Songwe. The major works of the proposed project shall include rehabilitation and widening of the carriageway from Karonga M1 roundabout to the expansion joint at the south end of the Songwe River bridge at Malawi-Tanzania Border. The Karonga-Songwe Road is a major and important trade route connecting many countries in the Eastern and Southern Africa trade corridor and has a lot of economic potential. Because of the scope and nature of works that will be undertaken before, during and after construction, the road project has received an environmental classification of Category 1. The classification of category 1 means that there is need to carry out an environmental and social impact assessment (ESIA) and develop a resettlement action plan as required by the Environmental Management Act (1996), Environmental Social Impact Assessment Guidelines and the World Bank's Environmental Self-guard policies and in line with the Roads Authority's Environmental and Social Management guidelines for the Road sector.

These Terms of Reference (TORs) outline the objectives, expected outputs, tasks for carrying out an ESIA and development of the Resettlement Action Plan (RAP) for the project in line with the Environmental Management Act (EMA, 1996), Environmental Impact Assessment Guidelines (1997) Environmental and Social Management Framework (ESMF, 2014) and the Resettlement Management Framework (RMF, 2014).

1.2 Objectives and Expected Outputs

1.2.1 Objectives

The objectives of the assignment are as follows:

1. To conduct an environmental and social impact assessment for the Karonga-Songwe M1 Road rehabilitation project
2. To prepare a Resettlement Action Plan (RAP) for the affected people along the Karonga- Songwe M1 Road project

1.2.2 Expected outputs

The expected outputs of the assignment are:

i. Environmental and social impact assessment report that includes an Environmental and Social Management Plan and an Environmental and Social Monitoring Plan as one document.
ii. Environmental and Social Management Plan.
iii. Resettlement Action Plan

2.0 SCOPE OF WORK

The scope of work is determined by the requirements of the EMA (1996) and prescriptions of the Malawi EIA Guidelines (1997) as supported by the World Bank's Environmental Self-guard policies and in line with the Roads Authority's Environmental and Social Management guidelines for the Road sector. The detailed scope outlines the task that the consultant shall undertake as follows:

2.1 Provide a detailed description of the Karonga –Songwe MI Road project including the details of the proponent, alternatives under consideration for the project, , general design of the road, size of land for to be affected by the project including electricity, water works system, mode of waste disposal and access roads including diversion if necessary. Provide a site specifics map of the area (Scale 1:50,000) showing the proposed road route.

2.2 Describe and analyse the baseline environment of the project. Collect, analyse and present baseline information on the environmental characteristics of the existing situation in the proposed road project between Karonga round about and Songwe Bridge. The description and analysis should include:

- Physical environment which includes topography, landforms, geology, soils climate and meteorology, air quality, hydrology, etc.
- Biological environment such as flora and fauna types and diversity, endangered species, sensitive habitats, etc.
- Social and cultural environment, including present and projected, where appropriate identify areas of cultural significance such as graveyards (there are about four to five graveyards along the Karonga –Songwe M1 Road) sacred sites, population, land use, planned development activities, community structures, gender, employment and labour market, sources and distribution of income, cultural properties, etc.

2.3 Legislative and regulatory frameworks. Identify and describe all pertinent regulations and standards governing the environmental quality, solid and liquid waste management, health and safety, protection of sensitive areas, land use control at national and local levels and ecological and socio-economic issues.

2.4 Identify potential environmental impacts that could result from the project. Describe and analyse all significant changes expected due to the proposed road project focusing on both negative and positive impacts. The impacts could include destruction of the ecosystems along South Rukuru, Luflya, Kyungu rivers and other streams, economic, environmental, ecological and social impacts which could both be positive or negative impacts as a result of the interaction between the proposed

project and the environment that are likely to bring about changes in the baseline environmental and social conditions of the area. It is expected that during the analysis, the consultant shall consider both biophysical and socio-economic factors that will include the impacts of: population change and migration; socio-economic characteristics of the difference target groups such as business people, vendors, women groups, schools, faith based communities and traders in and around the trading centres of Mwenitete, Pusi, Iponga, Ighembe and others ; forms of social organization and co-operation; physical and social infrastructure; change in economic activities of the people along the road as a result of the project; destruction of gardens and grazing areas; clearance of trees, fruits and medicinal plants and other types of vegetation; mechanical disturbance; removal of structures such as restaurants, groceries, hawkers, filling stations, office buildings such as Kaporo MRA office /road block sites; effects on flora and fauna; air quality; improved access; accident rates; and visual/aesthetic change.

The potential impacts must relate to the project cycle of the project which include following:

- Project planning- determination of route, land acquisition, resettlement of people along the key trading centres in the project area, compensation and housing of displaced people, etc.
- Project construction works- land clearing, earth moving, blasting works, HIV and AIDS, access roads, waste disposal and management systems, drainage systems, dust, loss of scenic values of landscape, threat to cultural and historical sites or artefacts.
- Project operation-generation and removal of waste, emission of pollutants from vehicles, maintenance of the road, access routes, interaction between migrant workers and local community, accidents, HIV and AIDS, effects of route on the land values, planning and management of ribbon development along the routes and others.
- Project decommissioning- allowing productive use of the land for example campsite, reconstruction of damaged environment

2.5 Analyse and describe occupational and health concerns. Describe and analyse all occupational health and safety concerns likely to arise as a result of construction and operations of the proposed road project. Critically analyse the impacts of reopening the quarry at Benjamin Chawinga village and surrounding. Make recommendations on corrective and remedial measures to be implemented under the environmental management plan.

2.6 Undertake a full public participation and consultations on the positive and negative impacts of the project amongst the key stakeholders at District Council level, Traditional Leaders such as T.A Mwakawoko, Paramount Kyungu and T.A Kilipula;

communities and business people in all the trading centres along the project area; and various stakeholders at the Songwe Border: Carry out a social due diligence which will involve a description of the social, economic and cultural status of the project area. Organise meeting and forums for public participation to enable interested and affected parties to present their concerns and opinions regarding the proposed project.

2.7 Propose mitigation measures to the identified environmental and social impacts of the proposed project. Propose feasible mitigation measures for the negative impacts that could result from the proposed project.

2.8 Develop an Environmental Management Plan to mitigate negative impacts of the project. Develop a comprehensive Environmental Management Plan that sets up mitigation, monitoring and institutional measures to eliminate, minimize or reduce to acceptable levels of the adverse environmental impacts and or minimize socio-economic benefits of the proposed project. Provide a cost outlay for the proposed measures as well as their institutional and financial support mechanisms.

2.9 Develop an Environmental Monitoring Plan which shall provide specific descriptions and technical details of monitoring measures, including parameters to be measured, methods to be applied, and sampling locations, frequency of measurements or data collection, and definitions of thresh-holds that will signal the need for corrective actions. The Monitoring Plan will also describe the monitoring and reporting procedures as well as the timeframes and implementation mechanisms and provide details of the staffing requirement and cost outlays for the implementation of the plan.

2.10 Prepare a Resettlement Action Plan (RAP) in line with the World Bank policy framework guidelines on Involuntary Resettlement (OP 4.12) and the Environmental Management Act (1996) and other the legal requirements of the country.

Submit to the Client the following: (a) 21 hard copies of Environmental and Social Impact Assessment report that includes an Environmental and Social Management Plan and an Environmental and Social Monitoring Plan as one document; (b) 21 hard copies of Environmental and Social Management Plan; (c) 21 hard copies of Resettlement Action Plan and (d) 8 CD-ROM or DVD-ROM soft copies the reports containing copies of all word, excel, AutoCAD or other similar files used in compiling the report.