Road Development Agency

FINAL UPDATED ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

SERENJE TO MPIKA ROAD

November 2022

ACRONYMS

AERC	Assistant Emergency Response Coordinator
AIDS	Acquired Immune Deficiency Syndrome
ASL	Above Sea Level
CEEC	Citizens Economic Empowerment Commission
COD	Chemical Oxygen Demand
COMESA	Common Market for Eastern and Southern Africa
DACO	District Agriculture and Cooperatives Officer
DANIDA	Danish International Development Aid
DC	District Commissioner
DHID	Department of Housing and Infrastructure Development
DPO	District Planning Officer
DPP	Department of Physical Planning
DRC	Democratic Republic of Congo
DSA	District Situation Analysis
DWA	Department of Water Affairs
ECZ	Environmental Council of Zambia
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPB	Environmental Project Brief
ERB	Energy Regulation Board
ERC	Emergency Response Coordinator
ERP	Emergency Response Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FC	Faecal Coliforms
FGD	Focus Group Discussion
FNDP	Fifth National Development Plan
FSP	Fertiliser Support Programme
GDP	Gross Domestic Product
GMA	Game Management Area
GPS	Global Positioning System
GRZ	Government of the Republic of Zambia
HAHC	Hospital Affiliated Health Centre
HIV	Human Immuno Virus
LuWSC	Lukanga Water and Sewerage Company
MOA	Ministry of Agriculture
MLGRD	Ministry of Local Government and Rural Development
MMMD	Ministry of Mines and Minerals Development
MoH	Ministry of Health
MGEE	Ministry of Green Economy and Environment
NGO	Non-Governmental Organization
NHCC	National Heritage Conservation Commission

PPE	Personal Protective Equipment
PRP	Poverty Reduction Programme
RDA	Roads Development Agency
ROADSIP	Road Sector Investment Programme
RTSA	Road Transport and Safety Agency
SADC	Southern African Development Community
SNDP	Sixth National Development Plan
STI	Sexually Transmitted Infection
TAZAMA	Tazania Zambia Mafuta
TAZARA	Tanzania Zambia Railway Authority
TC	Total Coliforms
TDS	Total Dissolved Solids
ToRs	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
USDA	United States Department of Agriculture
WCNH	World Cultural and National Heritage
WHO	World Health Organization
WRAP	Water Resources Action Programme
ZABS	Zambia Bureau of Standards
ZAMTEL	Zambia Telecommunication
ZAWA	Zambia Wildlife Authority
ZEMA	Zambia Environmental Management Agency
ZESCO	Zambia Electricity Supply Corporation
ZNBC	Zambia National Broadcasting Corporation

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EXECUTIVE SUMMARY

Introduction

The Serenje – Mpika road forms a part of the Zambian Great North Road (T2) that is a section of international routes i.e. the Trans-Africa Highway and the North-South Corridor (NSC) which is a joint COMESA/East African Community/South African Development Corporation (COMESA/EAC/SADC) Aid for Trade initiative. Its primary aim is to reduce the time, and cost of transport along this priority Corridor which links the port of Dar-es-Salaam in Tanzania to the Copper-belt (Southern DR Congo and Northern Zambia) and connects to the southern ports of South Africa specifically the port of Durban. The Corridor system, with its spurs, services eight (8) countries -Tanzania, Democratic Republic of Congo, Zambia, Malawi, Botswana, Zimbabwe, Mozambique, and South Africa. The project has been endorsed by the SADC/EAC/COMESA Tripartite that aims to improve the regional transport infrastructure with a view to supporting economic and social development programs along the Trans-Africa Highway/North-South Corridor.

The project road was originally constructed as a bitumen surfaced road in the early 1970s and is now beyond its design life, notwithstanding the emergency and periodic maintenance interventions that have been undertaken over the years. It has received a number of rehabilitation and periodic maintenance since its initial construction, commencing with emergency maintenance between 1995 and World Bank funded periodic maintenance between 1998 and 2000. This intervention provided a limited design life intervention, with focus on partial reconstruction for severally deteriorated sections and double seal treatment for most sections. Follow up maintenance was not fully undertaken, and consequently in 2011 Government of Zambia (GRZ) commissioned two emergency repair works contracts for the section. The poor condition of the road would be detrimental to the movement of goods and services, and therefore intervention driven by ensuring that the critical route does not present a transit bottleneck for trade in the region. The African Development Bank (AfDB) is financing the Chinsali–Nakonde section (approved July 2015) while the appraisal for the Mpika–Chinsali section is advanced with EU/European Investment Bank (EIB) support. The Serenje–Mpika (238km) section is complementary to these.

The AfDB has expressed interest to finance the rehabilitation of about 60Km of the Serenje-Mpika road which is a section between the Mpika weighbridge, and an area called Makantaulo.

PROJECT DESCRIPTION AND KEY COMPONENTS

Project Description

Serenje-Mpika road was originally built to a Class IA bitumen type with two lane flexible pavement. The existing pavement generally consists of double bituminous surface dressing with some sections with reseal or “cape seal” on top, 150mm cement stabilized base course and 150mm granular sub-base. Its carriageway width for most of the length is in the range of 5.8-6.1m wide. However, due to a poor maintenance regime, the road has rapidly deteriorated with some sections of the road disintegrating, posing a risk of complete failure in certain sections. In addition, there are several edge breaks which have reduced the original width of the lanes. The 60Km road project is planned to be a full pavement reconstruction involving Asphalt wearing course. Strengthening in some sections shall include an asphalt overlay to the existing pavement and using 50-70mm asphalt concrete. The intervention shall

include partial widening to achieve width of 7m for carriageway and to provide the 2.0m wide shoulders.

The Serenje–Mpika Road forms part of the Zambian Great North Road which is a section of international routes i.e. the Trans-Africa Highway and the North-South Corridor (NSC) which is a joint COMESA/EAC/SADC Aid for Trade initiative whose primary aim is to reduce the time, and cost of transport along this priority Corridor which links the port of Dar-es-Salaam in Tanzania to the Copper-belt (Southern DR Congo and Northern Zambia) and connects to the southern ports of South Africa specifically, the port of Durban. The Corridor system, with its spurs, services eight (8) countries-Tanzania, DR Congo, Zambia, Malawi, Botswana, Zimbabwe, Mozambique, and South Africa. *The project is envisaged to improve the living standards* and expand the productive capacity of the population in this region by contributing to improved access to the transport services thereby attaining sustainable, safe road network that facilitates economic growth and the improvement of lives of people along the road corridor. *Contribution to poverty reduction,* Zambia being a landlocked country needs to ensure better connectivity for its population to access market outlets for its increasing commercialized agriculture.

The emphasis on access requires a deliberate initiative in allocating resources mainly for infrastructure investments with more focus on roads which connect the country to areas with high agricultural potential (such as northern Zambia) through roads with cross-border trade opportunities as the Serenje-Mpika road. There is no doubt, that more success in agribusiness, including agro processing will thrive on lower costs of operation including transport as envisaged in this project. *In addition, the road passess through high agricultural productivity areas of* Mkushi, Chitambo, Lavushimanda and Mpika which are among the main producers of export crops such as maize and wheat. The road will therefore provide improved transportation of agricultural produce to markets internally and for export in the region to Tanzania and to markets in Lusaka and beyond the south. *With reference to tourism support, the road will improve access* to the tourists' sites such as Nachikufu caves 55km south of Mpika, Chipoma Falls on R. Lubu and Lwitikila Falls (15km from Mpika) close to Isoka towards Chinsali areas. Other areas of tourist interest include North Luangwa and South Luangwa, Lumimba and Lavushi Manda National Parks. In addition, there are a number of Game management areas close to the road corridor of Serenje-Mpika road. In all the road will support the growth of the tourism sector. *Furthermore, the planned rehabilitation of the 60Km stretch of the road will result in a fairly smooth* pavement surface as opposed to its current uneven surface in a number of sections which has led to accidents especially for the heavy trucks whose trailers lose control after suddenly going over potholes or uneven such surfaces.

Project components

The project will involve mainly three activities summarized as follows:

i. ***Pre-construction Phase*** **-** which includes feasibility and detailed engineering and the preparation of the ESIA and RAP reports.
ii. ***Construction Phase*** **-** This will involve construction of the road pavement and bridges/culverts. The component of consultancy services consists of design review and construction supervision of civil works; and
iii. ***Post-construction phase*** **-** This phase will cover inspection and technical audits in addition to operation and maintenance of the road. Sensitization of the road users and

installation of other accident intervention measures may also take place during this phase.

Analysis of Alternatives

The plan to rehabilitate a section of the Serenje-Mpika road is an integral part of the RDA's Strategy Plan 2019-2021, taking into account its centrality to the country's quest to eliminate trade bottlenecks and hindrance to access regional markets in the wider COMESA, SADC and EAC regions. This implies that, the rehabilitation of this road will improve connectivity between Zambia and northern trade partners in the north and, south of the country. Therefore, the Analysis of the Alternatives has focused on the implementation modalities of the road project, taking into account a combination of factors such as environmental, social and economic dimensions. In addition, it is important to note that this is already an existing paved road which only requires rehabilitation. Based on the above, the following alternatives were considered during the ESIA:

a. Alternative 01*:* Zero/Do Nothing Option.
b. Alternative 02: Routine Maintenance Option.
c. Alternative 03: Paving with Asphalt to class 1.

The Do-Nothing Scenario: this Scenario implies that, the Serenje-Mpika road would remain without any rehabilitation or maintenance interventions which will leave the road in worse condition with continued deterioration characterized emergence and rapid development of gaping potholes in the carriageway as well as deterioration of its drainage infrastructures alongside loss of road safety furniture thereby making it risky for public use. On the basis of these, the Do-Nothing Option was dropped from further consideration as it is not within GRZ aspirations as enshrined in the RDA strategic plan.

The Routine Maintenance Option: this was considered in terms of annual maintenance costs computed based on an "ideal" maintenance schedule rather than a "minimum" or "absolute minimum" schedule which presumes that, the road will always be maintained in a good condition. From the Feasibility Study of 2013, it is concluded that, the road pavement surface has greatly deteriorated and is generally weaker which merits major rehabilitation involving over-lay of asphalt and strengthening. Against this, both the position of RDA and the findings of the Feasibility Study all concur that, maintenance is not a technically and economically viable option for the Serenje-Mpika road section as is the case with the Chinsali-Nakonde and the Mpika – Chinsali section along the same highway. The Chinsali-Nakonde section is currently undergoing rehabilitation works whilst the Mpika-Chinsali section has been set for rehabilitation by 2023 with support from the European Investment Bank (EIB). Therefore, this Option was equally dropped from further consideration.

Rehabilitation with Asphalt: It is therefore proposed to rehabilitate the road by surfacing using crushed stones which are bonded using asphalt. The surfacing will be made from already mixed crushed stones and asphalt (hot mix) which will then be applied on the road base. The bonding between the road base and the surfacing will be enhanced by tack coat which will be spread on the road base before the surfacing material is applied. This was taken as a preferred Option/Alternative in implementing the road project.

MAJOR ENVIRONMENTAL AND SOCIAL IMPACTS AND CLIMATE CHANGE RISK

Positive Impacts

The major positive environmental and social impacts anticipated as a result of the project are:

a. The road project will *improve regional connectivity,* as the road forms part of a major highway linking Zambia to Tanzania in the north while in the south, the road links with routes to as far as Zimbabwe and South Africa which in a way will improve trade in the COMESA/SADC regions.
b. *Enhanced Economic Activity,* once the road is rehabilitated, the road will lead to improved access to markets and also open up business opportunities for the local people in its vicinity hence, better livelihoods will be experienced at household levels.
c. *Income from construction materials*-road construction will require supply of gravel and stone aggregate. Other materials such as lime, bitumen, water, cement and steel especially for bridges. Procurement of these resources will be sources of income to suppliers and owners of land where quarries will be sourced.
d. The northern region where the road project falls is considered the food basket in Zambia as such, the road will improve transportation of agricultural produce to markets in the neighboring countries especially Tanzania. The project area also has potential to develop its livestock industry especially on the Mkushi-Chitambo section of the road.
e. It will also *create employment opportunities,* and it is estimated that, about 500-800 persons mostly within the communities will be employed on the project alongside other experts in highway engineering, surveyors and inspectors.
f. Improvement of the road will have positive, significant and long-term local, national and regional socio-economic impacts. These include reduced vehicle wear/tear; reduced travel time; safer journeys with reduced accident risk. Accident rates will likely change following improvement in road geometry and pavement. Rehabilitation the project road will improve visibility, reduce braking distances and have road signs installed where none existed; and
g. Furthermore, the road will lead to improved tourism as it connects to some tourist sites such as Nachikufu caves (some 54km to Mpika), Chipoma Falls on R. Lubu towards Chinsali and Lwitikila Falls (15km from Mpika) close to Isoka towards Chinsali areas. Other areas of tourist interest include Nsalu caves, the Kundalila falls, the Sancha rock, and the David Livingstone memorial site.

Negative Impacts

The major negative environmental and social impacts anticipated as a result of the project include.

a. *Impacts relating to surveying and mapping* of the route will likely cause anxiety and speculation amongst the communities. This is to be mitigated through community sensitization programmes some of which have been outlined in the RAP.
b. *The road works will be undertaken* while the road remains open to traffic which possess a number of risks to the travelling public and to the workers. It is important, works should be scheduled bearing in mind the need to ensure road remains open and safe to traffic.
c. *Risks of potential slope failures* in hilly areas of can be a challenge to road use during road operations. This is to be mitigated through grass planting, use of gabion boxes to stabilize slopes, and good engineering measures to establish stable slope.

d. *Disruption of roadside trade activities* which can arise through relocation of roadside makeshift kiosks Kaole, Kasenga, Kapoko, Chibansa and Chilonga growth centres. This will impact on mainly women who are operators of such business enterprises, and this is to be mitigated through advance notification for project affected persons to relocate and there will be adequate, fair, and prompt compensation for such PAPs as provided in the RAP.

e. *The impacts on water points* especially boreholes/wells that are located in the road reserve areas. However, owners of such water points will be notified and compensated so that they can relocate their boreholes/wells. Water permits will be obtained from the Water Resources Management Authority (WARMA) to minimise any negative impacts on the public water bodies.

f. *Dust and air emissions* from earthworks and operating plant and equipment. This will be managed through routine sprinkling of water on cut and open surfaces during earthworks.

g. Impacts on land will include *erosion and soil loss, degradation through, loss of land and changes in land use, due to surface runoff* and general loss of vegetation. This will be mitigated by only cutting down vegetation in areas where civil works will be undertaken.

h. A potential influx in the population to the area for various jobs in the area can be associated with risky behaviours among the people with increased risk of STDs/STIs including HIV/AIDS on both the workers and the communities. This is to be mitigated through engaging an HIV/AIDS service provider to supply condoms, sensitize the communities and the workers on both HIV/AIDS and associated illnesses such Tuberculosis (TB). This can further be mitigated by giving priority to the recruitment of workers from the neighbouring communities as opposed to importing labour from distant areas thereby increasing risks of HIV/AIDS infections in the workers and communities in the project areas.

i. *Asphalt plant operation impacts* -re-surfacing of 60km road will require considerable quantities of bitumen. Its preparation, storage and application could have socio-environmental impacts. If firewood is used in heating bitumen, considerable cords of wood would be necessary representing a significant loss of vegetation for the entire road length. For the foregoing reasons and the fact that alternative heating fuel other than wood is highly recommended to be adopted in the project and this impact is of *moderate nature*.

j. There are *potential impacts relating to management and disposal of asphalt* that will be scarified and removed from the carriageway during rehabilitation works. It is proposed that, such material be pulverized and used as sub-base on the road.

k. *Occupational health safety risks for workers* -Road works will have the occupational health and safety risks with potential to cause serious injuries to workers; burns (handling hot bitumen, welding/hot works, etc.); electrocution; noise and body vibration from equipment; injury from fly rock e.g. at quarry sites or debris when demolishing affected buildings and accidents from construction vehicles. Significance of this impact is deemed as major, and the workers will be provided with Personal Protection Equipment-PPEs.

l. *Issues of borrow pits,* establishment of access routes and subsequent opening of borrow pits represents large negative impacts of the project. Before exploitation of the borrow pits is undertaken, the contractor will secure lease from the landlords for borrow areas. Stockpile cut to spoil materials from the borrow pits in the vicinity of the pits and with

the approval of the Resident Engineer (RE) such materials will be used in restoration of the borrow pit areas at the end of the project.

m. *Stone quarries and crushing units:* These will require independent environmental assessment reports which should be approved by ZEMA before embarking on the stone processing works.

n. *PAPS affected by the road rehabilitation project:* it is estimated that, about **393** heads of households will be affected in terms loss of residential structures, commercial buildings, combined commercial and residential structures. These structures will cost **ZMW 15,974,500.00** as per the valuation report from the Government Valuation Department (GVD). However, the total cost of implementing the RAP has been estimated at **ZMW 18,471,950.00.**

o. *Haulage of earth construction materials* -Road construction will necessitate transportation of materials from sources to worksites. Haulage of gravel and crushed stone (aggregate) from sources to road construction work sites will be associated with the following impacts: staining of households and goods in roadside shops by dust, excessive dust in dwellings poses a short-term health impact. This should be mitigated through routine sprinkling of water on access routes and erecting speed control devices to check speed limits.

p. *Storage of construction materials*-During the construction period, there will be a need to stockpile and store assorted materials at or near the construction site so as to ensure easy and uninterrupted access to supplies. This will lead to pollution of land and watercourses by spilling and wash away of materials.

q. On the *management of cut to spoil,* the equipment work areas and its general civil works is expected to generate sizeable volumes of cut to spoil materials. The supervising consultant should approve disposal sites for cut to spoil materials not to be disposed on the road reserve, forests or wetlands along the road.

r. To address *gender concerns* in the project, there should be a specialist to conduct sensitization campaigns to create awareness on gender mainstreaming in the project.

s. *Loss of vegetation:* to be mitigated through the restriction of vegetation clearance to areas for works sites only.

t. *As for physical cultural resources,* the ESIA has prepared a Chance Finds Procedure to guide recovery and management of any accidental excavations of archaeological resources in the road project; and

u. *Risks of the new road effect leading to accidents*-It is likely that, once the road is rehabilitated, drivers on a newly improved road will be tempted to over-speed what is popularly referred to as "*new road effect*" which usually happens in the first months of commissioning a new road and is associated with frequent road accidents. It is noted that, the Road Transport and Safety Agency will step up vigilance on the rehabilitated road to ensure the road users observe the set speed limits in various sections of the road.

v. *Climate change risks* – The project implementation is unlikely to lead to any climate change risks as vegetation clearance will be restricted to areas where civil works will be implemented and furthermore the road project will be undertaken in an area that is already developed. The expected complementary activities of tree planting is expected to minimize any possible climate change risks.

Enhancement/Mitigations measures and complementary initiatives

The ESIA has outlined several measures to mitigate the negative impacts. However, these measures can further be augmented through several measures such as:

a. ***Information Disclosure about the project:*** The project is envisaged to employ close to 800 people during its implementation which will be a large positive impact in terms of poverty reduction at household levels. To enhance this impact and provide information on available job opportunities to the wider community, it is proposed that, the project works closely with the District Labor Officers in the districts of Lavushi Manda and Mpika to disclose available employment opportunities through accessible and credible media outlets which will increase the wider public access to information on employment opportunities in the project.

b. ***In addition, both the contractors and the Supervising Engineers*** should have in their teams Environmental/Social Management Specialists whose roles will be to guide and oversee the implementation of the mitigation measures proposed in this ESIA. For the contractor, the Environmental/Social Specialist ought to be a full-time employee on the project. Furthermore, these Specialists should also be attending project monthly site meetings so as ably articulate environmental and social issues on the project and making the necessary follow-up actions.

c. It is also important to ensure that, ***environmental and social mitigation costs are integrated into the bills of quantities (BoQs)*** as articulated in the ESIA as well as ESIA Decision Letter issued by ZEMA. Such costs should include measures for soil erosion control, tree planting and re-grassing, dust control measures, provision of PPEs to the workers, storm water control, mobilization and awareness sensitization, compensation and HIV/AIDS interventions.

d. It is also recognized that, the road project ought to conduct yearly ***Environmental Audits***. The Audit should consider compliance requirements of AfDB and ZEMA. The Audit will highlight levels of compliance in the project and propose corrective measures; and

e. The need to prepare specific plans to further address impacts that are likely to be triggered by the project. In particular, the project will likely trigger issues of HIV/AIDS, gender concerns, grievances arising from several aspects, traffic management, labour management and occupational health safety amongst others. The contractors will prepare such plans for approval of the Resident Engineer. The plans include Construction Environmental and Social Management Plan (C-ESMP), Traffic Management Plan (TMP), HIV/AIDS Management Plan, Gender Mainstreaming Plan, Emergency Response Plan, and OHS Plan.

It is important that, the contractor prepares these plans in line with the specifics of the project to give them the matching details to ensure they will be responsive to issues in the project triggered by its implementation.

Complementary initiatives

During the ESIA study of 2018, it was observed that, women selling fresh fruits, tomatoes, cassava, dry fish and potatoes as well as other boiled food stuffs at the roadsides along the Serenje-Mpika road do operate under very hard conditions in that, they have no shelters and no public toilets. In the evenings their sales are even much more difficult as there is no electricity supply at their market stands. In addition, some of them come to the markets with their young children who equally suffer under harsh weather conditions of scotching sun or rain. Furthermore, since markets are in lay bays/bus stops, sometimes passengers on the buses get out of the buses and help themselves in nearby bushes within these markets a situation which further aggravates the public health risks of these women including the wider public in the vicinity. It is also noted that, there is no storage room for merchandize at the end of the day work.

It is proposed that, the road project considers building roadside markets at places such as Kaole, Kasenga and Chibansa. These areas by the time of this updated report were not involved in marketing of charcoal which the ESIA considers acceptable criteria of selecting the beneficiary groups. Secondly, the number of participating women in each of the groups ranges from 30-70 members and they have some leadership in place which needs to be streamlined before constructing the markets.

The ESIA further proposes on the need to construct some roadside shelters and stalls, separate public toilets for men and women, storage rooms for the merchandize and solar lighting. This intervention is deemed viable in that, on several occasions commuter buses and taxis stop at certain points to load passengers and during that time, the women get opportunities to sell their food items to the travellers.

Other complementary initiatives include:

a. *Tree Planting*: as part of road corridor beautification ventures especially along trading/urban centres as part of the beautification drives in the road corridor.
b. *Road Safety awareness campaigns*: The project will include an item of road safety campaign and education programs for the road users during construction and operation. Such activities shall be performed during construction where most contractors tend to be negligent about road safety measures. During operation, educational campaigns will have to target all users. The service provider for this activity will have to collaborate with the Road Transport and Safety Agency, and the Police.
c. *Malaria and HIV/AIDS/STI Awareness Campaign*: are the most prevalent health concerns of the population and the project has incorporated in its design, awareness and prevention programs against the spread of HIV/AIDS and STI/TB. RDA will develop ToRs for the recruitment of Service Providers. To ensure sustainability of programs and activities, RDA will impress upon the service provider to engage various networks at provincial and district levels (i.e. District and Provincial HIV/AIDS Task Forces alongside some NGOS.
d. *Gender Mainstreaming*: In line with the Bank's policy on Gender, the project will mainstream gender and ensure equal opportunities between men and women in project planning, implementation and benefits in line with the following principles: (i) incorporating legislative requirements of gender equality in all aspects of the project. Equal opportunity for all men and women land holders (including unmarried/married women/ men); (ii) raising awareness levels of all relevant stakeholders, and engaging

in advocacy to ensure that gender issues are identified and addressed; (iii) creating partnerships with gender-sensitive NGOs, on implementation of aspects of the RAP, to address gender at the grass roots level; (iv) working with local organizations that have an interest in or insight into gender issues, such as groups with women membership, particularly the Women's Associations at village and district levels. Besides ensuring greater participation, it would provide support during implementation; (v) actively including women in the consultation process and ensuring that their participation is sought during implementation and monitoring.

All impacts with their corresponding mitigation measures have been compiled into a management plan with corresponding designated personnel for each impact and cost of mitigation

Environmental and Social Monitoring Program

The primary oversight to ensure mitigation actions are implemented will rest with the RDA's Directorate of Planning and Design specifically, the Environmental and Social Management Unit (ESMU). ZEMA on the one hand will be seeking primarily from RDA to what extent the road project is complying with environmental and social requirements as detailed in their Decision Letter. RDA shall require contractors to comply with the ESMP and assign a fulltime staff (Environmental Officer) to undertake environmental supervision during construction. RDA will confer full mandate to the Supervising Engineering Consultant (SEC) to supervise the road project on a day-to-day basis. The SEC will oversee the work of the contractor by recruiting an Environmental Specialist who is to guide the contractor's fulltime Environmental Officer in undertaking his/her own responsibilities, including reporting.

External monitoring shall be done by the ZEMA according to their regulatory mandate prescribed in the Environmental Management Act of 2011. The Occupational Health & Safety (OHS) Department in the Ministry of Labour and Social Security shall also undertake external monitoring of labour issues and occupational health and safety compliance. The OHS Department has the mandate to inspect any facility for compliance with national requirements on safety in workplaces. Monitoring will be done through site inspection, review of grievances logged by stakeholders and on-site discussions with PAPs amongst others. Monitoring will be undertaken monthly over the construction period. On the part of the Bank, there will be scheduled Supervision Missions whose composition will include an Environmental and Social Consultant who will be interested in compliance aspects and whether agreed mitigation and complementary initiatives are being implemented.

Some of the key indicators to be monitored in the project will include:

a. Sensitization meetings planned and held.
b. PAPs compensated.
c. Operations of the Grievance Redress Mechanism.
d. Soil erosion and sedimentation control measures put in place.
e. Number of rehabilitated and graded sites at quarries, borrow pits.
f. Gender mainstreaming activities planned and implemented.
g. HIV/AIDS sensitization programme put in place and how they are implemented.
h. Traffic control measures.
i. Progress in implementing complementary initiatives.
j. noise and dust control measures put in place; and

k. PPE and their usage by the road project workers.

Public Consultation and Disclosure Requirements

Public consultations

Public consultations were undertaken at various levels to enlist the perceptions of the different stakeholders on the impacts of the road project. During the ESIA study of 2018, discussions were held with district officials in the project district headquarters at Serenje, Chitambo and Mpika while informal discussions were held with beneficiaries along the road. The key stakeholders consulted during the ESIA included: District Commissioners and District Administrative Officers (DAO), officers responsible for lands, forestry, gender, and labour officers among others. Consultations were also held with the PAPs to inform them mainly about the project land requirements, resettlement principles and processes. These meetings were also used to get wider public input from both primary and secondary stakeholders. The meetings were conducted at Serenje, Kanona, Lapula, Nkushi, Kapengwe, Kalonje, Muso, Chilonga and Mpika areas. The objective of consultations was to disseminate information, identify and address legislative, community and environmental concerns and seek information on appropriate mitigation for project negative impacts. During the RAP inventory that was conducted by RDA in September 2022 for the 60Km stretch, meetings were conducted at Kaole, Chibansa, Kasenga, Makantaulo, Kaombe, Mufubushi, Nachikufu cave and Kapoko areas to disseminate information to the local people about the road rehabilitation and the road reserve aspects.

Most of the respondents in the project area have a positive outlook towards the rehabilitation of the project road. The youth, are looking forward to employment opportunities during the construction phase while the Project Affected Persons were mainly concerned about compensation aspects. Though these findings and observations reveal that, the wider population and the PAPs are largely in favour of the project, efforts need to be made by RDA and the District administration to sensitize and mobilize the PAPS so that they can sustainably benefit from the road project. Of concern is the need to assist PAPs on strategies of managing and utilizing compensation packages for improvement of their livelihoods and replacement of lost assets.

Public Disclosure

The ESIA will be disclosed on the RDA website and at the Bank's Public Information Centre in compliance with relevant GRZ regulations and the Bank Operational Policies. Further RDA will provide copies of the ESIA and RAP reports to Mpika and Lavushi Manda Council offices for public access. The ESIA and RAP summaries will be disclosed in the Bank Infoshop for 120 days since it is a Category 1 project.

Institutional Arrangements and Capacity Building Requirements

Policy Framework: The GRZ National Environmental policy emphasizes the need for Zambia to pursue development on a sustainable path implying the need for sound environmental and natural resources exploitation and management. Other policy instruments of relevance to this road project include the Zambia Vision 2030, Guidelines for Road Rehabilitation Environmental and Maintenance Work, 1997, National Resettlement Policy Guidelines, the National Gender policy 2015, the National HIV/AIDS/STI/TB policy 2007 and the National Population Policy

2007. The Road Development Agency (RDA) Strategy Plan for 2012-2016 and the Zambia Land Policy 2015. These amongst others, provide sectoral frameworks for the mainstreaming of their thematic areas into the planned rehabilitation of road project.

Legal Framework: Legislations governing environmental issues in Zambia and of relevance to the road project include: The Constitution of Zambia (Amendment) Act, 2016; the Environmental Management Act 2011, the Forestry Act, 2015; the National Road Fund Agency Act No. 13 of 2002, Road Development Agency Act No. 12 of 2002; the Occupational Health and Safety Act No. 36 of 2010; s the Employment (Amendment) Act, 2015, and the Local Government Act Cap. 281 of the laws of Zambia and the Lands Acquisition Act Cap. 189. These legal instruments outline compliance requirements during the various stages of implementation of this road project.

ESIA Requirements

According to AfDB Environmental and Social Assessment Procedures of 2015 places projects that are financed by the Bank into four broad categories based on a combination of considerations. These projects categories are Category 1, 2, 3 and 4. The Serenje-Mpika road, will involve major rehabilitation works of about 60Km and will affect more than 200 Project Affected People (PAPs). According to an assessment that was conducted by the Road Development Agency between 6-13 September 2022, about 393 Project Affected People will require to be relocated from the road reserve areas along the road corridor. The project is therefore classified as a Category 1 type which requires a detailed ESIA to be conducted before its implementation.

The Zambia EIA Regulations under Part II Clause 7 (2) (a) stipulates that, an ESIA is required for any project specified in the Second Schedule of the Regulations. The Second Schedule of the Regulations, under Item 2 on Transportation subsection (a) specifies that "all major roads outside urban areas, the construction of new roads and major improvements over 10km in length require to undergo an ESIA process. The 60Km section of the Serenje-Mpika road project therefore qualifies for an ESIA to be conducted.

Applicable AfDB Policies

The Bank has published its Integrated Safeguards System (ISS) which is designed to promote the sustainability of project outcomes by protecting the environment and people from the potentially adverse impacts of projects. The ISS embodies the Integrated Safeguards Policy Statement and five Operational Safeguards. The Bank's Operational Safeguards include:

a. Operational Safeguard 1: For environmental and social assessment and covers aspects of project categorization and environmental and social assessment requirements.
b. Operational Safeguard 2: Consolidates the policy commitments and requirements set out in the Bank's policy on involuntary resettlement.
c. Operational Safeguard 3: Is focused on Biodiversity and ecosystem services which aims to conserve biological diversity and promote the sustainable use of natural resources.
d. Operational Safeguard 4: Addresses pollution prevention and control, hazardous materials and resource efficiency covering a range of key impacts of pollution, waste, and hazardous materials including greenhouse gas accounting; and

e. Operational Safeguard 5: With a focus on labour conditions, health and safety requirements for workers' conditions, rights and protection from abuse or exploitation.

These bank policy instruments have informed the ESIA process for the Serenje-Mpika road project to ensure the project is both environmentally and socially sound and meeting not only national environmental requirements but also, international commitments.

Administrative Framework

Some of the key institutions in the proposed road project include:

a. Zambia Environment Management Agency-ZEMA: a statutory agency for the protection of the environment and with reference to the road project, the ZEMA has the overall responsibility of approving and monitoring the project's compliance in line with its Decision Letter Conditions as well as other standards relating to environment.
b. Road Development Agency-RDA: a semi- autonomous government entity responsible for the administrative control, planning, development and maintenance of all roads and related structures including bridges in Zambia. RDA's Environmental and Social Management Unit (ESMU) will be responsible for monitoring compliance both during the construction and operation stages of the road project.
c. National Road Fund Agency-NRFA: Principally, it is to secure and manage the funds in a cost-effective manner to ensure timely routine and periodic maintenance of the core road network; and
d. Road Transport and Safety Agency: Has the oversight role in terms of traffic regulation, ensuring the road safety engineering and road safety campaigns through education and publicity.

Others include the Ministry of Green Economy and Environment which is lead agency on environment affairs, Ministry of Transport and Communication and Logistics, the Ministry of Infrastructure, Housing and Urban Development, the National HIV/AIDS Council of Zambia, lower administrative entities such as Provisional Administrative Structures (especially the Provisional Committees), the Chiefdoms, the NGOs and CBOs will play key roles in the road project implementation process.

ZEMA is responsible for the review and approval of both the ESIA and RAP reports thereafter it issues Decision Letters, with conditions. ZEMA will also play a key role in the supervision and compliance monitoring of the road project. On 12th May 2014, ZEMA granted an approval environmental Decision Letter for the rehabilitation of the Mpika-Serenje road project based on the ESIA report that had been prepared in 2013. The ESIA report was later updated in 2018 and has again been updated in 2022. RDA will apply to ZEMA for the renewal of the Decision Letter that was issued on 12th May 2014 since it expired in 2017 after a 3-year period.

The RDA's Environmental and Social Management Unit (ESMU) will assume the responsibilityy of ensuring that, the project implementation complies with the environmental and social requirements as will be detailed in the contract documents.

The *National Road Fund Agency (NRFA)* will be responsible for mobilization and provision of funds for timely maintenance of the Serenje-Mpika road after its rehabilitation. On the other

hand, the Road Transport and Safety Agency will assume the responsibility for safety campaigns and enforcement of road traffic safety regulations which will go a long way to curb road carnage once the road is rehabilitated. On matters of HIV/AIDS mainstreaming into the project, the District HIV/AIDS Task Force and the District AIDS Coordinating Advisor together with the National AIDS/TB/STI Council will advise on an appropriate HIV/AIDS Service Provider who will undertake HIV/AIDS awareness and sensitization, conduct Voluntary Counseling and Testing (VCT) and distribution of condoms to workers and members of the public in the vicinity of the project area. The *Contractor* on his part will be responsible for planning, implementing and reporting on mitigation measures during the execution of the project works.

It is important to note that, during implementation of the road project, the oversight compliance role will rest with RDA ESMU implying that the staff ought to be well placed both technically and logistically to accomplish this role. Though the Unit is staffed with four specialists, they need to be supported in terms of skills development and logistics. The Staff in the Unit will require some short-term specialized trainings in areas such as: mainstreaming climate change into the development process; gender, OHS and HIV/AIDS mainstreaming; Strategic Environment Assessment (SEA/SESA); project monitoring, evaluation and reporting. These trainings can be arranged within the region in centres such as ESAMI, Swaziland and South Africa. Operationally, support in terms of additional two 4WD vehicles is deemed adequate to facilitate the Unit's operations.

Estimated Costs

The overall cost of implementing the ESMP including environmental and social monitoring is estimated to cost **USD 2,429,000.00.** This cost covers aspects such as capacity building for RDA Environmental and Social Management Unit, road safety campaigns, HIV/AIDS, OHS and gender mainstreaming, as well as tree planting, environmental audits amongst others as detailed in ESMP in the ESIA.

Implementation Schedule and Reporting

Measures outlined in the ESIA will be implemented under the overall road project implementation schedule as most of the environmental and social interventions will be incorporated into the project design and implementation. The reporting on the implementation process and progress of the ESIA provisions will be done in line with the overall project framework and any environmental and social aspects requiring actions will be addressed by the Project Coordination Unit (PCU) and the Bank. On the side of the Bank, there will be scheduled supervision missions whose composition will include an environmental and social specialist who will offer additional support to the ESMU on matters of environmental monitoring and reporting.

Conclusion

a. The planned rehabilitation of the Serenje-Mpika road is of importance to GRZ as it is part of its main highway linking the country with neighbouring countries to the COMESA/EAC/SADC road corridor route. As such, it is central in terms of national and

regional trade facilitation. No doubt, in view of its regional connectivity, the road is an important trunk road which should be in good all-weather motorable condition.

b. The road will trigger both short and long-term positive impacts to the population in its corridor and beyond and improve living standards and household incomes.
c. During its implementation, to a large extent, road works will be limited to existing carriageway with envisaged limited displacement of communities in its road reserve and those who will be impacted by the road project will move back on to available land upon compensation; and
d. The study has put in place an Environmental and Social Management Plan and an Environmental Monitoring Plan to address the management of the identified environmental issues in the road project. The plans are explicit in terms of roles and responsibilities as well as budgetary requirements for their operationalization. It is therefore incumbent upon RDA as a lead implementing agency to ensure the plans are fully implemented to ensure compliance and sustainability of the road project.
e. The project is expected to have materials extraction sites, water abstraction sites, sites for setting up of campsites whose locations during the time of updating the ESIA had not yet been established. It is recommended that, where necessary independent environmental assessments will be undertaken for these activities and approvals will have to be obtained from relevant authorities such as ZEMA and
f. Inevitably, the project will likely lead to some environmental and social impacts which need to be mitigated during project implementation. This means, there should be deliberate efforts to recruit matching experts to oversee compliance with environmental and social requirements in the project in line with ZEMA Decision Letter conditions and the environmental and social requirements of AfDB.

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4. UNAIDS 2014: HIV/AIDS Country Report 2015 for Zambia.

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CHAPTER 1

1 INTRODUCTION

1.1 Background

The Serenje–Mpika Road forms a part of the Zambian Great North Road (T2) that is a section of international routes i.e. the Trans-Africa Highway and the North-South Corridor (NSC) which is a joint COMESA/EAC/SADC Aid for Trade initiative. Its primary aim is to reduce the time, and cost of transport along this priority Corridor which links the port of Dar-es-Salaam in Tanzania to the Copper-belt (Southern DR Congo and Northern Zambia) and connects to the southern ports of South Africa specifically the port of Durban. The Corridor system, with its spurs, services eight (8) countries - Tanzania, DR Congo, Zambia, Malawi, Botswana, Zimbabwe, Mozambique, and South Africa. The project has been endorsed by the SADC/EAC/COMESA Tripartite that aims to improve the regional transport infrastructure with a view to supporting economic and social development programs along the Trans-Africa Highway/North-South Corridor.

The project road was originally constructed as a bitumen surfaced road in 1970s and is now beyond its design life, notwithstanding the emergency and periodic maintenance interventions. It has received several rehabilitation and periodic maintenance since its initial construction, commencing with emergency maintenance between 1995 and a WB funded periodic maintenance between 1998 and 2000. This intervention provided a limited design life intervention, with focus on partial reconstruction for severally deteriorated sections and double seal treatment for most sections. Follow up maintenance was not fully undertaken, and consequently in 2011 GRZ commissioned two emergency repair works contracts for the section. The poor condition of the road would be detrimental to the movement of goods and services, and therefore intervention driven by ensuring that the critical route does not present a transit bottleneck for trade in the region. GRZ with the support of COMESA conducted studies in 2013 for the Serenje – Nakonde section of the corridor, in three (3) Lots viz.: *Lot 1* Serenje–Mpika, *Lot 2* – Mpika–Chinsali and *Lot 3* –Chinsali–Nakonde.

The African Development Bank (AfDB) is financing the Chinsali–Nakonde section (approved July 2015) while the appraisal for the Mpika–Chinsali section is advanced with EU/European Investment Bank (EIB) support. The Serenje–Mpika (238km) section is complementary to these.

The AfDB has expressed interest to finance the rehabilitation of about 60Km of the Serenje-Mpika road which is a section between the Mpika weighbridge, and an area called Makantaulo.

1.2 Brief Project Description and Rationale

It is proposed to rehabilitate the road by surfacing using crushed stones which are bonded using asphalt. The surfacing will be made from already mixed crushed stones and asphalt (hot mix) which will then be applied on the road base. The bonding between the road base and the surfacing will be enhanced by tack coat which will be spread on the road base before the surfacing material is applied. This was taken as a preferred Option/Alternative in implementing the road project.

The Serenje-Mpika road was originally built to a Class IA bitumen type with two lane flexible pavement. The existing pavement generally consists of double bituminous surface dressing with some sections with reseal or "cape seal" on top, 150mm cement stabilized base course and 150mm granular sub-base. Its carriageway width for most of the length is in the range of 5.8-6.1m wide. However, due to poor maintenance regime, the road has rapidly deteriorated with some sections of the road disintegrating, posing a risk of complete failure in certain sections. In addition, there are several edge breaks which have reduced the original width of the lanes. The road project is planned to be a full pavement reconstruction involving Asphalt wearing course. Strengthening in some sections shall include an asphalt overlay to the existing pavement and using 50-70mm asphalt concrete. The intervention shall include partial widening to achieve width of 7m for carriageway and to provide the 2.0m wide shoulders.

The Serenje- Mpika road will be constructed based on 100 meters right of way (ROW) in rural sections and 36 meters ROW in the urban sections. The design follows SATCC standard code of design for the Geometric Design of Trunk Roads (Ed. Sept 1998) together with Recommendations on Road Design Standards – Geometric Design of Rural Roads (Ed. Dec. 1994) issued by Roads Department, Zambia. The design standards for the project road have been adopted after reviewing the relevant latest Manuals, specifications and design guidelines (SATCC, AASHTO and Zambia Specifications). The road will be constructed using the conventional road construction method which involves clearing and grubbing, sub-base construction, road base construction, surfacing, construction of drainage infrastructure, and installation of road signage. The project road will be constructed with Asphalt concrete pavement on granular base on a cement stabilized sub-base course. The Serenje-Mpika road is of importance and therefore the need for it to be rehabilitated based on the following considerations:

1. The Serenje-Nakonde route is one of the six international trunk routes connecting Zambia with its neighbouring countries of Tanzania and Zimbabwe. It forms an important component of the Southern African Development Community (SADC) North-South Corridor and the Common Market for Eastern and Southern Africa (COMESA) Dar TAZARA Corridor. The route attracts trade and the transportation of international cargo and bulk commodities among the countries of Zambia, Tanzania, Democratic Republic of Congo (DRC), Zimbabwe and South Africa. The proposed rehabilitation of the Serenje-Mpika stretch will lead to reduction in transportation costs and an increase in Zambia's Gross Domestic Product (GDP) as well as that of the countries benefiting from the North-South Corridor.
2. The rehabilitation of the road has immediate relevance to inter-regional trade and transit traffic between Zambia and its neighbours. The road passes through high productive agricultural areas (Figure 3) and is essential for the local transportation of agricultural inputs and produce. The project area also has great potential to develop its livestock industry.
3. It is anticipated that improved transportation along the project road will also lead to benefits in the provision of basic social services such as access to health facilities and educational institutions, as well as markets and administrative centers–aspects which are difficult to quantify but are clearly linked to the cost and ease of access to the area.

1.3 Project location

The Serenje Mpika road stretches between Central and Muchinga Provinces in the northern part of Zambia. The 60Km stretch that will be rehabilitated from the Mpika weighbridge to Makantaulo is located in Muchinga Province between Lavushi Manda and Mpika districts.

1.4 Proposed Development Objectives and Specific Objective

The principal project's development objective is to establish transport systems that provide efficient, cost-effective and fully integrated infrastructure and operations that addresses the needs of users and promotes socio-economic development. The specific objective is to improve road transport infrastructure and services in Zambia through the development of the priority road corridor and reduction of transport costs along the road. The intervention is to facilitate intra and cross-border trade; and foster economic growth through the reduction of the cost of doing business, regional co-operation and integration. The project shall also improve accessibility for the communities (through the feeder roads improvement) in the zone of influence to markets and social services, contributing to the reduction of poverty. The project's immediate zone of influence are the villages traversed by the project road, however given the transit and regional context of the road, the beneficiaries shall span the extents of the corridor.

1.5 Contact Details of Shareholders/Directors

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1.6 Particulars of Shareholders

This project is 100% GRZ owned, and the Road Development Agency (RDA) represents the Government of Zambia.

1.7 Track Record

RDA is the executing arm of Government on all primary and secondary road projects.

1.8 Total Project Cost

The 60Km stretch of the Serenje – Mpika project road is anticipated to cost an estimated US59,245,000.00.

1.9 Project Implementation Date

The project is scheduled for implementation in 2023. However, project commencement date is subject to receipt of ZEMA extension of its decision letter of 12th May 2014.

1.10 Purpose of the ESIA

According to AfDB Environmental and Social Assessment Procedures of 2015 places projects that are financed by the Bank into four broad categories based on a combination of considerations. These project categories are Category 1, 2, 3 and 4. The rehabilitation of the 60Km stretch of the Serenje-Mpika road, will affect over 200 PAPs and as such the project is classified as a Category 1 type which requires a detailed ESIA to be conducted before its implementation.

Similarly, the Zambia EIA Regulations under Part II Clause 7 (2) (a) stipulates that, an ESIA is required for any project specified in the Second Schedule of the Regulations. The Second Schedule of the Regulations, under Item 2 on Transportation subsection (a) specifies that "all major roads outside urban areas, the construction of new roads and major improvements over 10km in length require an ESIA to be conducted.

1.11 ESIA Study Methodologies

In accomplishing the study, the following methodologies were adopted which largely addressed aspects of data collection and analysis. A summary description of the approach that was employed is summarized herein as follows:

1.11.1 The Scoping Phase

A scoping study was conducted to identify the significant issues relating to the proposed road rehabilitation, and to determine the scope of the issues to be addressed in a subsequent ESIA study. From the relevant issues identified during the scoping study, it was concluded that, an ESIA needed to be conducted for the road project. The scoping study recommended that the consultative process should continue engaging the government, the community, the project implementing authority and other stakeholders, in the preparation and implementation of the ESIA.

The scoping study recommended a multi-disciplinary ESIA team approach, including joint site visits (identification of key issues and their interplay), interviews, comprehensive screening of guidelines for each site to ensure that all issues are covered and team responsibilities for coverage are clearly understood, post-visit wrap-up and review sessions, and, focused inter-team discussions to identify mitigation and monitoring actions.

1.11.2 Literature review/desk study

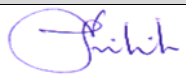
The literature review comprised one of the sources of secondary data and was aimed at:

a. Collection of documented data on some of the key aspects of the project (e.g. physical, biological and socio-economic);
b. Reviewing applicable environmental policies and legislation, technical documents related to road construction projects as well as AfDB safeguards polices.

c. Familiarizing with ZEMA environmental policies and its legal regime and ESIA approval processes; and
d. Collecting any additional information required in order to meet the requirements of the approving authority (ZEMA) and the Bank.

1.12 Environmental and Social Impact Assessment Team

The core environmental and social impact assessment team in 2018 comprised of the following:

NAME	EXPERT	SIGNATURE
Jacob Chishiba	Environmental Management Specialist/ESIA Coordinator	
Jere Dewey Mwila	Highway Engineer	
Lewis Tumbama	Socio-economist	
Alex MacDonald	Transport Economist	

In September 2022, RDA through its ESMU updated the ESIA and RAP reports to facilitate for the acquisition of funds to rehabilitate the 60Km stretch of the Mpika-Serenje road.

CHAPTER 2

2. POLICY, LEGAL AND REGULATORY FRAMEWORK

The following policies and legislation shall guide the rehabilitation of the 60Km of the Serenje-Mpika road project.

2.1 Policy framework

2.1.1 The National Policy on Environment

The National Policy on Environment (NPE) is the principal policy that coordinates environmental management in Zambia. The main focus of the National Policy on Environment is to ensure sound environmental management within a framework of sustainable development in Zambia. The Policy emphasizes that it is the duty of any institution, government, NGO, community group, people's organization or any individual that uses or otherwise carries out activities that affect the environment in any way, to exercise proper control to maintain the productivity and integrity of the environment. Implementation of the project will be in accordance with the requirements of the policy to ensure sustainable environmental management. The Policy is defined in terms of four basic natural resources of climate, land, water and biological diversity.

2.1.2 Guidelines for Road Rehabilitation Environmental and Maintenance Work

In August 1997, the Ministry of Transport and Communications then published guidelines to be used by those involved in the planning, designing, implementation and monitoring of road works, to ensure that environmental concerns are addressed. In addition to providing guidelines on how to integrate environmental concerns into the road design, contract documents or construction activities, it also outlines the national legal and policy framework for the management of natural resources relevant to road works.

2.1.3 National Resettlement Policy Guidelines

Resettlement due to road rehabilitation activities in Zambia is a new phenomenon primarily because the country is sparsely populated, and there hasn't been significant new road construction that might have given rise to human displacement. Although Zambian legislation covers compensation for lost structures, cropland and fruit trees, resettlement issues have hitherto not been addressed. The RDA's Guidelines for involuntary resettlement dated November 2003, is the first policy document that aims at ensuring that persons who suffer displacement and resettlement arising from road rehabilitation activities can be compensated adequately for their losses at replacement costs. Furthermore, the Guidelines seek to outline roles and responsibilities by various stakeholders in the planning, implementation, monitoring and evaluation of resettlement activities. These Guidelines are in tandem with both the World Bank Operational Policies on Involuntary Resettlement and those of AfDB and existing national legal provisions.

2.1.4 Republic of Zambia Vision 2030

The Zambian people's vision is to become "A Prosperous Middle-Income Nation by 2030". By 2030, Zambians, aspire to live in a strong and dynamic middle-income industrial nation that provides opportunities for improving the well-being of all, embodying values of socioeconomic

justice, underpinned by the principles of: (i) gender responsive sustainable development; (ii) democracy; (iii) respect for human rights; (iv) good traditional and family values; (v) positive attitude towards work; (vi) peaceful coexistence and; (vii) private-public partnerships.

2.1.5 Eighth National Development Plan

The 8NDP has prioritized improving transport systems and infrastructure as a critical development outcome for realising the strategic direction of economic diversification and job creation. Under development outcome # 1 on Industrialised and diversified economy and specifically strategy number 5 which is the improvement of Transport and Logistics the plan states that Improvements will be made in the transport and logistics sub-sectors, with the focus on positioning the country as a regional transport and logistics hub. This will be done through the maintenance, development, modernisation and integration of road, rail, air and water transport infrastructure. This will also contribute to the opening up of rural areas for development and enhancing participation of local communities in the economy. Further, infrastructure to support cross border trade in border areas will be put in place. Among the key measures for the effective implementation of this strategy will be strengthening local level capacities for planning and development of transport infrastructure. Further, the Government will take deliberate steps to ensure that at least 30 percent of bulk cargo is moved off the roads to the railway line through improvements to rail infrastructure. The volume of passengers and cargo transported by roads, rail and air are also expected to increase during the Plan period. With the above interventions, it is expected that the transport and logistics sub-sector will register an annual average growth rate of 5.5 percent from an annual average of 0.6 percent over the 2011-2020 period.

2.1.6 The National HIV/AIDS/STI/TB Policy 2002

The Policy is premised on the national aspiration of Zambia being a nation free from Human Immunodeficiency Virus and Acquired Immuno-deficiency syndrome (HIV/AIDS). It is guided by a couple of underlying principles namely, setting a stage for an appropriate legal framework which is essential for the overall attainment of the vision and most important, having an appropriate national co-ordination and advocacy framework which is essential for the development, implementation and co-ordination of HIV/AIDS/STI/TB strategies and interventions. The Policy also recognizes that, HIV/AIDS/STI/TB is a serious public health, social and economic problem affecting the whole country which needs to be addressed through a coordinated political, developmental and security national priority involving a multi-sectoral approach hence, the need to mainstream its interventions into the Serenje-Mpika road project.

2.1.7 The National Gender Policy 2015

The National Gender Policy provides broad objectives and policy commitments, as well as a detailed institutional framework for the operationalization of Government ‘s commitments to achieve gender equality and women ‘s empowerment in its national vision of investing in people for better social and economic growth.

2.1.8 The Zambia Land Policy 2015

Land in Zambia is vested in the Republican President who holds it in trust for and on behalf of the people. The President may, through the Commissioner of Lands, alienate land to citizens or non-citizens. The vestment of land in the President is one of the contentious clauses in the post-multiparty democratic dispensation. Therefore, the vision of the National Land Policy is to put

in place, an efficient and effective land administration system that promotes security of tenure, equitable access and utilization of land for the sustainable development of the people of Zambia.

2.1.9 The Transport Policy

The policy aims to facilitate sustainable growth and development of the transport sector, in order to ensure the provision of efficient, safe, gender and environmentally friendly, quality and adequate services, for the benefit of the people of Zambia. Implementation of the project will be in accordance with the requirements of the policy.

2.2 Environmental Legal framework

This section presents various Acts which will apply in the implementation of the proposed project:

2.2.1 The Environmental Management Act (EMA), No. 12 of 2011

The EMA is the principal environmental legislation in Zambia and provides for integrated environmental management and the protection and conservation of the environment and the sustainable management and use of natural resources etc. This law is the primary legal basis for undertaking environmental assessment for the proposed road upgrading project.

Relevance: *Section 29 (1) of the act states that 'A person shall not undertake any project that may have an effect on the environment without the written approval of the Agency, and except in accordance with any conditions imposed in that approval. In Zambia, it is a legal requirement under the EMA of 2011, that developers should implement projects in line with the provisions of the law.*

Compliance: *During the detailed study, the consultant did not only review the EMA but also identified all the negative environmental and social impacts likely to result from the project. The consultant has further developed mitigation measures for the negative impacts and advised the RDA on how best to implement the mitigation measures to minimize the impacts in line with the requirements of this Act.*

2.2.2 The Environmental Impact Assessment (EIA) Regulations, Statutory Instrument. No. 28 of 1997

These Regulations state that: "A developer shall not implement a project for which a project brief or an environmental impact statement is required under these Regulations, unless the project brief or an environmental impact assessment has been concluded in accordance with these Regulations, and the Agency has issued a decision letter."

Relevance: *All developers are required under the EIA regulations to submit an EIA report (Environmental Impact Statement Report) to ZEMA for review before commencement of a proposed project. All projects categorised in the second schedule of the EIA regulations are require a full EIA. These Regulations are therefore relevant to the current project since the length of the project road is more than 10km, and therefore, would require to be subjected to a full EIA.*

Compliance: *During the initial phase of the ESIA process, scoping meetings were conducted along the road corridor, resulting in the production of Scoping Report and Terms of Reference (TOR) for the upgrading of the project. The ToRs were consequently approved by the Zambia*

Environmental Management Agency (ZEMA) on 2nd October 2012. After the approval of the TOR, baseline studies were undertaken by different specialists. The ESIS Report is a summary of the baseline studies conducted along the road corridor in line with the requirements of the EIA Regulations and contains an Environmental and Social Management Plan (EMP).

2.2.3 The Environmental Management (Licensing) Regulations, Statutory Instrument No. 112 of 2013

The Environmental Management (Licensing) Regulations, 2013, were enacted in 2013. The regulations that are of relevance to the project road are listed below.

a) Part II: Air and Water Pollution Regulations

Relevance: *Section 4. (1) declares that a person who intends to emit or discharge a pollutant or contaminant into the environment shall apply to the Agency for an emission license in Form I set out in the First Schedule. Section 4 (2) outlines that the Agency shall, within thirty days of receipt of an application under sub-regulation (1), approve the application if the applicant (a) has measures and facilities in place to ensure the safe emission or discharge of a pollutant or contaminant into the environment. Section 6 shows that the Agency shall, in accordance with the guidelines set out in the Second Schedule, assess the quality of ambient air in order to protect human health, animal or plant life and the environment. In Section 9 (2) the act directs that an owner or operator of an effluent generating entity may re-use, recycle and minimize the discharge of effluent into the environment. Section 9 (3c) affirms that the operator must ensure that operations of discharge of effluent are conducted in a manner that protects human health, animal or plant life and the environment from adverse effects of the effluent or wastewater. Project activities such as land preparation, stockpiles, waste generation and vegetation clearing might result in emissions to water resources and the ambient environment*

Compliance: *The project shall endeavor to prevent and minimize the discharge of effluent into the environment. Measures to prevent and minimize emissions to the ambient environment shall include servicing of vehicles to ensure minimal exhaust fumes are emitted, periodic dust suppression using a water bowser on dust construction access roads and limiting on extent of area for vegetation clearing to limit greenhouse gas emissions.*

b) Part III: Waste Management Regulations

Relevance: *Section 12 (1) declares that a person who intends to reclaim, re-use, recover, recycle, transport, dispose of, transit, trade in, export waste or collect and dispose of waste from industrial, commercial, domestic or community activities or own, construct or operate a waste disposal site or facility for the permanent disposal or storage of waste shall apply to the Agency for a waste management licence in Form III set out in the First Schedule. Section 13 (1) directs that a holder of a waste management licence shall (e) ensure that generated waste is treated and disposed of in an environmentally sound manner. The project will generate construction waste materials such as rock waste, cement bags, plastics, food debris and feacal waste from the construction camp.*

Compliance: *The project shall ensure that measures for the management of biodegradable and non-biodegradable waste are in compliant with international best practice principles such as the re-use, recycle and reduce principle were necessary. The project will seek to engage a licensed waste management contractor to transport and dispose the hazardous waste.*

c) Part IV: Hazardous Waste Regulations

Relevance: *Section 21 recognizes that a holder of a hazardous waste licence who stores hazardous waste shall (b) comply with the requirements for storage of hazardous waste prescribed in the Eighth Schedule. The project will generate used oils, oil filters and batteries from construction equipment which will need to be managed in line with these regulations.*

Compliance: *RDA shall store hazardous waste in a well bunded, secure and labelled area. Further, a licensed hazardous waste transporter will be engaged to transport hazardous waste to a licensed disposal facility.*

2.2.4 The Water Resources Management Act, No.21 of 2011

The Act establishes the Water Resources Management Authority (WRMA) to provide for the management, development, conservation, protection and preservation of the water resources and its ecosystems. The Act also provides for creation of an enabling environment for adaptation to climate change and provide for the international and regional cooperation in, and equitable and sustainable utilization of, shared water resources. The WRMA is also responsible for the domestication and implementation of the basic principles and rules of international law relating to the environment and shared water resources as specified in the treaties, conventions and agreements to which Zambia is a State Party.

Relevance*: Section 48 (1) states that "Notwithstanding the Environmental Management Act, 2011, where any person discharges or disposes of (a) any organic or inorganic matter, including water containing such matter, into a water resource, whether directly or through drainage or seepage, so as to cause pollution of the water resource; or (b) any effluent or waste water which has been produced by, or results from, the use of water for any purpose, into a water resource, whether directly or through drainage or seepage. That person commits an offence, whether or not that person acted intentionally, and is liable, upon conviction, to a fine not exceeding one hundred thousand penalty units or to imprisonment for a period not exceeding one year, or to both.*

Compliance: *The ESIA has proposed measures that the RDA will undertake to ensure that activities during the construction and operation of the project road do not result in pollution and degradation of water resources in the project area.*

2.2.5 The Tourism and Hospitality Act No. 13 of 2015

An Act to provide for the sustainable development of the tourism industry through effective tourism planning, management, promotion and coordination to ensure sustainable tourism; provide for an enabling and facilitating environment for the growth of the tourism industry by ensuring that Zambia responds to changing tourism trends in the macro and competitive tourism market environment; provide effective mechanisms for coordination amongst the Government, private sector and local communities for the sustainable development of tourism through public-private partnerships and community participation; provide for integration of tourism into national development planning, budgeting and decision-making processes related to infrastructure development, environmental management and protection and empowerment of local communities; strengthen linkages and co-ordination between tourism development

and key subsectors such as arts and culture, heritage, transport, education, energy, forestry, fisheries, wildlife and water resource management by using a whole of Government approach; ensure that the tourism value chain is enhanced by positive linkages between tourism and supporting services and sectors, including police, immigration, customs, health and safety; establish the Zambia Tourism Agency and constitute the Board of the Agency and provide for their functions; regulate tourism enterprises and tourism-related services and enforce standards of operation and service; establish the Tourism Development Fund and provide for its administration; repeal the Tourism and Hospitality Act, 2007, and the Zambia Tourism Board Act, 2007; and provide for matters connected with, or incidental to, the foregoing.

Relevance: *Section 5 (2f) of the act encourages the development of all-weather access roads to tourist destinations, national parks and protected areas. The Serenje-Mpika road is a section of the Great North Road (T2) that provides access to most tourist destinations and protected areas such as Kasanka National Park (an international bird sanctuary) in Serenje District and the Luangwa National Park in Mpika District.*

Compliance: *During the ESIA study, the consultant engaged various stakeholders to understand how the upgrading of the road might help to boost tourism in the project area of influence. In addition, the ESIA has recommended that the RDA and its contractors make deliberate efforts to act in a manner consistent with the principles enshrined in this Act and where necessary to implement appropriate measures to promote and enhance the conservations along the road corridor.*

2.2.6 The Zambia Wildlife Act No. 14 of 2015

An Act to provide for the winding up of the affairs of the Zambia Wildlife Authority; establish the Department of National Parks and Wildlife in the Ministry responsible for tourism; provide for the appointment of a Director and other officers responsible for National Parks and Wildlife; provide for the transfer of the functions of the Authority to the Ministry responsible for tourism, Department of National Parks and Wildlife and Director of National Parks and Wildlife; establish the Wildlife Management Licensing Committee; provide for the establishment, control and management of National Parks, bird and wildlife sanctuaries and for the conservation and enhancement of wildlife eco-systems, biological diversity and objects of aesthetic, pre-historic, historical, geological, archeological and scientific interest in National Parks; provide for the promotion of opportunities for the equitable and sustainable use of the special qualities of public wildlife estates; provide for the establishment, control and co-management of Community Partnership Parks for the conservation and restoration of ecological structures for non-consumptive forms of recreation and environmental education; provide for the sustainable use of wildlife and the effective management of the wildlife habitat in Game Management Areas; enhance the benefits of Game Management Areas to local communities and wildlife; involve local communities in the management of Game Management Areas; provide for the development and implementation of management plans; provide for the regulation of game ranching; provide for the licensing of hunting and control of the processing, sale, import and export of wild animals and trophies; provide for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Convention on Wetlands of International Importance especially as Waterfowl Habitat, the Convention on Biological Diversity, the Lusaka Agreement on Cooperative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora and other international instruments to which Zambia is party; repeal the Zambia Wildlife Act, 1998; and provide for matters connected with, or incidental to, the foregoing.

Relevance: *Section 4 directs that wildlife shall be conserved and managed as an asset for present and future generations and to achieve economic growth; (b) wildlife utilization, management and conservation shall protect biological diversity, preserve the integrity and ensure the sustainability of the ecosystem and biological diversity. The areas of Lavushi Manda, Kasanka National Parks are fairly close to Serenje-Mpika road, and it is possible that some of the animals from the national park may easily come close to the project road. In addition, wildlife poachers from the National Park may easily find market for poached meat among the road workers.*

Compliance: *During the detailed study, the consultant engaged various stakeholders to understand how the upgrading of the road might help to boost wildlife conservation in the project area. Further the ESIA has made recommendations to the RDA and its contractors on how the agency can implement appropriate measures to promote and enhance conservation aims in general.*

2.2.7 The Forest Act No. 4 of 2015

An Act to provide for the establishment and declaration of National Forests, Local Forests, joint forest management areas, botanical reserves, private forests and community forests; provide for the participation of local communities, local authorities, traditional institutions, non-governmental organizations and other stakeholders in sustainable forest management; provide for the conservation and use of forests and trees for the sustainable management of forests ecosystems and biological diversity; establish the Forest Development Fund; provide for the implementation of the United Nations Framework Convention on Climate Change, Convention on International Trade in Endangered Species of Wild Flora and Fauna, the Convention on Wetlands of International Importance, especially as Water Fowl Habitat, the Convention on Biological Diversity, the Convention to Combat Desertification in those Countries experiencing Serious Drought and/or Desertification, particularly in Africa and any other relevant international agreement to which Zambia is a party; repeal and replace the Forests Act, 1999; and provide for matters connected with, or incidental to, the foregoing.

Relevance: *Section 5(1) gives powers to the forest department to do all such things as are necessary for the rationalization of the exploitation of forest resources and the promotion of sustainable forest management. Section 5(2c) allows the department to adopt and promote methods for the sustainability, conservation and preservation of ecosystems and biological diversity in forest areas and open areas. Section 5(2p) provides for the forest department to take appropriate measures, in consultation with the Zambia Environmental Management Agency (ZEMA), to safeguard protected species against extinction and control and prevent the introduction of invasive alien species in forest areas. Further, Section 8 points regards for the principle that forests and trees shall be managed as an asset for succeeding generations; the need to apply the precautionary principle to the development, management, utilization and conservation of forest ecosystems, biological diversity and habitats, taking into account the best scientific evidence available; the development, management, utilization and conservation of forests and trees to achieve a sound ecological balance. It goes on to show the need to achieve optimum utilization and ecologically sustainable development and management of forest ecosystems, biological diversity and habitats; the need to conserve forests and trees as living resources for both present and future generations and to achieve economic growth, human resource development and employment creation; the need to protect biological diversity in forest areas and protect the ecosystem as a whole, including species which are not targeted for exploitation. The section of the road near Mpika has Mpika Forest Reserve (i.e.* 240 and 292),

which may be affected by *construction activities will entail clearing of trees to pave way for road rehabilitation. In addition, charcoal production and selling is a major livelihood throughout the two sections of the project road, and the rehabilitation of the road may facilitate further production and selling of charcoal.*

Compliance: *The ESIA reports has made recommendations to RDA on how the agency can implement appropriate measures to promote and enhance the conservation aims enshrined in this Act and that clearing of vegetation shall only be confined to the road reserve areas, while planting of trees shall be encouraged during project implementation.*

2.2.8 The National Heritage Conservation Act No. 23 of 1989 and National Heritage Conservation Commission Amendment Act No. 13 of 1994

The National Heritage Conservation Act establish the National Heritage Conservation Commission (NHCC) and provides for the conservation of ancient, cultural and the natural heritage, relics, and objects of aesthetic, historical, pre–historical, archaeological or scientific interest. The NHCC is also responsible for enforcing the World Heritage Convention 1992, under which the heritage sites (such as significant waterfalls) are included in the World Heritage list as World Heritage Sites.

Relevance: *Section 42 of the Act states that "Any person, who discovers what appears to be an ancient heritage or relic shall: (a) Report his discovery to the Commission within fourteen days;(b) Suspend his operations in the immediate vicinity of his discovery until thirty days after the delivery of his report, unless the Commission authorizes their continuance; and (c) Deliver to the Commission as soon as practicable, or request the Commission to examine and remove, any object which is, or appears to be, a relic.* ***This Act is relevant to the project in that the activities of the project during construction will involve digging which may in the process lead to the discovery of artefacts or objects of archaeological significance.***

Compliance: *During the ESIA study the consultants paid particular attention to establishing the presence of any artefacts or objects of archaeological significance along the project road.*

2.2.9 The Urban and Regional Planning Act No. 3 of 2015

An Act to provide for development, planning and administration principles, standards and requirements for urban and regional planning processes and systems; provide for a framework for administering and managing urban and regional planning for the Republic; provide for a planning framework, guidelines, systems and processes for urban and regional planning for the Republic; establish a democratic, accountable, transparent, participatory and inclusive process for urban and regional planning that allows for involvement of communities, private sector, interest groups and other stakeholders in the planning, implementation and operation of human settlement development; ensure functional efficiency and socioeconomic integration by providing for integration of activities, uses and facilities; establish procedures for integrated urban and regional planning in a devolved system of governance so as to ensure multi-sector cooperation, coordination and involvement of different levels of ministries, provincial administration, local authorities, traditional leaders and other stakeholders in urban and regional planning; ensure sustainable urban and rural development by promoting environmental, social and economic sustainability in development initiatives and controls at all levels of urban and regional planning; ensure uniformity of law and policy with respect to urban and regional planning; repeal the Town and Country Planning Act, 1962, and the Housing (Statutory and

Improvement Areas) Act, 1975; and provide for matters connected with, or incidental to, the foregoing..

Relevance: *Section 19 (1) affirms that a planning authority shall prepare an integrated development plan for its area. Section 19 (3) An integrated development plan shall be the principal planning instrument to guide and inform all planning and development in the area of the local authority and all planning decisions of a planning authority. Section 19 (4) An integrated development plan shall (e) indicate priority areas for housing development, informal settlement upgrading and improvement; (ii) social service provision; (iii) infrastructure development, re-vitalization, renewal and maintenance; (iv) local economic development; (v) environmental management; (vi) protection of ecologically sensitive areas, heritage and cultural sites; and (vii) poverty alleviation.*

Compliance: *The councils along the road corridor have been engaged and their boundaries of jurisdictions have been noted. Further, the road being an existing alignment fits within the respective local authority's integrated land use and development plans.*

2.2.10 The Public Roads Act, CAP 12 of 2002

The Public Roads Act provides for the establishment of the Road Development Agency responsible for the planning, management and coordination of the road network in Zambia. Part III of this law prohibits road infringement by stipulating dimensions of road reserves within which no construction of any structures is allowed.

Relevance: *Although the project road is an existing road, very few people along the road corridor are aware of the road requirement for the project road. The project plans to demolish all structures found within the proposed road reserve (i.e. 50m on both side of the existing center line for rural sections of the road and 18m for the urban sections of Mpika and Chilonga.*

Compliance: *A RAP has been prepared to provide for a mechanism of compensating property owners that will be relocated from the road reserve areas.*

2.2.11 The Road Traffic Act No 11 of 2002

The Road Traffic Act No. 11 of 2002 provides for the establishment of the Road Transport and Safety Agency (RTSA) and defines its functions. It also provides for a system of road safety and traffic management in Zambia.

Relevance: *The traffic during transportation of construction materials has potential to cause accidents hence traffic control measures have to be observed and roads must comply with the provisions of the Act.*

*C**ompliance:** The ESIS has developed traffic safety measures, which the RDA and its contractors shall implement during both the construction and operation phases of the road project.*

2.2.12 The Petroleum Act, CAP 424

This Act, among other things, regulates the conveyance and storage of petroleum, inflammable oils and liquids.

Relevance: *During construction of the project road, the contractor will transport and store petroleum and inflammable oils and liquids and therefore, this Act is relevant to the project.*

Compliance: *The ESIS has proposed measures of how RDA and its contractors shall comply with regulations under this law during the transportation of fuel for construction equipment and generators. Where labor camps are located, the handling of re-fueling activities will require adherence to environmental, health and safety practices.*

2.2.13 The Energy Regulation Act, CAP 436

The Act provides for the establishment of procedures for the transportation, handling and storage of fuels to minimize negative environmental impacts.

Relevance: *During construction of the project road, the contractor will transport and store petroleum and inflammable oils and liquids and therefore, this Act is relevant to the project.*

Compliance: *The ESIS has proposed measures of how the RDA and its contractors shall comply with regulations under this law during transportation of fuel and will adhere to environmental, health and safety practices.*

2.2.14 Occupational Health and Safety Act of 2010

The Act establishes the Occupational Health and Safety Institute and provides for its functions; provides for the establishment of health and safety committees at workplaces and for the health, safety and welfare of persons at work. Most important is the provision regarding the protection of persons, other than persons at work, against risks to health or safety arising from, or in connection with, the activities of persons at work. The Act states that an engineer shall carry out his duties in such a manner as to ensure the occupational health and safety of persons at, or near, a workplace. The road, together with borrow pits and quarries, as construction sites will be associated with occupational hazards such as excessive emissions and noise. The contractor will be obliged to provide his workers with Personal Protection Equipment (PPEs) and overall, the construction will be carried out in accordance with the provisions of this Act.

Relevance: *Section 16(1) declares that Notwithstanding any other written law, an employer shall (a) ensure, so far as is reasonably practicable, the health, safety and welfare of the employees of the employer at a workplace; and (b) place and maintain an employee in an occupational environment adapted to the employee's physical, physiological and psychological ability. Section 26 (2) reaffirms that Without prejudice to the generality of subsection (1), an employer shall (a) provide plant and systems of work that are, so far as is reasonably practicable, safe and without any risks to human health and maintain them in that condition; (b) ensure, so far as is reasonably practicable, that articles, devices, items and substances provided for the use of the employees at a workplace are used, handled, stored and transported in a manner that is safe and without any risk to the health and safety of the employees at the workplace; (c) provide such information, instruction, training and supervision as is necessary to ensure, so far as is reasonably practicable, the health and safety of the employees at their workplace; (d) so far as is reasonably practicable, maintain a workplace under the employer's control, in a condition that is safe and without any risk to the health and safety of employees at their workplace; (e) so far as is reasonably practicable, provide and maintain the means of access to, or exit from, a workplace that are safe and without any risk to the health and safety of the employees using it; (f) provide and maintain a working environment for the employees that is, so far as is reasonably practicable, safe and without any risks to their health and safety, and which is adequate as regards facilities and arrangements for their welfare at the workplace.*

(h) provide for measures to deal with emergencies and accidents, including adequate first-aid arrangements; (i) provide at the employer's expense all appropriate protective clothing or equipment to be used in the workplace by employees, who in the course of employment, are likely to be exposed to the risk of bodily injuries, and adequate instructions in the use of such protective clothing or equipment. Construction activities shall expose workers to occupational risks to their health and safety due to factors such as operation of equipment, handling of materials and exposure to construction site hazards

Compliance: *The project will enforce measures indicated in the Environmental Management Plan attached herewith by appointing a construction environmental officer who will be a competent person mandated to implement among other things the recommended mitigation measures addressing occupational risks to workers.*

2.2.15 Anti-Gender Based Violence Act (2011)

The Anti Gender Based Violence Act of 2011 is a major step towards the fight against gender-based violence (GBV) in Zambia. It is one of the most comprehensive laws on GBV in SADC. The Act gives hope to many women and children who have been subjected to GBV without adequate recourse. GBV is defined as a hindrance to the attainment of gender equality and the realisation of the social and economic goals of Zambia, as it erodes the confidence of the survivors that they can contribute to development efforts. Gender-based violence (GBV) in Zambia takes the form of physical, mental, social or economic abuse against a person because of that person's gender and includes violence that may result in physical, sexual or psychological harm and suffering to the victim. It may also include threats or coercion, or the arbitrary deprivation of liberty, whether in public or private life.

Zambia Sexual Behaviour Study 2005 indicated that 15.1% of female respondents reported having experienced forced sex and that 17.7% of urban females and 13.7% of rural females reported having been subjected to sexual violence. About 43% of married women reported having experienced some form of physical or sexual violence from their husbands or partners in the year preceding the survey.

Compliance: The project will enforce the provisions of the GBV act to ensure that issues of GBV are adequately addressed at road construction sites among the workers and between the workers and the communities that they are serving during the civil works.

2.3 International and Regional Environmental Agreements

Zambia is a signatory to several international and regional conventions, which are related to the environment. Those of relevance to the project are described below.

2.3.1 Convention on Biological Diversity

The Convention on Biological Diversity (CBD), known informally as the Biodiversity Convention, is a multilateral treaty. The Convention has three main goals namely conservation of biological diversity (or biodiversity); sustainable use of its components; and fair and equitable sharing of benefits arising from genetic resources. In other words, its objective is to develop national strategies for the conservation and sustainable use of biological diversity.

Relevance: *Article 1 outlines the objectives of the Convention as the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding. Article 8 notes that Each Contracting Party shall, as far as possible and as appropriate: (c) Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use; (d) Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings: (h) Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.*
Compliance: *Zambia is a signatory to the CBD, hence one of the reasons for undertaking the environmental and social impact assessment of the project. Further, RDA will abide by the convention requirements in undertaking the project by ensuring that, efforts are made to protect and conserve biodiversity during implementation.*

2.3.2 United Nations Convention to Combat Desertification (UNCCD)

The objective of this Convention according to Article 2 is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas.

Relevance: *Article 5 (a)(c) reaffirms that affected country parties should give due priority to combating desertification and mitigating the effects of drought and allocate adequate resources in accordance with their circumstances and capabilities; address the underlying causes of desertification and pay special attention to the socio- economic factors contributing to desertification processes.*

Compliance: *The road project, in as far as is practical shall avoid uncontrolled felling of trees or unguided vegetation clearance which in a way will address issues of vegetation loss*.

2.3.3 Convention on the Conservation of Migratory Species of Wild Animals

The convention aims to conserve terrestrial, aquatic and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. *In the preamble the agreement states that the contracting parties being concerned particularly with those species of wild animals that migrate across or outside national jurisdictional boundaries; recognize that the States are and must be the protectors of the migratory species of wild animals that live within or pass through their national jurisdictional boundaries and convinced that conservation and effective management of migratory species of wild animals require the concerted action of all States within the national jurisdictional boundaries of which such species spend any part of their life cycle.*

Relevance: The project road traverses through an area with significant biodiversity for both flora and faunal species. The section of the road project for instance gets very proximal to the

Lavushi Manda National Park at some point. The National Park is habitant to several migratory animals.

Compliance: *The project will in its implementation be cognizant of migratory aspects of wildlife species.*

2.3.4 Ramsar Convention on Wetlands

The Ramsar convention recognises the fundamental ecological functions of wetlands as regulators of water regimes and as habitats supporting a characteristic flora and fauna, especially waterfowl. It is an international treaty for the conservation and sustainable utilization of wetlands, to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.

Relevance: *Article 3 (1) states that the Contracting Parties shall formulate and implement their planning to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory.*

Compliance: *The implementation of the proposed road rehabilitation will ensure that the wetland areas are not polluted/degraded through dumping of construction waste or waters are not polluted with effluent from the road or its associated facilities.*

2.3.5 Convention Concerning the Protection of World Cultural and Natural Heritage

The Convention on the Protection of World Cultural and Natural Heritage (WCNH) signed in 1973 aims to protect areas of universal value to science, conservation or natural and cultural heritage. It contains two legal principles, one of which states, "There is a legal duty on the part of all states to conserve and take responsibility for all natural and cultural heritage.

Relevance: In the preamble, the convention noting that cultural heritage and natural heritage are increasingly threatened with destruction not only by the traditional causes of decay, but also by changing social and economic conditions which aggravate the situation with even more formidable phenomena of damage or destruction, directs that parts of the cultural or natural heritage are of outstanding interest and therefore need to be preserved as part of the world heritage of mankind as a whole. Article 5 (a) recognizes that states must adopt a general policy which aims to give the cultural and natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning programmes.

Compliance: *Cultural and natural heritage sites will be preserved during construction and operation of the project by reporting any finds to the relevant authorities, as well as following the mitigation measures provided.*

2.3.6 United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC), signed in 1992 as article 2 of the convention puts it has a central objective "To achieve stabilization of greenhouse gas concentrations in the atmosphere". Zambia recognizes that the largest source of one of the main greenhouse gases, carbon dioxide, is from the burning of wood fuel and the use of coal and oil.

Relevance: Article 3 (3) (4) recognizes that parties should promote sustainable development and take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects

Compliance: *The project will minimize vegetative areas to be cleared as much as possible, ensure that all construction equipment and vehicles used during construction are serviced to minimize exhaust gas emissions.*

2.4 AfDB Integrated Safeguards Policy Statements

The Bank's Integrated Safeguards Policy Statements (ISS) sets out the Bank's commitments to and responsibilities for delivering the ISS to amongst others, ensure the systematic assessment of environmental and social impacts and risks as well as implementation of an adaptive and proportionate approach to environmental and social management measures to be agreed with clients as a condition of project financing. The ISS are summarized as follows:

2.4.1 OS 1: Environmental and Social Assessment

This overarching safeguard governs the process of determining a project's environmental and social category and the resulting environmental and social assessment requirements. It addresses issues of project categorisation, application and use of appropriate level of environmental assessment in line with the scale of the project. It also covers aspects of climate change vulnerability assessment; public consultation as well as grievance redresses procedures. *Under this OS, the road project is placed as a category 1 type and accordingly, a full and detailed ESIA has been prepared.*

2.4.2 OS 2: Involuntary Resettlement

The safeguard retains the requirement to provide compensation at full replacement cost; reiterates the importance of a resettlement that improves standards of living, income earning capacity, and overall means of livelihood while emphasizing the need to ensure social considerations, such as gender, age, and stakes in the project outcome so as not to disenfranchise project-affected people. *Under this project, there will be instances of land uptake and loss of infrastructures which is all being handled through the Resettlement Action Plan (RAP) which will spell out provisions for compensations.*

2.4.3 OS 3: Biodiversity and Ecosystem services

The overarching objective of this safeguard is to conserve biological diversity and promote the sustainable use of natural resources. The safeguard reflects the importance of biodiversity on the African continent and the value of key ecosystems to the population, emphasizing the need to amongst others, respect, conserve and maintain [the] knowledge, innovations and practices of indigenous and local communities in accordance with amongst others, traditional cultural practices that are compatible with conservation or sustainable use requirements. *The project is cognizant of the need to conserve biodiversity in its settings hence, baseline terrestrial and aquatic biodiversity surveys were conducted as part of the ESIA.*

2.4.4 OS4: Pollution Prevention and Control

This safeguard covers a range of impacts of pollution, waste, and hazardous materials for which there are agreed international conventions and comprehensive industry-specific standards that other multilateral development partners follow. It also introduces vulnerability analysis and monitoring of green-house gas emissions levels and provides a detailed analysis of the possible

reduction or compensatory measures framework. *With regard to this OS, the project will ensure activities that trigger pollution especially operations of the quarry plant, clearance and earthworks will necessitate occasional sprinkling of water to suppress the dust nuisance.*

2.4.5 OS 5: Labour Conditions, Health, and Safety

This Safeguard establishes the Bank's requirements for workers' conditions, rights and protection from abuse or exploitation. It covers working conditions, workers' organizations, occupational health and safety, and avoidance of child or forced labour. *The workers on the project will be provided with personal protective equipment (PPEs) and the working conditions will be governed by GRZ labour laws which are pegged to the International Labour Organization labour standards.*

2.4.6 Other Bank Safeguards Policies

2.4.6.1 The AfDB Gender Policy 2001

The policy defines the commitment of the Bank to promote gender mainstreaming as a means of fostering poverty reduction, economic development and gender equality in the interventions that the Bank finances. It seeks to provide, among others, a requisite framework for action to ensure equal access to women and men to resources and opportunities**.** This policy paper reaffirms the commitment of the Bank to promote gender mainstreaming as a means of fostering poverty reduction, economic development and gender equality in the region. The focus of the policy is on gender equality as a development goal rather than on women as a target group. The achievement of this goal requires the Bank to examine all of its policies, programmes and projects for their actual and potential impacts on women and men. The policy also reflects the principles of the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), the global consensus reached through several world conferences in particular the Dakar and the Beijing conferences as well as the wealth of research and insights emanating from the region. In addition, the policy is in line with the guidelines for gender equality and women's empowerment in development co-operation of the Development Assistance Committee (DAC) of the Organisation of the Economic Co-operation and Development (OECD). The policy identifies gender analysis as an integral part of all Bank policies, programmes and projects. Experience has shown that women and men differ in the way they respond to and/or benefit from development and in the absence of specific attention to differences between women and men, planning for "the people" can result in the exclusion of women or men as participants or beneficiaries of planned change.

In this context, the road project has sought to consider an equal representation of women and men during the consultative meetings. The project has also taken specific care on issues of women in the project in terms of employment opportunities and under complementary measures provided for intervention to support women in their livelihood ventures.

2.4.6.2 The AfDB policy on poverty reduction, 2004

The main objective of the policy is to provide a framework for action by putting poverty reduction at the centre of Bank supported projects. The policy affirms the commitment of the Bank to its overarching goal of poverty reduction by emphasizing the importance of supporting national ownership, participation and outcome orientation in the effort to improve the lives of the beneficiary communities**.** The overall objective in implementing the proposed rehabilitation of the road project is poverty reduction.

2.4.6.3 The AfDB Agriculture and rural development policy

Broadly, this sets to identify major constraints that limit economic growth in the agricultural sector and the rural economy and focus attention on specific areas where the Bank can develop comparative advantage for future leadership amongst others. One of the driving factors of household empowerment is through agriculture which is likely to be augmented through improved road as there will be faster transportation to markets amongst others.

2.4.6.4 AfDB Group's Policy on Disclosure and access to information

The objective of the of the Bank Group Policy on Disclosure of Information is to enhance broader stakeholder participation in Bank operations and activities, and to provide for the disclosure of Bank documents, consistent with the legal provisions of the Bank and the best practices of other Multilateral Development Banks. Furthermore, the Bank Group Policy on Disclosure of Information will allow interested members of the public to monitor the outcomes of specific Bank Group investments and will in part help assure that benefits reach the intended beneficiaries. The revised policy provides the Bank Group with an improved framework within which to disclose information on policies and strategies and key decisions made during project development and implementation. The Bank Group recognizes that, its effectiveness in engaging with key stakeholders is crucial to the attainment of its development mandate. As a rule, restrictions on disclosure to the public of categories of Bank Group information will be limited. The Bank Group will engage actively with its stakeholders and make information disclosure to stakeholders an obligation. Information disclosure will as a principle be mainstreamed into all Bank Group operations.

The policy states that Environmental and Social Impact Assessments (ESIAs) shall be prepared by the borrower for Category 1 projects with potentially substantial environmental and social impacts. Local populations shall be informed of the results of the ESIA and their opinions about proposed recommendations solicited during project scoping. Before the Bank Group proceeds to an appraisal mission for Category 1 projects, available ESIA studies shall be released in the borrowing country project area at some public place accessible to potential beneficiaries, affected group and local CSOs. Once the ESIA is released in the borrowing country and submitted officially to the Bank Group, it will be made available to the public through the Public Information Centre (PIC), website and the field offices where such offices are in place. If the borrower objects to the broader release of the ESIA outside the borrowing country, staff will not continue with the processing of the project. Public access to information on all Bank Group activities will be through the Public Information Centre, field offices and the Bank's website, with the latter being the main medium of access for documents.

2.4.6.5 AfDB Handbook on Stakeholder Consultation and Participation

Stakeholders are people/communities who may directly or indirectly, positively, or negatively affect or be affected by the outcomes of projects or programs. The Bank group encourages participation of primary and secondary stakeholders in all Bank supported projects including large infrastructure projects and policy-based lending. Benefits of participation include.

- Improved project design by drawing on local knowledge and expertise to ensure that designs accurately reflect stakeholder priorities and needs.
- Means of verifying the relevance and appropriateness of proposed interventions.
- Strengthened stakeholder commitment to, and ownership of, policies and projects--leading to increased uptake of project services and greater willingness to share costs.

- Enhanced sustainability because of increased stakeholder ownership.

Stakeholder consultation and participation was conducted through the scoping phase in 2012, were all project affected persons were consulted and their concerns and suggestions noted for integration in the project design. Further stakeholder consultations were conducted in September 2022 during the enumeration of properties that will be affected by the rehabilitation of the 60Km stretch.

2.4.6.6 AfDB Environmental and Social Assessment Procedures

The primary objective of the ESAP is to provide a formal process for the internal and inter-departmental environmental and social review of Bank-financed projects, programs and plans. The procedures highlight the various steps that shall be followed to assess environmental and social risks and benefits along the project cycle. In addition, the ESAP aim to ensure the integration of environmental and social dimensions into the public-sector project cycle from country programming to post evaluation. An integrated approach allows to take into account interrelations between environmental and social issues and to favour a multidisciplinary review of key concerns in a timely manner. Other objective of the procedures is to make Bank's borrowers aware of the environmental and social requirements for assessing Bank- financed projects, programs and plans, thus enhancing their capacity to achieve sustainable development. To comply with the Bank's requirements, environmental and social assessment studies shall address key crosscutting issues that are: poverty reduction, environment, gender, population, health and safety related issues, civil society and stakeholder participation.

2.4.6.7 AfDB Policy on the Environment

The policy is based on the following key principles that have gained general acceptance as prerequisites to sustainable development and have been articulated in several international agreements:

- A strong and diversified economy shall be recognized as a just means to enhance the capacity for environmental protection; however, all development-related decision-making processes shall integrate economic, social and environmental considerations.
- Environmental management tools, like environmental assessments, shall be used to ensure that economic activities are environmentally sustainable, and to systematically monitor their environmental performance.
- Community involvement in natural resource management decisions that affect the most marginalized and vulnerable groups shall be provided for, and the value of traditional knowledge shall be recognized and preserved.
- Transparency, accountability of governance structures and institutions, which are more responsive to the needs and priorities of affected communities in general, and poor people and vulnerable groups, shall be encouraged.

2.5 Administrative Framework

2.5.1 Ministry of Infrastructure Housing and Urban Development

The Ministry of Infrastructure, Housing and Urban Development (MIHUD) is responsible for overall policy formulation and monitoring of the road infrastructure developments. The Ministry oversees the construction and civil engineering activities to the extent that they should not adversely affect the environment. The Ministry will play a role in ensuring the RAP guidelines

are implemented through their representative in the RDA Board of Directors and would mainly be involved in supervision and ensuring compliance with policies of the transport sub-sector.

The Government Valuation Department (GVD) is also located in the Ministry of Infrastructure, Housing and Urban Development. GVD is responsible for the preparation of Valuation Reports upon request from a user Ministry or Institution such as RDA. *The Valuation reports form a basis for the fair compensation of project affected persons that may have their structures affected by the rehabilitation of the Mpika-Serenje road project. Further GVD will play a big role in the resolution of disputes relating to the valuation amounts as part of the grievance redress mechanism.*

2.5.2 Road Development Agency (RDA)

The Road Development Agency through its Environmental and Social Management Unit-ESMU will implement the RAP in conjunction with respective district local governments of Lavushi Manda and Mpika Districts and other key stakeholders such as traditional leaders. *RDA will mobilise the required funds and effect payments to the PAPs. It will also have the overall mandate of ensuring that the RAP is smoothly implemented by coordinating with all relevant stakeholders. RDA will pay the affected PAPs before the commencement of civil works.*

2.5.3 District Councils and Traditional Leadership

Local Councils and Traditional leadership are responsible for local policy matters, economic development, resolution of local conflicts and the provision of leadership in their respective areas. *District councils and traditional leaders are key players in the mobilisation of local people's participation in developmental programmes such as the rehabilitation of the Serenje-Mpika road.*

2.5.5 Zambia Environmental Management Agency (ZEMA)

ZEMA is empowered under the Environmental Management Act (EMA), No. 12 of 2011 to ensure that major developmental activities in Zambia adhere to the provisions of the Environmental Impact Assessment (EIA) Regulations of 1997. It is a requirement under the EIA regulations that any road rehabilitation/construction project exceeding 10Km should undergo an EIA process before the commencement of civil works. *Upon the successful conclusion of the EIA, ZEMA issues a Decision Letter to either approve or disapprove such a project. ZEMA had on 12th May 2014 issued an approval Environmental Decision Letter for the rehabilitation of the Serenje-Mpika road. The Decision Letter expired in May 2017. RDA will apply for the renewal of the Decision Letter to facilitate for the rehabilitation of the 60Km section of the Serenje-Mpika road. ZEMA will undertake compliance monitoring activities during the road construction phase to ensure that the EMA is being adhered to.*

2.5.6 Contractor

The Contractor or Contractors that will be engaged will mainly be responsible for undertaking the civil works to have the road rehabilitated according to the specifications that will be outlined in the contract. The Contractor will be responsible for mobilising the required plant and machinery including the personnel for the delivery of the expected output. Further it will be the responsibility of the Contractor(s) to ensure that the provisions of the ESIA are implemented at site through the preparation of the Contractor Environmental and Social Management Plans (C-ESMP). The Contractor will be expected to ensure that safety issues are prioritized to avoid

accidents that may derail the project. The Contractor is also expected to cultivate a cordial working relationship with the traditional leadership and the community at large along the road corridor through the engagement of Community Liaison Officers.

2.5.7 Community

The community along the road corridor will be expected to provide support to the Contractor(s) for the smooth implementation of the project. They will be expected to provide labour which is a major input in the execution of the civil works. The community members will not be expected to involve themselves in acts of vandalism that are a drawback to the civil works. They will be expected to report any such acts to relevant authorities for action.

CHAPTER 3

3. PROJECT DESCRIPTION

3.1 Location

The Serenje-Mpika Road Section (238km) forms a part of the Zambian Great North Road (T2) traversing Serenje, Chitambo, Lavushi Manda and Mpika Districts as illustrated in figure 1 below. Serenje is situated about 400km from Lusaka while Mpika district is located about 640km away from Lusaka, along the Kapiri Nakonde road, the T2 road. Chinsali district is also situated in the Muchinga Province of Zambia, about 168km from Mpika and 808km away from Lusaka. Key landmarks along the stretch include the Muchinga Escarpments, Lavushi Manda National Park, Nachikufu Cave Monument and Chilonga Mission Hospital.

The 60Km project area is located in Muchinga Province between the Mpika weighbridge and an area called Makantaulo.

Figure 1: Cartographic Location Map of Serenje – Mpika Project Road

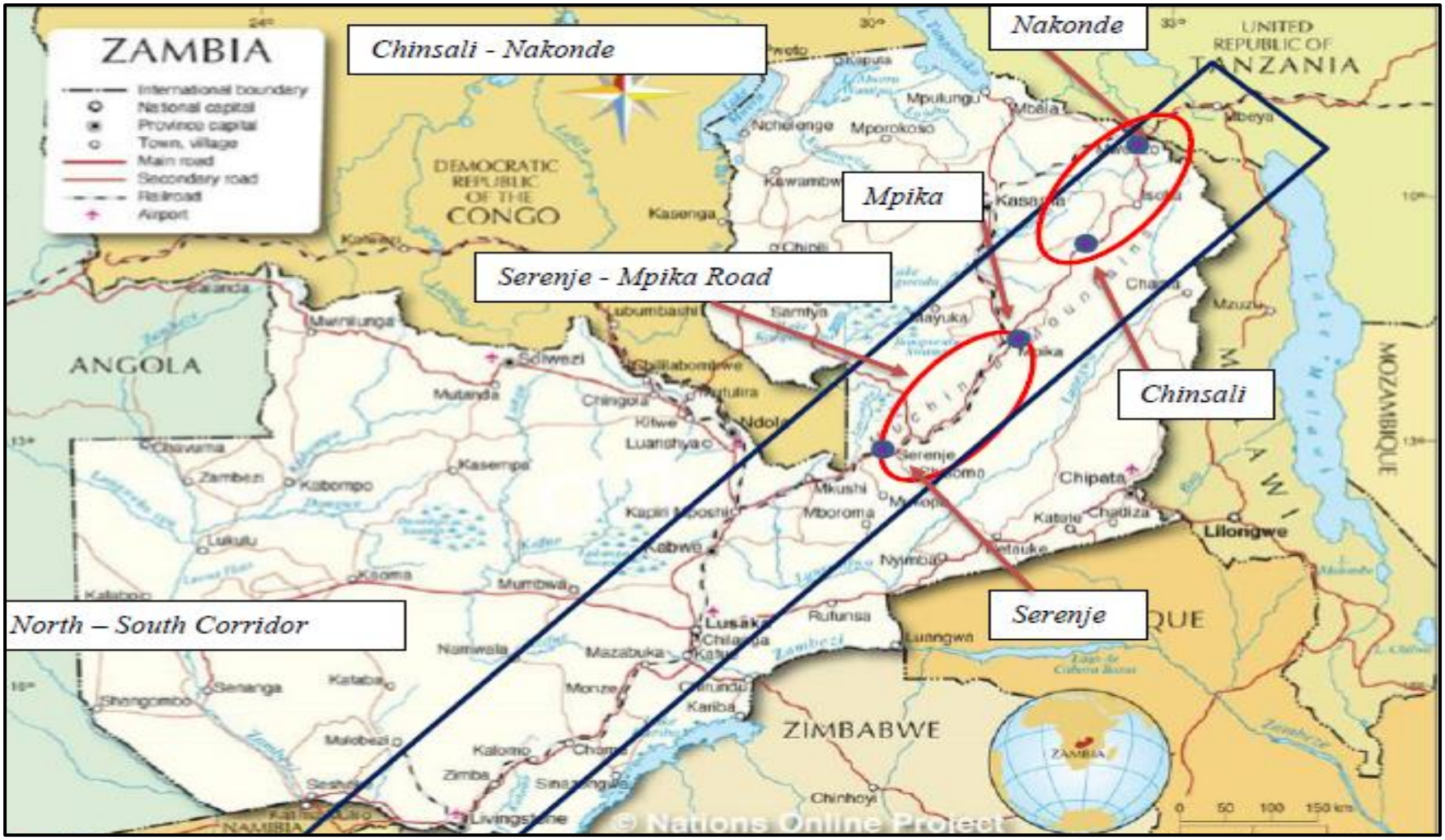
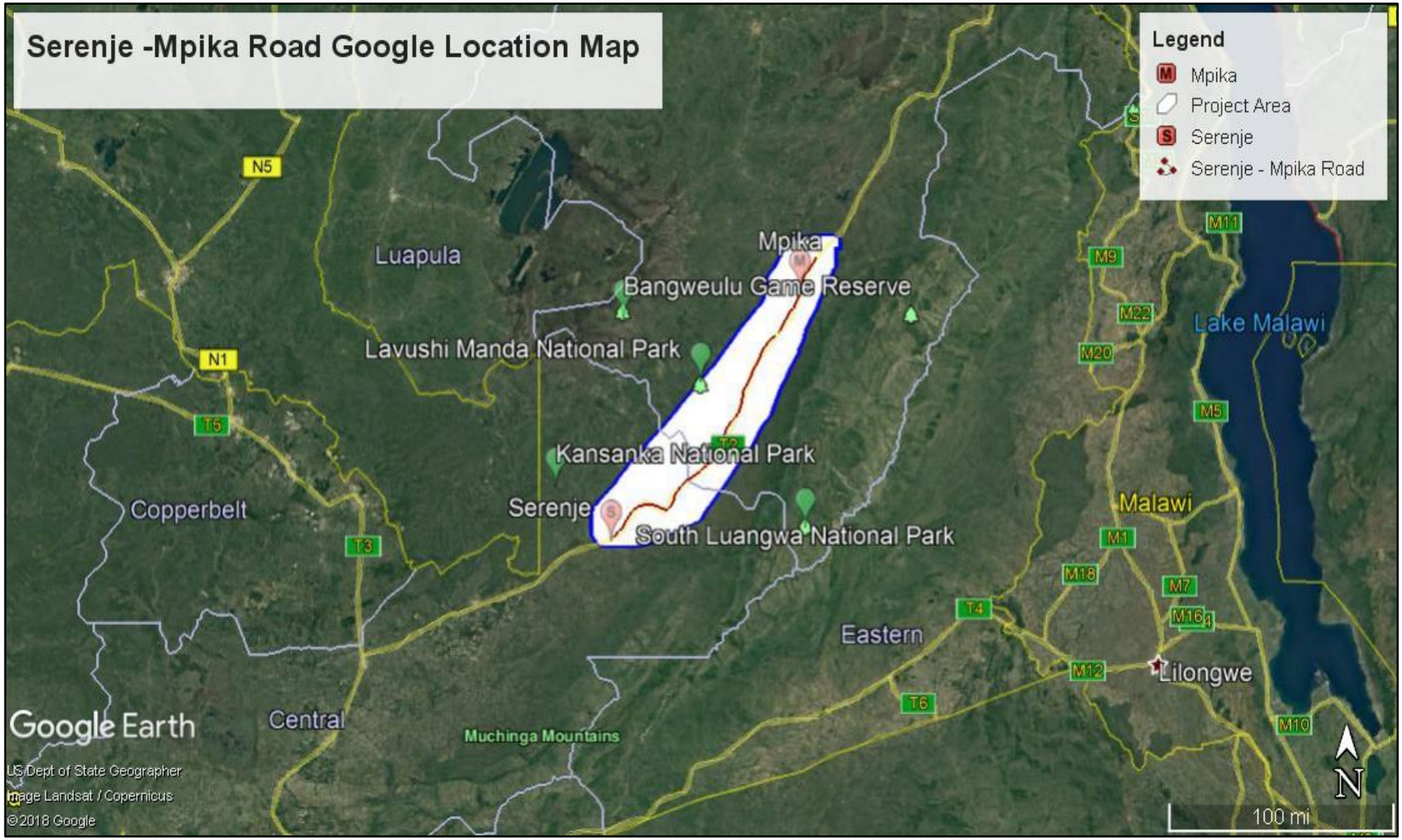


Figure 2: Google Map Showing Location of Project Road



3.2 Nature of the Project

3.2.1 Raw Materials

The following raw materials will be required during the upgrading of the project road:

- **Cement -** Cement is easily available, packed in 50kg bags and may be sourced from companies such as Dangote, Chilanga Cement and Zambezi Portland Cement.
- **Reinforcement Steel** - South Africa is the major source of steel for the entire project requirements. Strength and other properties of reinforcing steel will be confirmed by testing of samples in approved testing laboratories.
- **Bitumen** - Bitumen for road works is generally readily available from either Indeni Oil Refinery in Ndola or external suppliers. Supply at Indeni Oil Refinery has a limited capacity of 400t/day. Therefore, continuous supply to the project may be delayed or inadequate to meet the target progress. In such a case, the option of importing bitumen and ESMUlsion directly from sources in South Africa or further afield will be explored. Bitumen properties need to be checked by testing representative samples in approved laboratories.
- **Fuels/Oils** - To be used by construction vehicles and equipment will be sourced from local service providers such as Total, Puma and Mt Meru who have a presence in Mpika.
- **Water -** For construction purposes water will be abstracted from nearby rivers upon application for a permit from the Water Resources Management Authority (WARMA).
- **Energy –** Electricity supply will be sourced from ZESCO which already has some service lines along the road corridor. Fuels such as diesel which is a major component of the energy needs will be sourced from the registered service providers as illustrated above.
- **Staffing –** The project will require both skilled and non-skilled labour. Non-skilled labour will mainly be sourced from the surrounding local communities which shall also act as a form of local empowerment. The exact numbers of the labour force especially the non-skilled ones will be determined according to the workload at any prevailing time.
- **Gravel/Laterite, Crushed Aggregates -** Will be sourced from existing and any borrow pits that will be identified by the Contractor. Several quarry sites and borrow pits, which could be used for stone and gravel extraction, are found along the road. The exact borrow pits to be used have not yet been identified though the projects approach is to establish borrow pits areas at an average frequency of 5kms along each road. However, preference will be made concerning areas that have been partially exploited and if possible, pits on state land or in less densely populated areas will be exploited.

During site reconnaissance no active commercial quarry was encountered on the entire project route. There are hills along the route that could be explored for possible quarry sites. In the course of further materials investigations to supply the section of the road, preference should be given to potential quarries that have been exploited in the past such as one located at Mununga quarry. All necessary permits/licences such as water permits shall be obtained prior to the start of civil works and copies of such permits/licences will be submitted to the Bank.

3.2.2 Other Project Requirements

The following are some of the other requirements that will be needed during the road project:

- **Campsites-** The Contractor (s) will establish main campsites. The camp site which will be permanent during the project duration will be expected to comprise offices and living quarters for the Supervising Engineer and the Contractor. The campsite will also have a mechanical workshop, equipment yard, storeroom and the laboratory. The main campsite will be subjected to an environmental assessment and approval before their establishment. Satellite campsite(s) which will be temporary will be established along the road corridor to provide for convenience operations.
- **Transport requirements –** The Contractor will utilise tipper trucks to transport gravel from borrow pits and stone aggregates from the quarry site. The tipper trucks will also be utilised to transport cement and other materials from the campsites to the construction sites. Some of the materials such as fuel, steel, cement, bitumen etc will be transported to site (campsites) by the engaged service providers.
- **Waste management –** A waste management plan will be put in place by the Contractor (s). The solid waste that will be generated will be disposed at designated dumpsites that will be made available by the district councils along the road corridor. Service Providers will be engaged to be disposing of solid waste at regular intervals. Other Registered Service providers will be engaged to transport and dispose of hazardous waste such as used oil and used tyres.
- **Land uptake needs –** Land uptake needs will mostly arise through the relocation of built-up structures from the road reserve areas which is 100 meters and 36 meters in the rural and urban sections of the road corridor respectively. The other sources of land uptake will be through the opening up of borrow pit and quarry sites. However, land uptake is expected to be minimal as the existing road alignment will be maintained. The Resettlement Action Plan (RAP) report has been prepared separately to address how land uptake will be handled mostly through a compensation arrangement. The affected people will be compensated prior to the commencement of project activities in any road section.

3.2.3 Process and Technology

The road will be constructed using the conventional road construction method which involves:

a) clearing and grubbing.
b) sub-base construction
c) road base construction.
d) surfacing.
e) construction of drainage infrastructure and
f) installation of road signage

3.2.4 Clearing and grubbing

Clearing and grubbing is the first step in road construction. It involves the removal of vegetation and trees from the area where the road will be constructed taking into consideration sight

distances. In this project, since the proposed alignment is along the existing road, not much clearing and grubbing is anticipated.

3.2.5 Sub-base construction

Traditionally, the construction of the sub-base begins after the clearing and grubbing phase. This is the stage at which the road formation is created which can either be in cutting or in embankment. However, the formation level is already established in this project. Therefore, as part of sub-base construction, the surfacing of the old road will be ripped off. The resulting bituminous waste will be disposed of in the existing abandoned borrow pits as a way of land reclamation. The old road base will then be ploughed and watered before compaction to form the first layer of the sub-base. More gravel as required will then be brought in to bring the road to the new required width. This will also be adequately compacted.

3.2.6 Road base construction

The road base, which is the load-bearing layer of the road, is traditionally constructed from a well graded material consisting of various sized particles containing coarse and fine aggregate for enhanced compaction. Material is usually brought in using dumper trucks and compacted with a wide range of compacters. For this project, the road base will be of crushed stones.

3.2.7 Surfacing

Traditional surfacing is usually of crushed stones which are bonded using asphalt. The surfacing in this project will also be of crushed stones bonded using asphalt. The surfacing will be made from already mixed crushed stones and asphalt (hot mix) which will then be applied on the road base. The bonding between the road base and the surfacing will be enhanced by tack coat which will be spread on the road base before the surfacing material is applied.

3.2.8 Drainage infrastructure construction

Drainage is an important component of road construction. This involves provision of drains along the road to carry water away from the road and providing culverts and bridges where water needs to move from one side of the road to the other. As per normal practice, drainages will be installed as the road works are progressing. This will be done to avoid/minimize erosion which would otherwise result. Most culverts, where required, will be prefabricated units except in sections where these may not be feasible. Use of prefabricated units will reduce construction/installation time with a corresponding reduction in the duration of impacts.

3.2.9 Equipment and machinery

Carrying out the above listed activities requires various types of equipment and machinery. Whereas some equipment can be used in a number or all the above activities, some are specialized and are only able to carry out one activity. Some of the equipment and machinery expected on site include the following:

a. Bulldozers.
b. Backhoes.
c. Chainsaws and axes.
d. Water Bowsers.
e. Compactors.
f. Front-end loaders.
g. Graders.

h. Hydraulic excavators.
i. Scrappers.
j. Dump trucks.
k. Cranes.
l. Asphalt mix plants.
m. Road sweepers; and
n. Chip spreaders.

3.2.10 Products and By-Products

The main product of this project will be a modern fully engineered bitumen road that has the capacity to withstand the effect of harsh weather and heavy traffic. It is, however, likely that the project will also produce by-products. These by-products may include pollutants such as used oils and toxic fumes (CO, CO_2, NOx, SOx, aromatic compounds, particulate matter, and other volatile compounds) from hot asphalt and engines, dust, noise, silt, vibrations, strong lights, smells, spoils of soil and rock from excavation works, plastics, medical waste at the construction camp and sanitary waste

3.2.11 Project Schedule and Life Span

The project is scheduled to start in 2023, subject to the renewal of the Decision Letter of 2014 by ZEMA and compensation of project affected persons settled in the Right of Way (ROW).

3.2.12 Project activities

The rehabilitation works will involve land preparation to create access roads to camp and road reserves, filling and grading for shoulder construction and section cutting for drainages and culverts, sealing, and laying bitumen, aggregate and compressing. The activities involved in each phase are elaborated in the sections below.

3.2.13 Phases in Road Rehabilitation

The proposed project is divided into phases namely, pre-construction (design) phase, construction phase and operational phase. Different environmental impacts may be generated during the different phases. The activities involved in each phase are elaborated in the sections below.

a) Pre-Construction (Design) Phase

This phase involves carrying out a survey of the proposed road. Survey in this case refers to land investigations, drilling, measurements, and pre-works examination of the site. To facilitate the development of a conceptual design an environmental impact assessment was undertaken and the key concerns from the study were also considered in the design phase. The output from this phase is an environmentally friendly engineered design for road rehabilitation which must be implemented in the construction phase.

b) Construction Phase

The actual rehabilitation of the road will take place in the construction phase. The estimated roadwork will cover the following activities:

- **Road Upgrading**

As the conditions of the road vary, the road would have to undergo different degree of work, which will have different levels of impact on the environment.

The Project Team has carried out a number of surveys and analysis to determine the condition of the road and to assess what it would require to rehabilitate the existing road to an acceptable road safety, speed and environmentally friendly. According to these surveys the estimated work required to bring the road to an acceptable standard would include some interventions.

- **Reconstruction of the shoulders**

The general condition of the shoulders of the road is very poor. Most of the shoulders have completely disappeared or are covered with vegetation. Often the vegetation consists of tall grasses, obstructing road users and thus increasing the risk of accident.

The shoulders will be completely upgraded to pavement. In certain areas, an increase in width may be envisaged to cater for the large number of non-motorised users of the road, such as pedestrians and cyclists.

- **Cleaning and clearing of ditches, culverts and drains**

Ditches have been constructed all along the side of the road. Most of these ditches are silted up and overgrown by vegetation and they will need to be cleared and reshaped during the upgrading process. This will also include the mitre drains.

The Project Team has observed several culverts on the road (elaborated in the hydrological and drainage survey).

- **Installation of new road furniture and the rehabilitation of existing road**

Presently the road has very little road furniture in the forms of road signs, demarcations and lining, safety barriers, kilometer posts, culvert beacons, traffic lights. The Project will introduce all the above-mentioned furniture where appropriate.

- **Upgrading of existing Lay-by**

The Project Team has observed some lay-bys along the road. The lay-bys vary from simple dirt areas of 2-3 m next to the road to wide half circle shaped lay-bys.

Given the type and frequency of traffic more lay-bys will be considered necessary. The lay-bys will be paved and separated from the road.

- **Road Safety Measures**

At present there are no traffic safety measures or speed reducing devices along the road. The Project will install these at black spots and at strategic areas around settlements, villages and towns.

c) Operational Phase

This is the post-construction phase when all the road upgrading works have been completed and the road has been commissioned for use. In the operation phase, the main activities will be routine and emergency maintenance works of the road such as patching of potholes, maintenance of shoulders and drainages, placement of signage, road

markings and vegetation clearing on the sides of the road to maintain sight distance. Other activities are regulation of maximum weights permissible for transmission on the road, provision of a system for road safety and traffic management, and promotion of road safety.

CHAPTER 4

4. PROJECT ALTERNATIVES

The plan to rehabilitate Serenje-Mpika road is an integral part of the RDA's Strategy Plan 2019-2021, considering its centrality to the country's quest to eliminate trade bottlenecks and hindrance to access regional markets in the wider COMESA, SADC and EAC regions. This implies that, the rehabilitation of this road will improve connectivity between Zambia and northern trade partners in the north and, south of the country. Therefore, the analysis of the Alternatives has focused on the implementation modalities of the road project, considering a combination of factors such as environmental, social and economic dimensions. In addition, it is important to note that this is an already existing paved road which only requires rehabilitation as the project is not constructing a new road in a green field therefore, there are no alternatives to the existing route for the road.

4.1 Constructing a New Road Option

Constructing a new road option to a different site is not an option available for the project implementation as this project is to improve accessibility to an already established Great North Road (T2) that is a section of international routes i.e. the Trans-Africa Highway and the North-South Corridor (NSC) which is a joint COMESA/East African Community/South African Development Corporation (COMESA/EAC/SADC) Aid for Trade initiative. Its primary aim is to reduce the time, and cost of transport along this priority Corridor which links the port of Dar-es-Salaam in Tanzania to the Copper-belt (Southern DR Congo and Northern Zambia) and connects to the southern ports of South Africa specifically the port of Durban. This option is not the most suitable alternative from an extreme environmental and socio-economic perspective as it interferes with the existing conditions and has high impacts.

4.2 The Do-Nothing Scenario

This Scenario implies that, the Serenje-Mpika road would remain without any rehabilitation or maintenance interventions which will leave the road in worse condition with continued deterioration characterized emergence and rapid development of gaping potholes in the carriageway as well as deterioration of its drainage infrastructures alongside loss of road safety furniture thereby making it risky for public use. On the basis of these, the Do-Nothing Option was dropped from further consideration as it is not within GRZ aspirations as enshrined in the RDA strategy plan. There are no alternatives to this road that fulfill the functions of providing relatively fast, cheap and easy transportation. The only other alternatives are Air and Rail. Transportation by air is unlikely to either complement or to substitute for roads or highways in the short to medium term.

The Tanzania Zambia Railway Authority (TAZARA) option is potentially an important alternative mode of transport, but this also suffers a lot of setbacks in terms of delayed movement of goods and poor railway infrastructure which has not received major rehabilitation works in the past few years rendering it ineffective. The railway transport is a possible future consideration, but this too is unlikely to either complement or to substitute for the project road in the short to medium term.

4.3 The Routine Maintenance Option

Options considered here was whether to continue routine road maintenance against major rehabilitation. This was considered in terms of annual maintenance costs computed based on an "ideal" maintenance schedule rather than a "minimum" or "absolute minimum" schedule which presumes that, the road will always be maintained in a good condition.

4.4 Design Standard Alternative

The Serenje- Mpika road will be constructed based on 100 meters right of way (ROW). The design follows SATCC standard code of design for the Geometric Design of Trunk Roads (Ed. Sept 1998) together with Recommendations on Road Design Standards – Geometric Design of Rural Roads (Ed. Dec. 1994) issued by Roads Department, Zambia. The design standards for the project road have been adopted after reviewing the relevant latest Manuals, specifications, and design guidelines (SATCC, AASHTO and Zambia Specifications).

4.5 Technology Alternatives (Rehabilitation with Asphalt)

Although there are different types of pavements that can be considered for the upgrade of the project road (i.e. concrete pavement, Asphalt concrete pavement, or Composite pavement), the project road will be constructed with Asphalt concrete pavement on granular base on a cement stabilized sub-base course. Concrete pavement has been proposed at Police Posts.

The pavement structure has been decided based on minimum practicable thickness, which will create a balanced pavement structure. The direction split was not considered as the pavement structure for both ways is at a minimum design level and the traffic load one way or the other would not change the layer thickness designs. The strength of the sub grade was determined using DCP, down to minimum depth of structural influence of sub grade, as well as laboratory verification of CBR values. Although the road was divided into various sections where the sub grade material was investigated, during the design, it was concluded that the entire road would have the same structural layers. It is therefore proposed to rehabilitate the road by surfacing using crushed stones which are bonded using asphalt. The surfacing will be made from already mixed crushed stones and asphalt (hot mix) which will then be applied on the road base. The bonding between the road base and the surfacing will be enhanced by tack coat which will be spread on the road base before the surfacing material is applied. This was taken as a preferred Option/Alternative in implementing the road project.

4.6 Raw Material Alternatives

Options that were considered include sourcing materials locally or not. Materials such as gravel, laterite and stone aggregates which are available in the project area might be sourced in Lavushi Manda or Mpika after environmental assessments have been conducted and approved by ZEMA. Materials that may not be found locally such as asphalt and reinforced steel may be sourced from main urban centres such as Lusaka or Durban in South Africa.

4.7 Analysis of Alternatives

From the Feasibility Study of 2013, it is concluded that, the road pavement surface has greatly deteriorated and is generally weaker which merits major rehabilitation involving over-lay of asphalt and strengthening. Against this, both the position of RDA and the findings of the Feasibility Study all concur that, maintenance is not a technically and economically viable option for the Serenje-Mpika road section as was the case with the Chinsali-Nakonde and

Chinsali-Mpika sections along the same highway. The Chinsali-Nakonde section is currently undergoing rehabilitation with the financial support of the AfDB while the rehabilitation of the Mpika-Chinsali section is likely to commence in 2023 with the support of the European Investment Bank. Therefore, the maintenance Option was equally dropped from further consideration. The Zero project alternative and the rail transport alternative were dropped from consideration due to the opportunity cost that would be incurred in not implementing the project as well as the high cost of operationalizing rail transport from Nakonde to the southern province of Zambia, in order to link the north south corridor. Asphalt pavement has been adopted due to its cost effectiveness and suitability for a trunk road. Most raw materials that would be found locally (in Lavushi Manda/Mpika) will be sourced locally in preference from distant places for operational efficiency. Existing borrow pits and quarries along the stretch of the project road will be exploited in preference to opening new sites to limit degrading a larger landscape.

CHAPTER 5

5 ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

The environmental and social baseline conditions presented in this chapter are for the project area from Serenje to Mpika districts. The data is presented under three sub-headings namely physical, biological and socio-economic environments.

5.1 Physical Environment

5.1.1 Topography

Serenje district is at an altitude of 1120m above mean sea level (amsl). The Muchinga escarpment dominates the landscape on the southeast while the rest of the district is composed of scattered hills and a soft undulating valley in the southern part. From Serenje, the project area follows the Muchinga Escarpment which borders the project area on the right-hand side (mostly eastern side). The Muchinga Escarpment rises to 1800m amsl along the edge of the main Zambian Plateau, which is around 1500m near Mpika. The town of Mpika is at an elevation of 1440m amsl. Its topography is characterised by ridges, plains, pans and undulating surfaces. The Luangwa Valley is about 600m above sea level but is overlooked by the Muchinga Escarpment rising to 1 800m along the edge of the main Zambian Plateau, which is around 1 500m near the town of Mpika, sloping gently towards the west to Lake Bangweulu at about 1 160m.

5.1.2 Geology

Zambia forms part of the African plateau, of gently undulating Landscape, rolling in series to flat plateau zones with isolated hills or low ranges of resistant rock. The plateau formed over a long period of time. Erosion cycles have produced nearly level pene-plains across rocks of varying resistance. The plateau consists of different ages occurring at different levels from uplift and plantations. The oldest erosion surfaces being found at the highest altitudes but limited areas.

The geology under lying the project area from Serenje to Mpika has been described as the Mesoproterozoic Irumide belt (Mani and Waele, 2002). The Irumide Fold belt of Zambia consists of a Palaeo to Mesoproterozoic complex of gneisses and granite gneisses and a supracrustal sequence of quartzites and pelites. Although no direct correlation is possible, the metasedimentary sequence is tentatively equated with the Manshya River Group described in the NE. The basement to the Irumide belt consists of the Bangweulu Granites to the North, and the Mkushi gneiss basement (MGB) to the Southwest. Age constraints on the Bangweulu Block are limited, but the Mkushi Gneiss has been dated at 2050 Ma. A detrital provenance study on a quartzite of the Manshya River Group near Mkushi indicates derivation from terranes of up to 3180 Ma, with a maximum age for the Manshya River Group set by the youngest detrital grain at 1941 Ma. Detrital cores from paragneisses and migmatites in the Serenje area indicate a more uniform detrital source for the sedimentary protolith of 2050–2000 Ma.

5.1.3 Climate

The project districts are situated in region III of the Zambia's agro-ecological regions. This region receives over 1000mm annual rainfall. The climate of Serenje and Mpika is characterized by four seasons: namely winter running from June to August, the pre-rainy season from September to October, the rainy season from November to March and the post-rainy season from April to May. The 30-year average annual rainfall is between 1105 and 1018mm with 103 and 99 rainy days per year for Serenje and Mpika, respectively. More than 90% of the annual rainfall is concentrated in the rainy season from November to March. The remainder falls in October and April. Temperature variations between the cold and hot seasons are considerable. The lowest average temperature of 7.5°C was recorded in July for Serenje and the highest of 30.3°C was in October whereas Mpika had 9.0°C and 29.7°C as lowest and highest, respectively for the same months. The average annual evapotranspiration values for the project area are 818 and 797mm while the values for potential evapotranspiration are 1538 and 1507mm for Serenje and Mpika, respectively. Rates of evaporation are highest in October with the minimum of 9mm and lowest in the months between November and March with minimum of 4mm. Relative humidity for Mpika is in the region of 40-60% and 80% during the dry and wet seasons, respectively (DSA,2010).

5.1.4 Air quality

For most of the Serenje-Mpika Road, the areas comprise forest land with very few settlements and gardens. Most settlements along the stretch are towards Mpika after Km200. There are no industries except the Mununga Quarry at Km130, CICO Quarry for gravel at Km135 and Chicco Quarry for aggregate at Km217. The emissions from these quarries are however not widespread. Traffic emissions constitute a source of air pollution along this road although no quantitative data was available (Figure 8). Seasonal bush fires contribute air pollution though this is mainly during the dry season.

Photo 1: Pollution Sources along Serenje-Mpika Road

5.1.5 Water quality for selected water bodies along the project site

5.1.5.1 Surface Water Quality

The surface water quality of the bodies in the project site was determined from sampling and analysis of the water which was collected from streams within the road alignment. Although a detailed characterization can only be done if samples are collected for over a full hydrological cycle (full calendar year), the collected data still provides an insight in the general quality (Tables 2-4). The results indicate that water surface bodies within the proposed project area are relatively unpolluted. Except for the microbiological aspects for some sources, the water conforms to the World Health Organisation (WHO) Guidelines and Zambian Standards for drinking water. This is expected as all these water bodies drain an environment that is literary free from anthropogenic activities.

The pH of the water bodies during the period of the study ranged between 7.04 to 7.47. There are no general surface water guideline standards. The Zambian Standards and WHO guidelines for drinking water stipulate 6.5 to 8.0 to which quality all the analysed samples conformed. The conductivity of the water is very low indicating low levels of dissolved minerals. High value of conductivity is an indicator of possible pollution of water as it signifies a high concentration of dissolved ions which in most cases results from pollution. Low concentration is an indicator that the water is relatively unpolluted. WHO guidelines for drinking water stipulate permissible limit of 1500(μmhos/cm). With respect to this parameter, the water bodies are therefore not polluted.

5.1.5.2 Ground water quality

Ground water quality within the project area was determined from samples that were collected from available boreholes in the project area. The results are presented in Table 3 below. From the results, the ground water quality within the project area is slanted towards acidic. The pH for all samples except for the sample from Pensulo Roadblock was acidic. All other parameters, except for iron, are within acceptable limits for drinking water in accordance with both the WHO Drinking Water Guidelines and the Zambian Standards for drinking water as contained in ZS190 of 2010. Half of the samples exceed the guideline value for iron recommended for water meant for domestic use. Both the WHO and Zambia Standards stipulate 0.3mg/l of iron as the upper limit. This finding is in line with the general groundwater quality from this area including Luapula Province and parts of Northern Province where high concentrations of iron in ground water is a problem.

Table 1: Water quality results for some surface water bodies in the project area

PARAMETER	NAME OF SOURCE AND GPS COORDINATES						GUIDELINEVALUES	
	Mulu	**Lubambala**	**Mungulube**	**Masanta**	**Masansa**	**Kakulu**		
	S 11° 53' 03.5" E 31° 25' 36.1"	S 11° 54' 08.4" E 31° 24' 55.8"	S 12° 08' 38.6" E 31° 14' 38.9"	S 12° 12' 33.1' E 31° 10' 46.5"'	S 12° 36' 16.9" E 31° 00' 25.8"	S 12° 49' 48.0" E 30° 51' 31.9"	**ZS190**	**WHO**
Turbidity (NTU)	6.99	5.30	1.51	2.60	1.28	2.30	5.0	5.0
Ph	7.28	7.47	7.04	7.25	7.16	7.14	6.5 – 8.0	6.5 – 8.5
Alkalinity (as mg $CaCO_3$/l)	45	68	102	26	42	31	500	500
Total hardness (as mg $CaCO_3$/l)	54	74	116	36	50	38	500	500
Zinc (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	3.0	3.0
Chlorides (mg/l)	13.0	10.0	9.0	11.0	10.0	9.0	250	250
Nitrates (as NO_3-Nmg/l)	<0.01	<0.01	<0.01	<0.01	0.58	<0.01	10	10
Nitrites (as NO_2-Nmg/l)	0.002	<0.001	<0.001	0.045	<0.001	0.021	1.0	0.1
Ammonia (as NH_4-Nmg/l)	<0.01	0.04	<0.01	0.01	<0.01	0.07	-	1.5
Total phosphates (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	0.45	-	6
Sulphates (mg/l)	8.60	13.90	5.80	6.90	8.00	4.90	400	250
Copper (mg/l)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	1.0	2.0
Conductivity (µS/cm)	71	81	144	21	70	22	1500	1500
Cadmium (mg/l)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
Chemical Oxygen Demand (as mg O_2/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-
BACTERIOLOGICAL RESULTS								
Total coliforms (#/100ml)	900	70	60	0	0	100	0	0
Faecal coliforms (#/100ml)	500	40	40	0	0	40	0	0

Table 2: Water quality results for some groundwater sources in the project area

PARAMETER	NAME OF SOURCE AND GPS COORDINATES						GUIDELINEVALUES	
	Mumbulu area (Well)	Kapoko School (Borehole)	Muchelenge Basic (Borehole)	Salamo Basic (Borehole)	Katoba (Borehole)	Kapengwe Basic (Well)		
	S 12º08'28.3" E 31º 14' 43.0"	S12º10' 53.7" E31º 12' 41.1"	S12º 22' 30.4" E31º 05' 51.9"	S12º 28' 39.9" E31º 03' 44.6"	S12º 54' 18.2" E30º 44' 46.9"	S12º 43' 24.8" E30º 58' 14.6"	**ZS190**	**WHO**
Ph	6.24	5.95	6.70	6.60	6.97	6.85	6.5 – 8.0	6.5 – 8.5
Turbidity (NTU)	16.90	1.20	7.29	11.80	44.60	361.00	5.0	5.0
Conductivity (mMhos/cm)	187	45	112	194	83	182	1500	1500
Total hardness (as mg $CaCO_3$/l)	142	50	72	130	54	144	500	500
Alkalinity (as mg $CaCO_3$/l)	132	44	64	122	50	131	500	500
Iron (mg/l)	1.20	0.02	0.32	1.32	-	1.28	0.3	0.3
Ammonia (as NH_4-Nmg/l)	<0.01	<0.01	<0.01	<0.01	0.10	<0.01	-	1.5
Sulphates (mg/l)	4.40	0.80	2.70	3.30	14.70	2.80	400	250
Chlorides (mg/l)	8.0	8.0	16.0	6.0	8.0	11.0	250	250
Nitrites (as NO_2 –Nmg/l)	0.009	0.009	0.004	0.002	0.051	0.005	1.0	0.1
Nitrates (as NO_3 –Nmg/l)	<0.01	0.31	0.35	<0.01	<0.01	0.70	10	10
Total phosphates (mg/l)	<0.01	<0.01	<0.01	<0.01	0.26	<0.01	-	6
Calcium (mg/l)	39.2	5.6	25.6	50.4		44.0		
Manganese (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	0.1
Copper (mg/l)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	1.0	2.0
Cadmium (mg/l)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
Zinc (mg/l)	<0.001	0.073	<0.001	<0.001	<0.001	0.008	3.0	3.0
BACTERIOLOGICAL RESULTS								
Total coliforms (#/100ml)	120	0	0	0	0	15	0	0
Feacal coliforms (#/100ml)	27	0	0	0	0	0	0	0

Table 3: Water Quality Test Results for some Groundwater Sources in the project area

PARAMETER	NAME OF SOURCE AND GPS COORDINATES				GUIDELINEVALUES	
	Lukulu Basic (Borehole)	Kanona Clinic (Borehole)	Pensulo Roadblock (Borehole)	Serenje Council (Borehole)		
	S12º 49' 34.2" E30º 52'00.2"	S13º 04' 19.5" E30º 37' 40.8"	S13º 02' 23.3" E30º 26' 12.9"	S13º 13' 49.8" E30º 14' 02.4"	**ZS190**	**WHO**
Ph	6.83	6.50	7.11	6.74	6.5 – 8.0	6.5 – 8.5
Turbidity (NTU)	1.17	1.06	5.94	86.80	5.0	5.0
Conductivity (mMhos/cm)	121	115	107	92	1500	1500
Total hardness (as mg $CaCO_3$/l)	86	62	86	50	500	500
Alkalinity (as mg $CaCO_3$/l)	80	60	45	42	500	500
Iron (mg/l)	0.20	0.04	0.18	2.18	0.3	0.3
Ammonia (as NH_4-Nmg/l)	<0.01	<0.08	<0.01	<0.01	-	1.5
Sulphates (mg/l)	1.60	2.00	12.50	8.30	400	250
Chlorides (mg/l)	8.0	11.0	9.0	15.0	250	250
Nitrites (as NO_2 –Nmg/l)	0.001	0.605	<0.001	0.203	1.0	0.1
Nitrates (as NO_3 –Nmg/l)	<0.01	9.14	<0.01	2.18	10	10
Total phosphates (mg/l)	<0.01	<0.01	0.42	0.07	-	6
Calcium (mg/l)	30.4	15.2	26.4	12.8		
Manganese (mg/l)	<0.01	<0.01	<0.01	<0.01	-	0.1
Copper (mg/l)	<0.003	<0.003	<0.003	<0.003	1.0	2.0
Cadmium (mg/l)	<0.0002	<0.0002	<0.0002	<0.0002		
Zinc (mg/l)	<0.001	0.222	<0.001	1.682	3.0	3.0
BACTERIOLOGICAL RESULTS						
Total coliforms (#/100ml)	0	0	0	0	0	0
Feacal coliforms (#/100ml)	0	0	0	0	0	0

5.1.5.3 Soils

Soils in Zambia according to JAICAF (2008) have been formed from a great diversity of parent materials. However, the characteristics and distribution of the soils are largely influenced by climate particularly rainfall. In region III the annual rainfall exceeds 1000mm and the soils are highly weathered and strongly leached. Generally, the soils in the project area include Acrisols, Lithosols and Ferisols. Ferralsols are less fertile than Acrisols. The CEC is less than 16meq and base saturation is low. Soil pH is strongly acid with values less than 4.5. Phosphorous deficiency and Al toxicity of crops are prominent. A major part of the country is covered with Acrisols and Ferralsols. These soils are highly weathered and strongly leached and are thus infertile soils, characterized by weakly structured, loamy topsoils, clayey sub soils. Ferralsols are easy to form stable structures due to the clay properties. The major difference between the two soils is that Ferralsols generally tend to have a uniform texture throughout the profile while Acrisols display a marked clay increase with depth. Topsoil textures of Acrisols show loamy sand or sandy loam while Ferralsols show clayey textures.

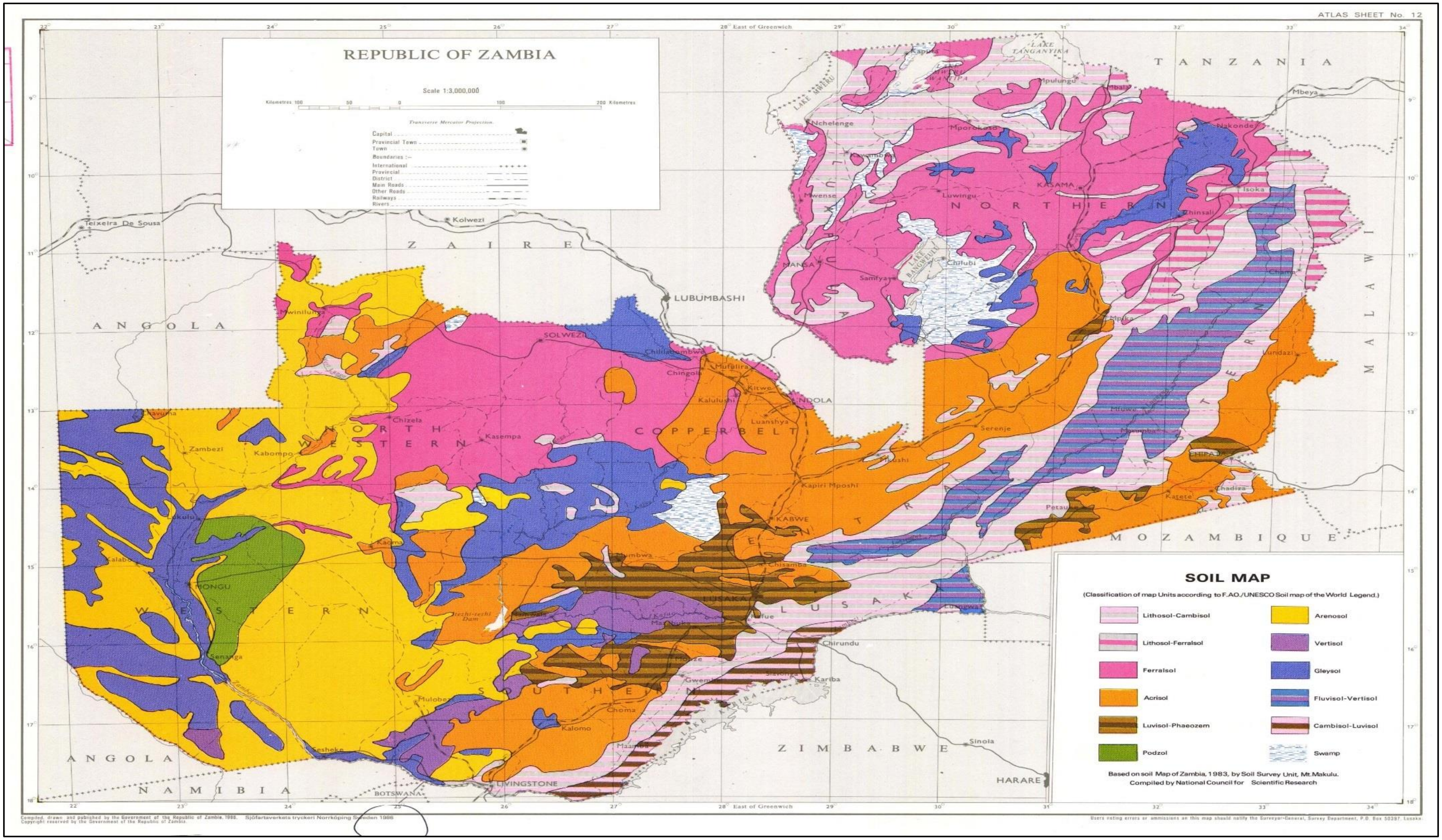
5.1.5.4 Hydrology and Drainage

Major surface water bodies in the project area include Luombwa, Luangwa River and lake Banweulu (figure x below). The Luombwa River which flows in the north rises at the western end of the watershed, crosses the Katanga and joins the Luapula River. Its tributaries are Kasanka and Munte rivers. A large reservoir called Lusiwasi is located within 40m from the road at Chitambo Mission junction (at 77+000km). Rivers in the east of Mpika run from the Muchinga Escarpment and flow via the Luangwa River into the Indian Ocean.

Figure 3: Cartographic Map Showing Major Surface Water Bodies Along the Serenje-Mpika Project Road

Source: United Nations (2004)

Figure 4: Map Showing the Soil Types Found Along Serenje-Mpika Road



Source: GRZ (1986)

5.2 Biological Environment

5.2.1 Vegetation

The vegetation type along the Serenje-Mpika Road is the typical Miombo woodland (Figure 9) which is of two storied with mainly an open and light crown of semi-evergreen to deciduous trees between 15-21m high. The Miombo Woodland is of major importance in protecting the steep terrain from accelerated soil loss. The Miombo thins out towards the Bangweulu Swamps into regional swamp edge parklands comprising small pockets of Woodland into inter-spaced with open grassland. Dominant trees are mainly species of *Brachystegia, Isoberlinia, Julbernardia* and *Marquesia macroura* with *Pericopsis angolensis, Anisophyllea boehmii, Erythrophleum africanum* and *Parinari curatellifolia* as common associates. The road also goes through sections of the Serenje Forest Reserve, Kanona Forest Reserve and Mpika Forest Reserve. The dominant grasses along the road are of *Hyparrehnia, Andropogon* and *Loudetia* species. (Table 5). *It is important to note that, the road project will follow its existing alignment hence, there will be minimal impacts on the vegetation resources in the protected areas. In addition, the preparation of asphalt will be done by use of motorized internal heating system without any use of open fire using firewood which would bring about cutting of vegetation.*

Photo 3: Miombo Vegetation Found Along the Project Area

Termitari species also occur where the soils are waterlogged for most parts of the year and are characterised by termite mounds and low shrubs. The contact zone between edaphic grasslands and the plateau carries chipya forest characterised by woody under Toray under-grown by tall grasses. Other vegetation types include MOPANE and MUNGA woodlands, which are largely confined to the Luangwa Valley and are associated with rich clay soils. Dominant species are the Colophospermaum

mopane. The Miombo Woodland is the most extensive vegetation types and covers most of the plateau. Branchstegia, Isobemadia and Juberrnadia dominate this Woodland (Chidumayo, 1987).

Table 4: Floral species sampled between Serenje-Mpika

No.	Scientific Name		No.	Scientific Name	Common Name
1	*Abrus precatorius*		27	*Julbernadia globiflora*	
2	*Acacia sieberana*		28	*Julbernadia paniculata*	
3	*Accacia polyacantha*		29	*Khaya nyasica*	
4	*Afzelia quanzensis*		30	*Marquesia macroura*	
5	*Albizia antunesiana*		31	*Monotes africanus*	
6	*Bauhinia petersiana*		32	*Ochna leptoclada*	
7	*Brachystegia boehmii*		33	*Parinari curatelifolia*	
8	*Brachystegia spiciformis*		34	*Parinari excelsa*	
9	*Brachystegia utillis*		35	*Paullinia pinnata*	
10	*Bridelia macrantha*		36	*Pericopsis angolensis*	
11	*Cassia abbreviata*		37	*phoenix* palms	
12	*Cocculus hirsutus*		38	*Phyllanthus muelleranus*	
13	*Combretum collinun*		39	*Phyllanthus muelleranus*	
14	*Combretum microphyllum*		40	*Piliostigma thonningii*	
15	*Combretum molle*		41	*Strychnos innocua*	
16	*Cryptosepalum maraviense*		42	*Syzygium cordatum*	
17	*Dichrostachys cinerea*		43	*Syzygium guineense subsp. afromantanum*	
18	*Diospyros mespiliformis*		44	*Syzygium guineense subsp. guineense*	
19	*Entanda abyssinica*		45	*Syzygium guineense subsp. Huillense*	
20	*Erythrina abyssinica*		46	*Syzygium owariense*	
21	*Erythrophluem africanum*		47	*Terminalia mollis*	
22	*Euphorbia sp.*		48	*Terminalia sericea*	
23	*Faurea saligna*		49	*Uappaca kirkiana*	
24	*Ficus capensis*		50	*Uappaca nitida*	
25	*Ficus sycamorus*		51	*Xylopia aethiopica*	
26	*Homalium africanum*				

5.2.2 Fauna

Based on consultations from local people and officials the Department of Wildlife and National Parks (DWNP) in Serenje and Mpika (especially across protected areas of Lavushi Manda National Park) it is clear that, most of the wildlife in areas through which the road passes are restricted outside the 50m road corridor. Based on consultations with DWNP and neighbouring communities in the project areas, it is reported that, rarely does wildlife especially large mammals stray in the busy road corridor with a lot of human disturbance. However, based on the interviews, the following groups of wildlife are commonly seen by the locals and wildlife authorities: *Cercopithecus pygerythrus* (Vervet Monkeys), *OtolESMUr crassicaudatus* (African Hare), *Paraxerus cepapi* (Bushbaby), *Potamochoerus porcus* (Bush Pig), *Sylvicapra grimmia* (Common Duiker). Others include reptiles such as *Kinixys spekii* (Tortoise), *Python sebae natalensis* (African Python) and *Bitis arietans arietans* (Puff Adder). Other groups of fauna along the areas of the project is summarized on Table 6. In all the wildlife in the areas of the project is of least conservation concern in terms of not being rare, endangered or vulnerable as per the IUCN Red Data Lists implying implementation of the project will not have any adverse direct and indirect impacts on wildlife resources.

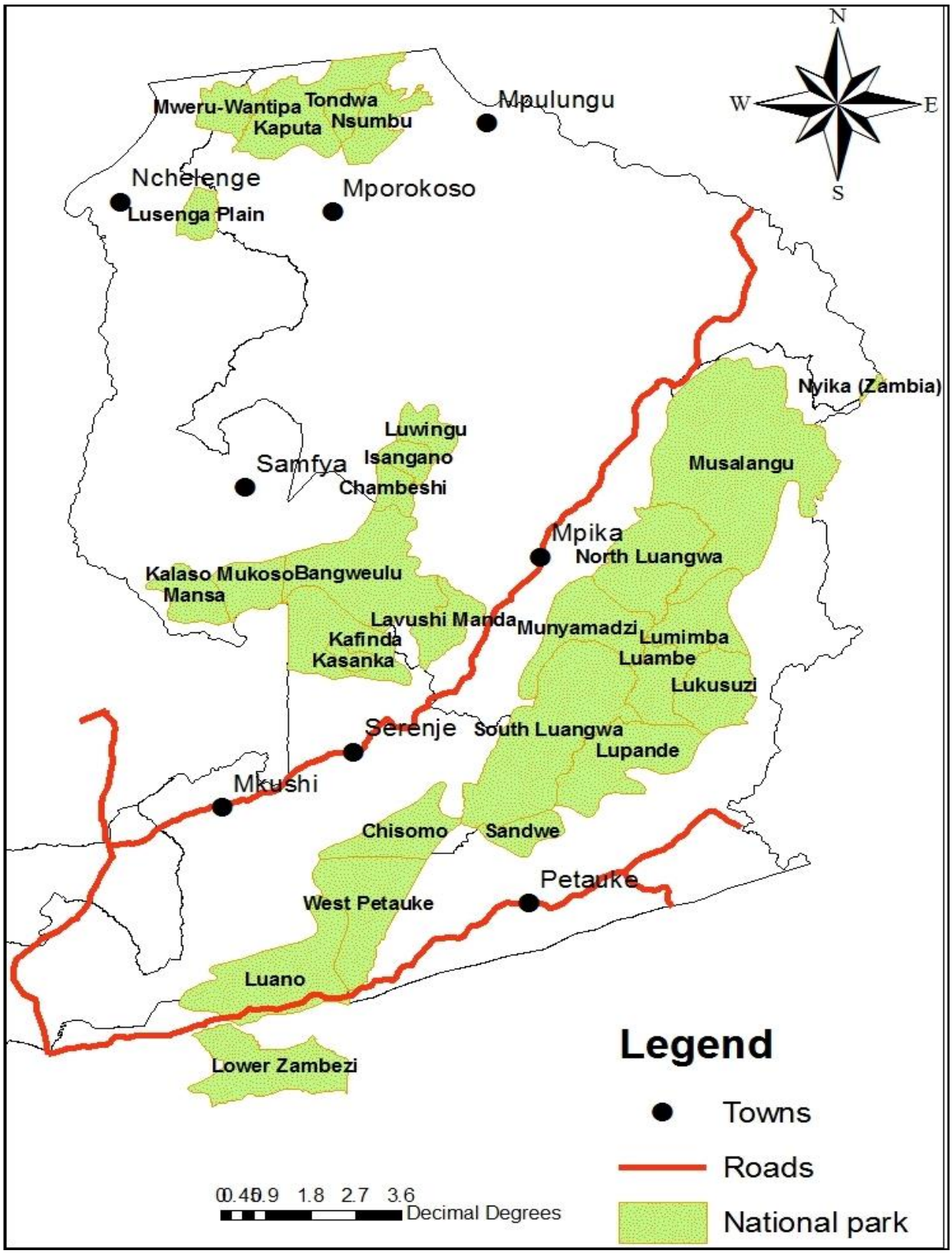


Figure 5: Location of National Parks and game Management Areas in relation to the Serenje-Mpika Road

Table 5: Fauna groups typical in areas of Serenje-Mpika Road

	Scientific Name	**Common Name**
1	*Cercopithecus pygerythrus*	Vervet monkeys
2	*Lepus victoriae*	Hare
3	*OtolESMUr crassicaudatus*	Bushbaby
4	*Paraxerus cepapi*	Bush squirrel
5	*Potamochoerus porcus*	Bushpig
6	*Sylvicapra grimmia*	Common duiker
Reptiles		
	Scientific Name	**Common Name**
1	*Agama aculeate armata*	Spiny Agama
2	*Bitis arietans arietans*	Puff Adder
3	*Chamaeleo dilepis dilepis*	Common Flap-Necked Chameleon
4	*Gerrhosaurus nigrolineatus*	Black-Lined Plated Lizard
5	*Kinixys spekii*	Tortoise
6	*Natriciteres olivacea*	Olive Marsh Snake
7	*Philothamnus hopplogaster*	Southeastern Green Snake
8	*Psammophis phillipsii*	Olive Grass Snake
9	*Python sebae natalensis*	African Python
Amphibians		
	Scientific Name	**Common Name**
1	*Phrynobatrachus natalensis*	Puddle Frog
2	*Ptychadena oxyrhynchus*	Ridged Frog
3	*Xenopus laevis pertersii*	Clawed Frog
Fish		
	Scientific Name	**Common Name**
1	*Alestes lateralis*	Striped Robber
2	*Clarias gariepinus (mossambicus)*	Barbel Catfish
3	*Hydrocynus vittatus*	Tiger fish
4	*Marcusenius macrolepidotus*	Bull Dog
5	*Oreochromis macrochir*	Green Headed bream
6	*Oreochromis mortimeri*	Kariba Bream
7	*Serranochromis robustus*	Yellow Belly Bream
8	*Tilapia rendallii*	Red-breasted
9	*Tilapia sparrmani*	Banded bream
Birds		
	Scientific Name	**Common Name**
1	*Anhinga rufa*	African Darter
2	*Corvus albus*	Pied Crow
3	*Dicrurus adsimilis*	Fork-tailed Drongo
4	*Emberiza flaviventris*	Golden-breasted Bunting
5	*Gallinula chloropus*	Common Moorhen
6	*Kaupifalco monogrammicus*	Lizard Buzzard
7	*Milvus migrans*	Black (Yellow-billed) Kite
8	*Oriolus larvatus*	Eastern Black-headed Oriole
9	*Parus griseiventris*	Miombo Grey Tit
10	*Pycnonotus barbatus*	Common Bulbul
11	*Streptopelia semitorquata*	Red-eyed Dove
12	*Tchagra senegala*	Black-crowned Tchagra
13	*Uraeginthus angolensis*	Blue Waxbill

5.2.3 Protected areas along the Serenje-Mpika Road

There are 3 protected areas in the project area. The forest reserves that are in proximity to the road include Kanona, Mpika and part of the Serenje forest reserves:

5.2.3.1 The Serenje Forest Reserve

It is the largest Forest Reserve in the District covering a total surface area of approximately 29, 680 hectares. Serenje national forest stretches along both sides of the Great North Road to Mateshi–Chipiya in the east and Kalwa Farms in the west. It protects the Munte–Ibolelo catchments and is a source of firewood and bush poles for Serenje Township and the surrounding areas. The vegetation consists of Miombo woodlands. Serenje national forest is situated in Kabamba Chiefdom. It important to note that, the forest reserve is about 10km away from the road project areas.

5.2.3.2 Kanona Forest Reserve

Kanona Forest Reserve is the second largest national forest covering an area of approximately 28, 449 hectares. Kanona National Forest stretches from west of Muchinka–Kafinda (Tuta) turn–off on the west to Chitambo Mission Hospital turn–off on the east and it is heavily encroached by illegal settlers. There are other activities that have degraded parts of Kanona Forest Reserve, and these include clearing of extensive RoW for electricity transmission lines by ZESCO. Other activities include construction of a power line to connect the Manganese Plant and of recent, construction of residential flats that within the bounds of the forest reserve. A gravel road has also been constructed on the right-hand side of Serenje–Mpika Road.

5.2.3.3 Mpika Forest Reserve

In Mpika Boma, along the Serenje–Mpika road on the right side starting from the weigh bridge, is a 2,811 hectares Mpika Forest Reserve P41 stretching about 1.7Km up to the Tazara road township junction. Mpika Forest Reserve extends in a south-easterly direction away from the road. Its vegetation is typical Miombo woodlands type dominated by Brachystegia and Julbenardia tree species. However, officials from the Forestry Department stated that all the reserve forest is rapidly being degraded through encroachment through agriculture, settlement/construction activities, charcoal and occupation by squatters.

Photo 4: Showing a Manganese Plant Construction

5.3 Social- Economic environment

5.3.1 Population

The 2010 Census puts the total population of the Serenje district at 62,327. Of this population, 31,315 were females while 31,012 were males. The population figures indicate that the district had slightly more females than males. The total number of households according to the same document 11,996 puts the number of inhabitants per household at about (5) five. No gender disaggregation of the households is available. For Mpika, its population according to the 2010 Census put the population at 211,425 with an average annual growth rate of 3.8%. Of this population, it is estimated that only about 30% reside in the urban areas while the remaining 70% are in the rural areas.

5.3.2 Ethnicity

The Lala tribe is one of the indigenous and most prominent tribal group found in Serenje district. However, there are other small ethnic groups among the workers and the farming communities. While in Mpika, the Bisa are the major ethnic group though there are other minority ethnic groups from other provinces which have settled in Mpika district for employment or for farming purposes.

5.3.3 Land administration and land use Land Tenure

Land tenure in the project area the same as the rest of the country and is vested in the President who holds it on behalf of the Zambian people. Access to land is on tenure basis as governed by the Lands Act. There are basically two types of land tenure systems in Zambia namely traditional and leasehold. Most of the land in Zambia is held by traditional leaders who have powers to issue it for use by their subjects. No title deeds are issued for land under customary tenure system because this type of land is basically under communal ownership and as such property rights and security is dependent on the traditional leader's goodwill. The advantage of this system compared to leasehold is that everyone belonging to a particular chiefdom has shared ownership rights and cannot be declared landless. User rights on a given piece of land are thus passed on through inheritance or as a gift from the chief or his representatives (headmen or clan leaders).

There are several ways in which villagers gain access to land. Access to land is based on the important traditional principle that all residents of the village are entitled to land for their personal or household use. This means that as far as virgin land is concerned any member of the related community can select a field for growing crops within the village territory. The headman, rather than anyone else, deals with strangers on land issues. The individual owns the land for as long as he or she cultivates it or has built a house or other functional structure. However, traditionally it is held that no one man can own land and that land belongs to the villagers as a group. Individual land ownership of land is thus subject to corporate interests of the village community. Transfer to another person through gifts inheritance, sale or abandonment terminates an individual's land rights.

The chief and village headmen merely represent the village communities and exercise jurisdiction over land in case of conflict or disputes. Despite this conception of land tenure, the Government of Zambia enacted the lands Act No. 29 of 1995 to recognise the title of individuals holding land under customary tenure. The law also provides for the conversion of tenure of such

holding from traditional to leasehold tenure. Consequently, this has set in motion a dynamic of change of tenure with some individuals, especially cash crop farmers, starting the process of converting their customary use and occupation rights into state leasehold tenure. Thus, a mixed form of land holding consisting of statutory leasehold and customary tenure has emerged and is operating at some of the sites surveyed.

5.3.4 Land Use

Agriculture is the main land use along the road corridor and accounts for about 50% of the land area of the project area. Cultivation is done along or near the road or behind or around homestead. Hoe cultivation is mainly practised. The main crops grown in the project area are maize, groundnuts, beans, cotton and tobacco. Apart from agriculture, the project area has well protected game populations in the National Parks and Game Management Areas in the valley. The National Parks include North Luangwa National Park, Kasanka National Park and Lavushi Manda National Park. The Game Management Areas include Bangweulu, Munyamadzi and Mukungule. The GMAs are a buffer zones between the parks where there is conservation without harvesting and the open areas where there is controlled harvesting. There are plenty of animals in the GMAs spilling from the national parks. Other the wildlife the local forests account for about 45% of the total land use in the project area. Settlements which are mostly located along the road occupy the remaining 5%.

5.3.5 Economic activities

5.3.5.1 Agriculture

There are three types of registered farmers in the districts, and they are: commercial farmers who are farmers who have more than 10ha of land under cultivation and there are 6 such type of farmers in the district. The others are the *emergent farmers* who cultivate between 2-10 ha of land. The other category are small scale farmers who typically cultivate less than 2ha of land. This group comprises the remaining number of registered farmers. Generally, these are resource poor and usually cultivate their land by hand.

5.3.5.2 Livelihoods Activities and Strategies

The baseline information obtained along the road corridor indicates that, households typically pursue diverse livelihood portfolios, not because they have plenty of economic opportunities, but as a response to a range of constraints and risks. Much of the road corridor's population is dependent on slash-and-burn, rain-fed agriculture for its subsistence. Maize still dominates the crop production along the road corridor with observed resurgence in the production of traditional crops.

5.3.5.3 Income Composition

Results of the baseline survey show that, most households in the project area earn less than ZMW300 per month, with a significant number of the households earning less than ZMW150 per month. The main sources of income are: (a) own livelihood or economic activity; (b) income from employment paid in cash; (c) unpaid income; (d) other cash income; and (e) income from employment paid in kind. Respondents were asked to identify their main and second source of income. It appears that own livelihood or economic activities play an important role in day-to-day living of households along the road corridor with more than 80% dependent on it.

5.3.5.4 Poverty levels

In terms of poverty levels, majority of household along the road corridor fall within the "poor category" (55%) and over half of these poor households have income far below the upper poverty line (earn less than ZMW150 per month). The household survey revealed that majority of households (38.9%) have between 5-8 members. In terms of household headship, female headed households are more likely to be below the poverty line. Although the results of the household survey indicate that only 23% of the respondent were female headed households, the number of these female headed households living below the lower poverty line is significant (73%) compared to 29% of male headed households living below the lower poverty line. Only 60% of households owned an average of two consumer durable items.

Gender equity

No doubt like many rural parts in Africa, the areas of Serenje-Mpika equally experience glaring gender disparity with women taking on many livelihood ventures and the households' levels. Women are key in household faming, roadside trading to earn additional income for the families and are responsible for the welfare and health of the children. From discussions during the ESIA, the women have few employment opportunities in rural areas especially in road projects as compared to men. To address this disparity and scale up women empowerment, GRZ has in place a National Gender Policy as a tool to guide mainstreaming gender interventions into the development process and planning into the sectors of economy. The gender policy is to facilitate Zambia's gender mainstreaming programs in all sectors of the national economy.

In line with these, RDA has embarked on mainstreaming gender into its policies, plans and activities though the framework tools for this process are at their formative stages. RDA has also two staff i.e. sociologists in its Environmental and Social Management Unit who handle gender issues in its road projects in terms of monitoring compliance and operations of the contractors in line with national gender guidelines. At the district levels, through Community Development Departments together with the NGOs, there are deliberate steps to promote women-based organizations in development work and in Mpika and Serenje districts, they have Food Security Pack Programme (FSPP) to address food vulnerability at households.

Therefore, in the Serenje-Mpika road project, RDA proposes to ensure that, the contractors set aside at least 20% of road work/activities to be undertaken by women especially controlling traffic, masonry works in terms of stone pitching, surveying, clerical based work, medical services and working in contractors' canteen. For their effective involvement, the contractor is to put in place support facilities to enhance their participation such as separate toilets for male and female workers, observe the GRZ 120 calendar maternity leave and 5 days for paternity leave and some sheds for children amongst others.

5.3.5.5 Traditional and religious practices

The family structure within this group is based on monogamous, matrilocal marriage where the husband migrates to settle in the wife's birthplace. However, the trend is slowly changing with cases of patrilocal marriages where the wife relocates to the husbands' birthplace becoming more widespread. There are a number of traditional ceremonies that take place in the project area. The most celebrated ceremony among the Lala people is Chibwela Mushi, which brings together the Lala people of Serenje and the Swaka of Mkushi. Celebrations are held every September in Mkushi district. Traditional ceremonies in Mpika district are practiced annually

in commemoration of some historical events. The major traditional ceremonies are Chinamanongo by the Bisa speaking people under Senior Chief Kopa and Malaila ceremony spearheaded by Chief Nabwalya.

5.3.5.6 Historical and Archaeological Sites

Nachikufu caves (Figure 12) in Mpika District thought to be some 18,000 years old rock paintings at 12°15' S 31°10' E. This is one of the archaeological sites of significance which has the potential to attract both domestic and foreign tourists. It is located 2.2km off Serenje-Mpika road. The cave is an ancient artifact where the Stone Age people lived. It has some schematic paintings of archaeological significance. Government maintains it as a cultural and historical heritage site. On average, annually, the site reportedly receives over 500 foreign visitors leave alone schools and local tour groups. In Serenje, major archaeological sites include the Nsalu caves, the Kundalila falls, the Sancha rock, and the David Livingstone memorial site which are all located some distance from the road.

Photo 5: Main Entrance to the Nachikufu cave

5.3.5.7 Prevalent Diseases

In terms of disease burden and prevalence, information from the health centres visited indicate that Malaria, Diarrhoea, Bilharzia, Respiratory Tract Infections (RTI) and Skin Rashes are the common diseases in the project sites. Vulnerability to HIV/AIDS, TB and malaria has continued to threaten lives and overall well-being of the population along the road corridor. Malaria vectors are widespread in the project sites especially during the rainy season, and the high

prevalence of malaria can also be attributed to lack of ITNs and improper use of the same. Diarrhoea and Bilharzia is attributed to the contaminated water from wells and streams. In addition, as mentioned above, people rarely chlorinate their drinking water and water from boreholes is not accessible to most households. A critical consequence of the disease burden has been the presence of relatively high morbidity and mortality among children and women.

Based on UNAIDS Report of 2014, Zambia now has a generalized epidemic, with HIV spreading throughout the population as opposed to being concentrated in specific populations. Adult HIV prevalence peaked in the 1990s and was estimated at 13.3% in the Zambia Demographic and Health Study (ZDHS) 2013-14 with prevalence in women higher than in men (15.1% compared to 11.3%). However, trends indicate a continuous drop in HIV prevalence at a national level. Provincial prevalence levels range from 7% to 21% (2007). The Northern and North-western Provinces have reportedly the lowest HIV prevalence levels as compared to other regions (UNAIDS, 2014).

5.3.6 Social services and amenities

5.3.6.1 Education

The district education sector in Serenje is managed under District Education Board. The board is responsible for basic education in the district (Grades 1-9). The district has a total of 186 learning institutions broken down as shown in Table 7. High schools include Serenje Boys, Mukando, Ibolelo and Serenje Technical. At tertiary level, the district has two colleges namely, Malcom Moffat Teachers' College and Chitambo School of Nursing.

Table 6: Institutions of learning in Serenje District

S/N	Type	Number	Comment
1	Early Childhood Care, Development Education	2	-
2	Middle basic	63	4 new basic schools constructed
3	Upper basic	33	-
4	High School	3	2 additional high schools are under construction
5	Community school	84	Many community schools inactive due to staff shortages
6	College of education	1	-

Source: SDSA,2010

As for Mpika areas, there are currently 98 basic schools, five high schools, six Secondary Schools, 80 Community Schools, four IRI centres and eight private nursery schools. There are more than 60,000 pupils served by these schools at different levels. The district has very few tertiary institutions which include the Zambia College of Agriculture and Farmers' Institute.

Table 7: Institutions of learning in the district

NO.	Type of institution	NUMBER
1	Schools with open learning centres.	18
2	Middle Basic Schools.	45
3	Upper Basic Schools.	35
4	Secondary Schools.	1
5	High Schools.	5

6	Schools with SEN units.	2
7	Community Schools	80
8	IRI Centres	4
9	Private Schools.	8

Source: Mpika DSA (2012)

5.3.6.2 Health services

Mpika district has two major hospitals namely Mpika District hospital and Chilonga Mission Hospital which is along the road. There are also several health centres, clinics and health posts. The district is operating at 75% of its capacity in terms of human resources with majority being nurses. Although there is a critical shortage of clinical officers within the district, at least each health facility has a qualified member of staff save for two rural health centres namely Mbati and Kabinga (MDSA, 2011). In Serenje, the district has two hospitals: Chitambo and Serenje district hospitals. Other health facilities include two Hospital Affiliated Health Centers (HAHC's), 15 rural health centres and 9 health posts. Theatre facilities are available at Chitambo Hospital and Serenje District Hospital.

5.3.6.3 Water supply and sanitation services

The main provider of water supply services in Mpika and Serenje is Lukanga Water and Sewerage Company (LuWSC). More than 60% of the population has access to safe water while 38% of the population rely on shallow wells and other unorthodox sources. Lack of access to safe water is thought to be one of the reasons or causes of diarrhoeal diseases in the district. Water supply and sanitation services within the township are provided by Lukanga Water and Sewerage Company (LuWSC).

5.3.6.4 Villages/Settlements

Several villages and settlements are dotted along the stretch of the road. Domestic infrastructures found within the road reserve (within 30m from the centreline of the road on both sides) mostly constituted huts, Insanka, kitchens, and pit latrines. Most of the households within the road reserve occur in Mpika district by comparison.

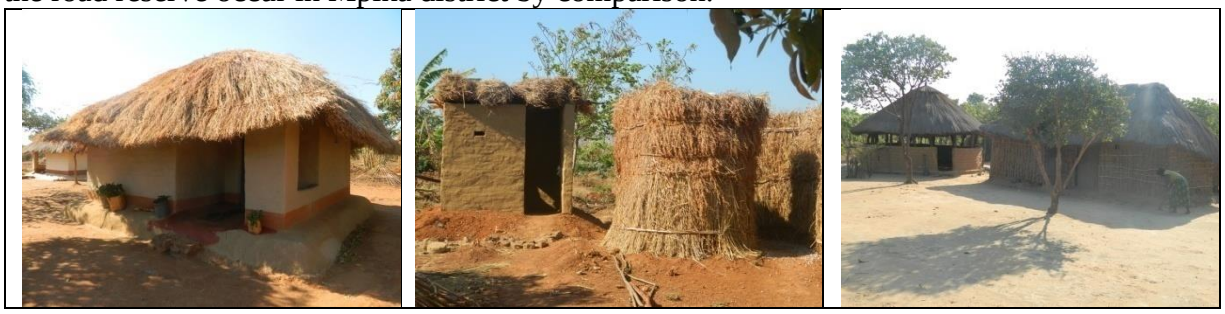


Photo 6: Typical structures for domestic use located within the road reserve (Left: Hut. Centre: Pit latrine and grass wall bathroom. Right: House and Insanka

5.4 Stakeholder Consultations

It is most important that people are aware of developments that are going on or planned for in their localities, particularly when these developments affect their land and their neighbourhoods. It has long been recognised that local communities have a thorough knowledge and

understanding of their natural, physical, cultural and social environments. Logically, therefore, they must be involved in the identification of potential environmental and social issues, as well as in the formulation of remediation measures for any adverse impacts.

Generally, if persons that are likely to be affected by a project are informed well in advance about the project characteristics and activities, they are more likely to accept the consequences of the project. Moreover, they can then prepare and plan, both mentally and physically, for any upheavals or changes to their lifestyles. During the Scoping Study, public consultations were undertaken at various levels in order to elicit the perceptions of the different stakeholders with regard to the positive and negative impacts the project road. While during the detailed ESIA study, consultations were held with district officials in the four project districts, while informal discussions were held with road beneficiaries along the project road.

Stakeholder consultations were further undertaken in September 2022 during the data collection exercise for the affected structures on the 60Km stretch of the road that will be rehabilitated. These were mostly one on one discussions as most of the people were already aware of the plan to rehabilitate the road from Serenje to Mpika.

5.4.1 Objectives of the Public Consultations

The objective of consultations with principal stakeholders and regulators for the Chinsali-Nakonde Road was to acquire and disseminate information, identify and address legislative, community and environmental concerns and to proffer appropriate mitigation options for all identified negative impacts.

The consultation process aimed to:

a. Inform the people about the proposed project/development.
b. Establish areas of co-operation and development with the stakeholders.
c. Identify problems, concerns and needs of the PAPs.
d. Obtain feedback.
e. Build ownership and enhance social acceptability of the project by stakeholders.
f. Evaluate alternatives and seek solutions.
g. Explore how to resolve and avoid conflicts.

5.4.2 Identification and Involvement of Key Stakeholders

With over 7 urban centres and a host of communities cutting across the project area, consultation was deemed to be critical for the success of the EIA process. Some of the key urban centres consulted included Mpika weighbridge, Chilonga Mission areas, Kalonje pump station settlement, Mununga railway station settlement, Chitambo hospital areas and trading centre, Zawa check point, Luapula Junction, Muso urban centre, and Pensulo checkpoint areas. The consultation process was approached as follows:

a. Issuance of notice of intent to carry out an EIA for the proposed development.
b. Sharing the terms of reference with regulatory agencies and potential stakeholders.

c. Sustaining consultation with stakeholders with explanations on key issues as they arise and affect the people.
d. Maintaining effective communication with communities.

The primary stakeholders were identified as being:
a. The immediate communities along the proposed road and within the road reserve.
b. The Municipal Councils and District Authorities along the project area.
c. The Traditional Councils in the project area.
d. The Forest Department.
e. Wildlife management; and
f. The Water Affairs Department.

The stakeholders were consulted indirectly through letters of intent and directly by group discussions. Regulators identified are the Ministry Green Economy and Environment; Ministry of Transport and Logistics; Zambia Environmental Management Agency and the Department of Surveys. The regulators were informed of the proposed project through letters as well as visit to their offices and direct discussion. Discussions were also held with the local authorities, community leaders and traditional leaders to ensure that all issues of concern are adequately addressed.

5.4.3 Field Interaction

The socio-economic aspect of the studies involved field interviews and consultation with the host communities, the leaders, and other community representatives. Field activities took place in August 2016 and minutes of some of those meetings are summarized in Appendices 01-03 with other details summarized below as follows:

5.4.3.1 Summary of key issues of concern raised in the public consultations

The table below illustrates the key concerns that were raised during the public consultations process and how each of these concerns will be addressed during the project implementation.

A Table to illustrate the concerns that were raised and the possible available solutions to those concerns.

S/N	Concern raised during the public consultations	How the raised concerns will be addressed during the project implementation
1	Key concern over-compensation for land, property and trees where there is a tendency and practice to rely on values from Government valuers who are working for Government and not bother much about the people.	The property owners will be engaged to consent to the compensation values that will be determined by the Valuation Experts prior to the compensation being paid
2	Compensation should be effected before project implementation.	Compensation will be paid before the start of civil works at any locality or section of the road.
3	Land use competition because of the need to share available land resources as more people come into the area. This may disadvantage local residents and disrupt their land-based livelihoods. Negative impacts in the form of diseases including introduction of new ones due to influx of people thereby increasing the disease burden.	-The Contractor will be encouraged to employ as many people as possible from among the local community members to minimise the influx of people from outside the project area -An HIV/AIDs program will be implemented alongside the civil works to sensitize people on communicable diseases
4	Support to institutions charged with the responsibility of protecting environmental resources so that they can effectively follow environmental requirements in the road project.	Institutions charged with the responsibility of protecting the environment will be supported mostly through the provision of information/data that they would require in carrying out their mandate and making the Officers on the road project available whenever necessary.
5	Roadside market vendors will be displaced will they be supported to re-settle in some areas as works continue through their sections.	Vendors that own physical structures that are located within the road reserve areas will be compensated to enable them to re-build their structures outside the road reserve area. Adequate notice will be provided for relocation after the compensation has been paid.
6	Change in landscape through borrow pits that create habitats for mosquitoes and malaria problems.	All the borrow pits will be rehabilitated after use to avoid turning such areas into breeding grounds for mosquitoes that cause malaria.
7	Working conditions of the employees especially issues of public health and welfare compared to the conditions of foreigners on the same project.	The country's labour laws will be enforced on the project. The Labour Officers based in the districts along the road corridor will have free access to conduct their inspections.

8	Communication language where contractor staff uses vulgar and abusive language on the locals.	-A code of conduct will be put in place to guide all the employees on the project on the dos and don'ts. -A Grievance Redress Mechanism will be available through which workers and members of the community can raise any such concerns so that appropriate action is taken.
9	Issues of early pregnancies among school going girls.	-A code of conduct will be put in place to guide all the employees on the project on such issues. -Topics on Gender Based Violence will be among the toolbox talks.
10	Influx of other communities into the project area may contribute to potential cross transmission of communicable diseases, there is fear over HIV/AIDS and sexually transmitted diseases.	An HIV/AIDs program will be implemented alongside the civil works to sensitize people on communicable diseases. A specialised Service Provider will be engaged to provide these services.
11	Consultation should go beyond the EIA study phase and resource should be provided to ensure consultation continues throughout project implementation and developers should be informed of this requirement.	-The Contractor will engage Community Liaison Officers to ensure the continued engagement with the local people and other stakeholders -RDA as a Client will regularly visit the project area to interact with the local stakeholders in the project area
12	Negative multiplier effects on economic variables such as rentals and commodity prices due to a high demand unmatched by supply due to an influx of people and this may disadvantage local communities and may also result in other developmental problems. Forest deforestation, because of increased population and activities. Forest reserves are most likely to be affected because of increased economic activities and demand for wood-based energy.	-The Contractor will be encouraged to employ as many people as possible from among the local community members to minimise the influx of people from outside the project area who may cause some economic disturbances. -Cutting down of trees for firewood will be discouraged on the project to minimise aspects of deforestation.
13	Potential for introduction of invasive species used as ornamental plants. This increase is anticipated as is usual with an influx of people into a new area. It may result from people purposively carrying seedlings of plants to grow in the new area. In addition, agricultural crops can carry seeds from invasive plants.	-Introduction of invasive species in the project area will not be allowed.
14	Improved coordination between various sector institutions during road implementation process to avoid duplication in roles and such involvement should be facilitated by the project.	-Monthly site meetings to which the Local Councils can attend will be held to facilitate coordination.

15	Mitigation of involuntary resettlement should focus on facilitating re-establishment of livelihoods of resettled people in the new area and support should continue until they have stabilized.	A Resettlement Action Plan (RAP) document will be prepared to mitigate against the effects of involuntary resettlement.
16	Ensure that all basic sanitation facilities are put in place before the workers are mobilized to the camp site.	The campsites that will be established will have all the necessary sanitation facilities to cater for the number of workers that will be employed. Additionally mobile toilet facilities will be made available at sites outside the campsites.
17	The need to emphasize the importance of EIAs because most developers fail to adhere to the norms and rules of EIAs.	The road project will only be implemented after the EIA has been prepared and approved by the Zambia Environmental Management Agency as the main environmental regulator in Zambia. Additionally, the EIA will also need to be cleared by the African Development Bank who are going to finance the project.
18	Involvement of Members of the DDCC in the monitoring ensures that developers who failed to adhere to such standards of EIAs were challenged.	The DDCC members will be allowed to visit the project site and to provide their guidance.
19	Lack of involvement of district officers was noted as partly being the cause of inadequate consideration of issues of concern and a recommendation was made that the officers should be involved not only at the beginning of the project but when it comes to implementation as well since it is these local officials who knew the resources at hand and how best to safeguard them.	The district councils through their Director of Works will be part of the implementation. They will undertake monitoring activities and will participate in the monthly site meetings that involve the Contractor, Consultant and the Client.
20	Most developmental projects, which came to the area, failed to mainstream issues of HIV/AIDS into their project and the need to ensure that all road construction projects mainstreamed HIV/AIDS.	A specific budget line to address issues of HIV/AIDs and other communicable diseases will be provided in the works contract. This will ensure that issues of HIV/AIDs are mainstreamed on the project
21	Developmental projects should take into consideration the issues affecting children and the developers should make effort to visit the schools and other institutions dealing with the welfare of children and explain how they would be affected.	Contractors will be encouraged to help schools and health centres along the road corridor as part of the corporate social responsibility program. Help may be rendered in the provision of boreholes to enhance water supply at such facilities or as per the needs of a specific facility.

22	Construction works associated with such projects often deny communities their means of livelihood through cutting off access to such sites.	
23	Construction activities across major streams and rivers, which serve as sources of drinking water for the people, often pollute these water bodies, thus denying them their clean water supply.	Pollution of water points will be avoided by the project. Campsites, quarries and borrow pits will be located far away from the water bodies. Sanitation facilities will be made available to the workers to avoid open defection that can ultimately result in water contamination after a runoff.
24	There is a fear among some communities as to whether they will be adequately compensated by the relevant authorities should their crops, houses and valuables get destroyed during the process of construction.	Compensation will be paid to any property owner whose property will be destroyed or damaged because of the road works. The works contract will have a budget line that will cater for such compensations.
25	Potential increase cases of civil and criminal cases because of increased population of people of different backgrounds and increased activities.	The Contractor will be encouraged to employ as many people as possible from among the local community members to minimise the influx of people from outside the project area who may bring such criminal and civil vices in the project area.
26	Neglect by previous governments in terms of provision of infrastructure and social amenities.	Government is committed to improving the infrastructure and social amenities throughout the country. Budgetary constraints usually inhibit the realisation of this commitment.
27	Payment of compensation for damages to their plots and structures and other developments that might be destroyed during construction.	Compensation will be paid to any property owner whose property will be destroyed or damaged because of the road works. The works contract will have a budget line that will cater for such compensations.
28	Employment of their people during and after construction is often promised but never a reality on road projects instead, people are imported from far to work on the projects.	The Contractor will be encouraged to employ as many people as possible from among the local community members.
29	The traditional rulers be informed when the project is about to commence. This is to enable them to inform their people to forestall any uncooperative attitude. If there are areas which are of socio-cultural importance, cultural rites be performed accordingly.	The traditional leadership in the project area will continue to be engaged at every stage of the project to keep them abreast with the developments.

30	Social amenities to be provided for them as way of community social responsibility.	Contractors will be encouraged to implement their corporate social responsibility program.
31	First identify the people who need to be compensated and then evaluate their investments/assets that they have.	This will be done during the preparation of the Resettlement Action Plan
32	Learn from what has been done in other cases especially on Chinsali-Nakonde road and apply such on the project.	The Road Development Agency which will implement the rehabilitation of the Mpika-Serenje section is the same institution in charge of the works on the Chinsali-Nakonde road section and will therefore utilise valuable lessons learnt on the Chinsali-Nakonde and other road projects previously on the Mpika-Serenje road project.
33	Other than the economic compensation, there is need for psychological compensation e.g. by offering an upset allowance because there is no place like home.	Compensation values usually contain an element of disturbance allowance which is paid to the beneficiaries.
34	On the economic livelihood compensation, affected individuals should be given a chance to choose a place where to go and settle.	Individuals will be free to choose a place of their choice for resettlement after having been paid their compensation.
35	Affected people can also be given new skills and some form of start-up capital if there are no chances that they can continue doing their activities.	The Ministries responsible for Community Development and Small and Medium Scale enterprises will be engaged to offer such services to interested individuals.
36	Rivers downstream of the dam should be allowed to continue flowing and support life downstream.	Abstraction of water from the water bodies for use on the road project will be guided by the Water Resources Management Authority (WARMA) who will provide the necessary permits in order not to disadvantage other water users of the same water bodies.
37	The catchment areas should be maintained intact by arresting deforestation which could negatively affected the developed infrastructure e.g. through dam siltation.	Cutting down of trees will be extremely minimal. It will only be restricted to construction sites such as quarry sites and borrow pit areas. There will be negligible tree cutting activities along the road alignment since there will be no change in the road alignment.

38	Compensation should be based on what has been agreed upon with affected parties. In other words, compensation should be according to what has agreed upon.	Affected individuals will sign consent forms to agree to the compensation amounts.
39	The forum or structure to negotiate should be open and transparent.	A transparent process will be put in place through the Resettlement Action Plan.
40	The developer should make assessments of affected assets and approach the affected people for a negotiated settlement.	This is exactly what the Resettlement Action Plan will aim to achieve.

CHAPTER 6

6 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

This chapter presents the environmental and social impacts expected from the proposed rehabilitation works of the road. The impacts were assessed from the changes likely to be brought about by the project activities on baseline environmental conditions. The impacts are discussed under the affected environmental components.

6.1 Biophysical Environment

6.1.1 Impacts on Land and Soil

Construction Phase

In this phase dust raised from gravel access roads by haulage trucks while transporting laterite, stone aggregate, cement, lime, petroleum products and other chemicals may change the soil structure. This impact is considered insignificant. Soil contamination will be caused by leakages from the asphalt plant operations, poor handling of petroleum products such as oil and fuel spillage during dispensing as well as improper disposal of used oils, hydraulic fluids, toxic and empty oil containers. Within the construction phase some activities involving site installation, stockpiles preparation, quarrying, construction of detours, access roads, plant park sites and drainage excavation will cause soil destabilization. Soil compaction by plant machinery and vehicles movement will lead to reduced groundwater yields.

During the construction phase, there is a likelihood of loss of agriculture land and crop produce. This will mainly arise because of people relocating from the road reserve areas where they have been settled for several years and from the borrow pit/quarry site areas. The impact of loss of agricultural land is insignificant as the road reserve area from where the people will relocate from is mostly used for settlement activities as opposed to agriculture activities. Additionally, the impact on loss of produce is likely to be insignificant as people in the project area mostly do their cultivation far away from the fringes of the road.

Operational Phase

Abandoned excess laterite and stone aggregate littered around stockpile areas after construction is completed change the soil structure in the surrounding areas. Similarly, de-vegetated areas resulting from post excavation and grading works including drainage channels enhance soil erosion on discharge areas.

6.1.2 Impacts on Vegetation

Construction Phase

The vegetation to be affected most is that which is confined to the road reserve and where gravel pits will be established. The ecological value of the inundated forests and woodlands to the riverine ecosystem cannot be ignored in that such vegetation stands contain several niches for diversity of animal species. Should the design of the road construction confine the extent of land clearing to the limits of the road reserve, then this will not affect vegetation in the outlying areas. However, trees within the road reserve should be preserved for ecological and aesthetic reasons.

Dust raised from gravel access roads by haulage trucks during the transportation of laterite, stone aggregate, cement, lime, petroleum products and other chemicals including emissions from plant machinery and vehicles hamper normal growth of roadside vegetation. Similarly, Poor disposal of toxic waste and petroleum products hampers normal growth of vegetation. Loss of vegetation in this phase is caused by activities related to clearing of sites for installation of works, clearing of the quarry site, preparation of stockpile area, construction of detours, access roads and park sites and the demand for fuelwood by labour force.

Operational Phase

There are no significant impacts on vegetation associated with the operation phase.

6.1.3 Impacts on Protected Areas

Construction Phase

The project area is largely void of megafauna mainly because the road reserve is expansive, regularly maintained through cutting of vegetation and a distance away from protected areas such as Lavushi Manda, South and North Luangwa and Kafinda-Masanda areas. In addition, the road reserve will not be cleared during project implementation. The ESIA baseline did not come across any significant wildlife. However, off-road activities such as sourcing construction materials will potentially disrupt any wildlife habitats (if done in protected areas) and possible smaller wildlife species in such habitats

Operational Phase

During this phase, it is possible that stray animals from nearby protected areas such Lavushi Manda National Park might be at risk of mortality due to speeding vehicles on the improved road. However, this is more common for small animals such as rodents and night Owls (Pululu).

6.1.4 Impacts on Surface Water

Construction Phase

During construction phase, the bridges, side drains, mitre drains and culverts will require cleaning, de-silting, reshaping and repair. Some of the drains and culverts might be prone to soil erosion, which will result in siltation of nearby watercourses. Also impacts on water quality may be caused by contaminated run-off of petroleum product spillages, leakages from storage areas and heavy vehicles, improper disposal of used oils and from hydraulic fluids which enters the nearby surface water sources. Similarly, easily eroded destabilized soils may be washed into surface water sources and cause siltation and sedimentation which will reduce the water quality and impact on aquatic life. Activities that will give rise to this impact include construction of detours, access roads, drainage channels, excavation and grading works. During construction phase water will be needed for various purposes such as for watering down the dust. Abstraction of water in large quantities from local sources may lead to water shortage to the local community. This impact is considered significant. In some section of the road, the Contractor will set up temporary camps for its labour force and will require sanitation facilities such as pit latrines. Construction of sub-standard pit latrines for campsite labour force may contaminate groundwater due to seepage to the groundwater.

Operational Phase

Excess construction material left after construction works may be washed into the water sources and lead to sedimentation of water sources and lowering of the water quality. Erosion of bare areas resulting from excavation and grading works and construction of drainage channels may increase runoff which will lead to sedimentation and increased turbidity in surface water as well as reduced groundwater infiltration. Further hazardous materials spilled from haulage vehicles and washed into water sources will result in water pollution.

6.1.5 Impacts on Ground Water

Construction Phase

Possible impacts during this phase include pollution of ground water as a result of seepage/leakage of fuels and oils from the storage area at the camp, during servicing of vehicles or equipment and due to leakages from construction equipment.

Operation Phase

The risk of pollution is expected to be low during this phase. Impact sources during this phase are mostly from vehicle spills of oils, fuels or chemicals especially from heavy vehicles such as trucks. The Great North Road has seen so many traffic accidents not only due to the bad state of the road but also due to the landscape and topography of the terrain.

6.1.6 Impacts on Air Quality

Construction Phase

During construction phase large amounts of soil will be excavated and transported. The machinery used for excavation will generate dust, which can be dispersed by the wind affecting a zone of up to 100m around the excavation. Emissions to the air in form of exhaust fumes and dust from vehicles and machines including operations from the asphalt plant may cause nuisance to the closest surroundings. Dust raised from gravel access roads by haulage trucks during transportation of materials will also pollute the air of the immediate local environment.

Operational Phase

Impact on air quality in the operational phase is likely to come from increased vehicular traffic flows which proportionately discharge emissions to the air. In addition, loose soils on cleared areas may be blown off during strong winds and raise dust particulate matter, which may affect the quality of the air.

6.1.7 Impacts of Noise and Vibrations

Construction Phase

During construction phase heavy machinery will be used for the excavation of soil. The machines are noisy and will cause a certain degree of nuisance to the surrounding environment. The noise levels of machines and vehicles vary widely and depend on the type of noise generated and level of activity. A front-end loader has for instance a power level of 100dB(A) while a truck will have a power level of 85 dB(A).

In the worst case a combined power level of 115 dB(A) will be in place during construction which will result in the 50 dB(A) contour being located at a maximum 250m from the

construction site. However, since the equipment will never work at the same location the 50 dB(A) contour will be confined to the construction site and within the road reserve area.

Some common impacts of noise nuisance include annoyance, sleep disturbance and interference with communication. Acceptable levels of noise are regarded to be 40 dB(A) during the night and 50 dB(A) during the day. Since construction will take place during the day only the 50 dB(A) level is of importance.

Operational Phase

During operational phase the source of noise is expected to come from increased traffic and heavy vehicles using the inner ring road. In both air and noise assessment, the survey also identified potential impacts that are likely to emanate during construction and operation of the Inner Ring Road and the cardinal measures to mitigate these impacts and predicts the air quality and noise levels as they will impact on the environment and the surrounding communities in accordance with the legal framework in Zambia. Furthermore, a tentative schedule and operational budget has been suggested for the monitoring of these impacts. The quantitative data collected for both air quality and noise is logically and chronologically presented in tabular and graphic forms for easy perception. The results for all the components covered are discussed at the end of each respective component.

6.1.8 Impacts on Landscape and Aesthetics

Construction Phase

Generation of dust during quarrying, equipment movement including land clearing for stockpiles as well as reshaping during detour, access roads and park site construction distorts the natural landscape and may degrade areas of scenic beauty. Furthermore, extensive excavations and dumping of stripped topsoil in scenic area spoils the beauty of the areas. During construction phase, several quarries and borrow pits along the route will be opened up. Potential impacts include vegetation clearance and landscape scars resulting from the absence of re-vegetation programmes and poor excavation techniques. Extraction of construction materials from quarries and borrow pits could generate excessive noise caused by blasting, movement of machinery and labourers and thus impact on the nearby communities. Also increased air pollution due to diesel fumes and dust generation resulting from the presence of construction machinery and site clearing activities.

Quarries and borrow pits impact on the visual and aesthetic view. The excavated areas become prone to soil erosion during rainy season and can contaminate nearby surface water.

Operational Phase

Abandoned structures, which are left near areas of scenic beauty after construction works, excess construction materials of laterite, stone aggregate and concrete slabs left in areas of scenic beauty reduces the quality scenery. Quarries and borrow pits left abandoned after construction works could be a potential hazard to ecology and nearby communities. Transmission of diseases, such as malaria and their vector can occur in stagnant water collected in abandoned borrow pits. Malaria that is transmitted by the anopheles' mosquito and diarrhoea are both water-related diseases. Thus, the potential impact from poor extraction techniques and lack of re-vegetation programmes is considered significant. Further if the quarries and borrow pits are sited nearby communities the pits could become habitats for dangerous creatures such

as snakes, which can easily attack unsuspecting children playing in these abandoned quarries and borrow pits.

6.1.9 Impacts on Solid and Hazardous Waste

Construction Phase
The expected type of waste to be generated at site are construction waste such as plastics, cement bags, rock waste, cleared vegetation, plastic containers and demolition rubble, etc. Domestic waste would generally consist of ordinary municipal waste comprising paper, plastic, bottles, tins, vegetable matter and food waste, etc. In addition, waste would be produced at the camps including sewage and petroleum product waste from storage facilities. RDA intends to set up or engage a licensed firm to collect and dispose of waste from camp site to designated sites.

Hazardous waste materials such as used oils, batteries and tyres that will be generated at the project area will be stored in a well bunded, secure and labelled area and will be transported from the project area by an engaged licenced Transporter who have them disposed at designated sites in accordance with the ZEMA regulations.

6.2 Socioeconomic and Cultural Impacts

6.2.1 Impacts on Land Use

Construction Phase
The land-use along the road is characterized by trading areas, arable land, rough grazing with trees, settlements and wood & forests. Trading places and settlements within the Right of Way (100 m) will have to be removed to pave way for the road project. A new bypass to accommodate traffic on the Great North Road will be constructed while the project road is being rehabilitated. This will result in the clearing of vegetation. This will temporarily affect existing uses for such land.

Operation Phase
There are no anticipated impacts on land use during this phase as the road will have been fully rehabilitated and operational following its current alignment.

6.2.2 Impacts on Loss of Land and Property

Construction Phase

Less extreme impacts will be felt by Project Affected Persons dwelling within the project corridor who will lose smaller segments of their land and property and who won't have to physically migrate from their present living arrangement or place of business. A separate RAP Report has been prepared to mitigate this kind of impact and has been submitted together with this ESIA Report.

6.2.3 Impacts on Archaeology and Cultural Heritage

Construction Phase

During the construction phase of the Project. The potential negative impacts could be damage to archaeological finds that may be exposed or unearthed during construction works. If by any chance cultural and natural heritage resources are exposed or unearthed during the construction phase, such incidences will be reported to the relevant authority concerned with such matters.

Operation Phase

There are no anticipated impacts during this phase

6.2.4 Impacts on Traffic and Road Safety

Construction Phase

The project will likely result in an increase in construction related traffic in the local area travelling to and from the site delivering materials and removing waste as well as associated with the transportation of workers. The increase in traffic is likely to result in increased traffic congestion and decreased road safety. Increase in traffic and decrease in road safety may potentially cause traffic-related injuries and fatalities among members of the public including construction workers.

Operation Phase

During this phase the road would have been upgraded to its new design standards, hence will accommodate more international traffic. It is anticipated that there will be reduced road fatalities as compared to the current scenario as the road would have been rehabilitated and improved.

6.2.5 Impacts on Occupational Health & Safety

Construction Phase

During the construction phase heavy machinery will be employed. Heavy machines make a lot of noise, cause carbon dioxide emissions and generate dust and may cause accidents among operators if not handled properly. This is likely to have negative impact on health of the workers. To limit the risk of accidents, safety procedures will be put in place and enforced by the foreman to ensure that vehicles and machinery only drive in designated places by authorized personnel.

Operation Phase

As the road construction project would have been completed there will be no construction workers on site and there will be no more impact from this phase. Contractors undertaking periodic maintenance of the road may also be prone to accident risks from cruising vehicles on the operational road.

6.2.6 Impacts on Demography

Construction Phase

Population density along the proposed road will change as the road construction activities are labour intensive. This means that people from other areas will come and be engaged as casual workers, hence increasing the existing population. The male population, especially, will show

an upward trend. This influx in population may result in land use change and increased pressure on local resources.

Operation Phase
Some of the migrants that come in search for job opportunities, may settle along the road, which will increase on the number of settlements along the road contributing to increased road traffic accidents especially in road sections devoid of road signage during the operational phase.

6.2.7 Impacts on Public Health

Construction Phase

Communicable diseases may be transmitted during the construction phase through interaction between construction workers and the local community. Such diseases may include acute respiratory infections and tuberculosis (TB), HIV/AIDS, Hepatitis B and C, and other sexually transmitted infections and Malaria. There is a risk that the workforce employed during the construction period of the Project could impact the local communities' health status. Groups vulnerable to health impacts would include young children, the elderly, the socio-economically deprived, and groups with chronic health conditions. The origin, size and health status of the workforce (some of whom could be recruited outside of Zambia), and their cultural norms, could influence the nature and severity of these risks.

Following the outbreak of the Covid-19, the contractors will be expected to put in place preventive measures in conjunction with the Provincial Medical Office (PMO) and the District Medical Offices (DMO). These measures include the following where necessary.

- Provision of face masks to workers
- Provision of hand washing facilities at campsite entry points.
- Provision of alcohol-based hand sanitizers to workers on site
- Temperature checks at campsite entry points
- Disinfection of vehicles with chlorine at campsite entry points
- Regular disinfection of offices.

Measures will be put in place in collaboration with Health Authorities to address any other future pandemics/epidemics that may arise during the lifespan of the project.

Operation Phase
Communicable diseases may appear or increase in incidence owing to the influx of migrants to the area. Increased mosquito activity resulting from construction actions may also have harmful effects on populations adapting to the new environment. There are also likely to be socio-demographic changes associated with changes in reproductive behaviour and women's activities.

6.2.8 Impacts on the Local Economy

Construction Phase

Employment Creation: The execution of the project will require employment of different professionals and casuals at different stages. Firstly, there will be creation of job opportunities to the consultants for design and supervisory works. After the designs, a contractor or

contractors will be engaged to carry out construction works. It is estimated that, the road project will employ close to 500-800 workers in the various project activities which will translate to household earnings and support to the families.

Local procurement: The construction phase will generate contracts for the purchase of equipment and other goods and services. While many of these contracts will be for specialist goods and services, there is likely to be some potential for procurement from businesses at the local and provincial levels, which will be significant for the local economy.

Increase in the local prices: There could be a significant, though short-term improvement in the local economy (for example due to local procurement of supplies and services by the construction camp). However, there could also be an increase in the price of local goods, which could make life more difficult for those vulnerable sectors of society that are unlikely to benefit from the construction phase and are already economically strained.

6.2.9 Impacts Due to Improved Socioeconomic Conditions

Improved access to social amenities

The improved road is expected to enhance the movement of people to access social amenities like hospitals and clinics. Since the road which is existing, and that, the project will only improve its motorability, this impact is expected to be of moderate magnitude.

Improved quality of livelihoods

During the period, the project will be running, there will be enhanced quality of livelihoods for those who will be employed. People who will directly or indirectly be employed will earn incomes which they can use to buy food, clothes and school requisites for their children, and pay for medical services. This will lead to improved quality of life to the beneficiaries. The impact will be significant but of short-term mode.

Support tourism development

Furthermore, the road will lead to improved tourism as it connects to some tourist sites such as Nachikufu caves (some 55km to Mpika), Chipoma Falls on R. Lubu towards Chinsali and Lwitikila Falls (15km from Mpika) close to Isoka towards Chinasali areas. Other areas of tourist interest include Nsalu caves, the Kundalila falls, the Sancha rock, and the David Livingstone memorial site.

Contribute to national and regional socio-economic development

Improvement of the road will have positive, significant, and long-term local, national and regional socio-economic impacts. These include reduced vehicle wear/tear; reduced travel time; safer journeys with reduced accident risk. Accident rates will likely change following improvement in road geometry and pavement. Rehabilitation the project road will improve visibility, reduce braking distances, and have road signs installed where none existed.

Support agricultural development

The northern region where the road project falls is considered the food basket in Zambia as such, the road will improve transportation of agricultural produce to markets in the neighbouring countries especially Tanzania. The project area also has potential to develop its livestock industry especially on the Mkushi-Chitambo section of the road.

Council increased revenue base in personal levies and other services

Provision of goods and services by local contractors will result in revenue earnings for the Councils. This may be through personal levies and other services the Council may provide to these local suppliers. Considering the low levels of capacity of the local enterprises in Serenje and Mpika, this impact will be low and short term.

Opportunity to Improve Drainage

The road is an existing road, hence the impact of the existing road as a barrier to natural drainage can be observed especially on low lying areas such as is the case at Ch.19, where water sometimes flood. It is intended that the present effects of the road will be studied, as part of the overall design process, to improve drainage in general.

6.3 Evaluation of Environmental and Social Impacts

This chapter presents the environmental and social impacts expected from the proposed rehabilitation works of the road. The impacts were assessed from the changes likely to be brought about by the project activities on baseline environmental conditions. The significance of the environmental impact arithmetic product of the ratings for likelihood and consequence of the environmental impact shown.

6.3.1 Impact Assessment Model

Impact significance is determined as a function of the receptor's sensitivity (environmental value), the severity and magnitude of the impact (degree of change) taking into account its duration on the environmental components it affects.

Table 8: Ranking of Evaluation Criteria Matrix

CONSEQUENCE		LIKELIHOOD	
Geographic Extent of Impact	**Rating**	**Frequency of Impact**	**Rating**
Site	1	Rare	1
Local Area	2	Unlikely	2
Regional	3	Occasional	3
National	4	Likely	4
International	5	Almost certain	5
Impact Duration	**Rating**	**Receptor Sensitivity**	**Rating**
Construction Phase	1	Negligible (No change)	1
Operational Phase	2	Low (Detectable but minor change)	2
Decommissioning Phase	3	Medium (Detectable change – non-fundamental)	3
All Project Phases	4	High (Detectable change – fundamental temporary	4
Post-Closure Phase	5	Very high (detectable change – permanent change)	5

Table 9: Ranking of Severity Level of Environmental Impact

Severity	Natural Environment	Rating
Insignificant	The impact is very little and will not have significant influence on the environment. Limited damage to minimal area of low significance.	1
Minor	Environment affected but natural and/or manmade functions and processes continue. Minor short-medium term damage to small area of limited significance.	2
Moderate	The impact alters the affected environment in such a way that the natural processes or functions are not affected and where restoration activities can be accomplished. Moderate short-medium term widespread impacts.	3
Major	Environment affected to the extent that natural and/or human-made functions are altered but can be reversed. Relatively widespread medium-long term impacts.	4
Severe	Long-term, widespread effects on significant environment.	5

Table 10: Evaluation of Overall Significance Ratings

LIKELIHOOD (Frequency of activity frequency of impact x Sensitivity)	CONSEQUENCE (Magnitude x Geographic Extent x Duration of impact)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Figure 6: Determination of Overall Significance

Insignificant	1-24	Acceptable positive and negative impacts subject to periodic passive monitoring measures. Should have no significant influence on the proposed development project.
Minor	25-50	Acceptable positive and negative impacts subject to regular passive monitoring measures. Positive impacts should weigh towards a decision to continue.
Moderate	52-75	Acceptable positive and negative impacts subject to regular active monitoring measures. Positive impacts should weigh towards a decision to continue, should be enhanced in final design.
Major	77-120	Unacceptable negative impacts which require constant active monitoring, and measures to be put in place to reduce exposure. Negative impact should weigh towards a decision to terminate proposal, or mitigation should be performed to reduce significance to at least a moderate significance rating. Positive impact should weigh towards a decision to continue, should be enhanced in final design.
Significant	126-150	Unacceptable level of risk exposure which requires immediate corrective action to be taken. If mitigation cannot be implemented effectively for negative impacts, proposal should be terminated. Positive impact should weigh towards a decision to continue, should be enhanced in final design.

6.3.2 Positive Socio-Economic Impacts

6.3.2.1 Impacts on Local Economy

The execution of the project will require employment of different professionals and casuals at different stages. It is estimated that, the road project will employ close to 800-1,200 workers in the various project activities which will translate to household earnings and support to the families. The construction phase will also generate contracts for the purchase of equipment and

other goods and services. While many of these contracts will be for specialist goods and services, there is likely to be some potential for procurement from businesses at the local and provincial levels, which will be significant for the local economy. The new road with its increased traffic flow and road furniture such as ley byes will provide a market for local people to sale different assorted farm merchandise such as chickens, fruits, vegetables and charcoal to motorists using the improved road.

Significance Rating for Impact on Local Economy

Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Major	International	All project phases	Medium	Likely	Major
4	5	4	3	4	13 x 7
13			7		91
Recommended Enhancement Measures RDA shall seek to employ unskilled workers from within the project area to empower the local community RDA shall include a clause to procure available materials and food items from the local urban or rural areas in the tender documents					
Modified Impact Assessment					
Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Major	International	All project phases	High	Almost certain	Major
4	5	4	3	5	13 x8
13			8		108

6.3.2.2 Impacts due to improved Socio-Economic Conditions

The improved road is expected to enhance the movement of people to access social amenities like hospitals and clinics. Furthermore, the road will lead to an improvement in the tourism sector of the region as the project road provides access to tourist sites such as the Nachikufu caves (some 55km to Mpika), Chipoma Falls on R. Lubu towards Chinsali and Lwitikila Falls (15km from Mpika), Lavushi Manda National Parkand, David Livingstone memorial site, Bangweulu wetlands (a Ramsar site) Kasanka National Park in Serenje district (a designated international bird sanctuary) and South Luangwa National Park (in Mpika district). Tourists will come with the much-needed foreign currency and contribute to national and regional socio-economic development.

Significance Rating for Impacts on Socio-econonic Conditions

Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Major	Regional	Operational phase	Medium	Likely	Major
4	3	2	3	4	9 x 7
Duration			7		63
Recommended Enhancement Measures RDA shall conduct routine and periodic maintenance of the project road to sustain its lifespan All traffic using the project will be subjected to either a weigh bridge or made to pay a Toll fee for using the road					
Modified Impact Assessment					

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Major	Regional	Operational phase	High	Almost certain	Major
4	5	2	3	5	11 x8
11			8		88

6.3.3 Negative Socio-Economic Impacts

6.3.3.1 Impacts on Land Use

The land-use along the road is characterized by trading areas, arable land, rough grazing with trees, settlements and wood & forests. Trading places, housing units and fields within the Right of Way 100 m in rural sections and 36 m in urban sections will have to pave way for the road project. A new bypass to accommodate traffic on the Great North Road will be constructed while the project road is being rehabilitated that will require the clearing of vegetation. This will temporarily affect existing uses for such land.

Significance Rating for Impacts on Land Use

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Regional	Construction phase	Medium	Likely	Moderate
3	3	1	3	5	7 x 8
7			8		56
Recommended Enhancement Measures Trading areas, housing structures and fields that may be affected along the right of way will be compensated for before resettlement					
Modified Impact Assessment 4					
Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Regional	Construction phase	Medium	Likely	Minor
2	3	2	3	4	7 x7
7			7		49

6.3.3.2 Impacts on Cultural and Natural Heritage

During the construction phase of the Project. The potential negative impacts could be damage to archaeological finds that may be exposed or unearthed during construction works. If by any chance cultural and natural heritage resources are exposed or unearthed during the construction phase, such incidences will be reported to the relevant authority concerned with such matters.

Significance Rating for Impacts on Cultural and Natural Heritage

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Regional	Construction phase	Medium	Unlikely	Minor
2	3	1	3	2	6 x 5
6			5		30

Recommended Mitigation Measures					
Any chance finds will be handled and secured in line with appropriate procedure and reported to the National Heritage and Conservation Commission Since the project road will follow the existing alignment, it is expected that there will be minimal impacts on cultural resources					
Modified Impact Assessment					
Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Insignificant	Regional	Construction phase	Medium	Unlikely	Minor
1	3	1	3	2	5 x5
5			5		25

6.3.3.3 Impacts on Road Traffic and Safety

The project will likely result in an increase in construction related traffic along the Great North Road. The increase in traffic is likely to result in increased traffic congestion and decreased road safety especially that the route is normally used by heavy trucks. Increase in traffic and decrease in road safety may potentially cause traffic-related injuries and fatalities among members of the public including construction workers.

Significance Rating for Impacts on Traffic and Safety

Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Regional	Construction phase	High	likely	Moderate
3	3	1	4	4	7 x 8
7			8		56
Recommended Mitigation Measures • Appropriate traffic control measures such as the use of signage and construction of a temporal bypass to divert traffic from the construction area on the great north road will be constructed • The contractor will prepare and implement a construction phase health and safety plan to protect workers and the public safety					
Modified Impact Assessment					
Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Regional	Construction phase	High	likely	Minor
2	3	1	4	4	6 x8
6			8		48

6.3.3.4 Impacts on Occupational Health and Safety

Construction workers will be exposed to several hazards due to operation of heavy equipment, working in excessively noise areas, traffic and dust generation. To limit the risk of accidents, safety procedures will be put in place and all workers will be inducted on how to protect themselves. During the operation phase as the road construction project would have been completed there will be no construction workers on site and there will be no more impact from this phase. Contractors undertaking periodic maintenance of the road may also be prone to accident risks from cruising vehicles on the operational road.

Significance Rating for Impacts on Occupational Health and Safety

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Regional	Operation phase	High	likely	Moderate
3	3	2	4	4	8 x 8
8			8		64
Recommended Mitigation Measures ▪ The Contractor will induct workers in construction site safety procedures through before engaging workers ▪ All workers will be provided with full PPE ▪ Appropriate signage will be displayed about the project area to incoming traffic so as divert it to the temporal by pass					
Modified Impact Assessment					
Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Regional	Operation phase	High	unlikely	Minor
2	3	2	4	2	7 x6
7			6		42

6.3.3.5 Impacts on Public Health

Communicable diseases may be transmitted during the construction phase through interaction between construction workers and the local community. Such diseases may include acute respiratory infections and tuberculosis (TB), HIV/AIDS, Hepatitis B and C, and other sexually transmitted infections and Malaria. There is a risk that the workforce employed during the construction period of the Project could impact the local communities' health status. Groups vulnerable to health impacts would include young children, the elderly, the socio-economically deprived, and groups with chronic health conditions. The origin, size and health status of the workforce (some of whom could be recruited outside of Zambia), and their cultural norms, could influence the nature and severity of these risks.

Operation Phase

Communicable diseases may appear or increase in incidence owing to the influx of migrants to the area. Increased mosquito activity resulting from environmental liabilities left by the newly upgraded road may also pose harmful effects on populations adapting to the new environment.

Significance Rating for Impacts on Public Health

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Regional	Operation phase	High	Almost certain	Moderate
3	3	2	4	5	8 x 9
8			9		72
Recommended Mitigation Measures ▪ Contractors engaged on the project road shall comply with the RDA health and safety policy manual ▪ The contractor shall as part of daily safety awareness briefs sensitise workers on issues pertaining to STIs/STDs, Tuberculosis and provide all construction workers with condoms					

▪ Construction workers shall be encouraged to spend time at their matrimonial homes on their off days

Modified Impact Assessment					
Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Regional	Operation phase	High	likely	Moderate
2	3	2	4	4	7 x8
7			8		56

6.3.3.6 Impacts on Demography

Population density along the proposed road will rise as the road construction activities are labour intensive. It is anticipated that people from other areas will come and be engaged as casual workers, hence increasing the existing population. The male population, especially, will show an upward trend. This influx in population may result in land use change and increased pressure on local resources.

Significance Rating for Impacts on Demography

Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Regional	Operation phase	Low	Likely	Minor
3	3	2	2	4	8 x 6
8			6		48
Recommended Mitigation Measures					
▪ Some of the migrants will be employed as unskilled workers on the project road ▪ Contractors will be encouraged to buy available food items such as fruits and vegetables from the local community					
Modified Impact Assessment					
Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Regional	Operation phase	Low	Unlikely	Minor
2	3	2	2	2	7 x6
7			8		42

6.3.3.7 Impacts on Grievances

Just like any other projects it is envisaged that during the implementation of the project, grievances are bound to arise especially from the communities where the project will be implemented. These grievances may relate to land acquisition and compensation, construction and social related issues. Grievances are bound to surface at different stages of the project cycle. Some grievances may arise during the project design and planning stage, while others may come up during the project implementation process. Not only should Project Affected Persons (PAPs) be able to raise their grievances and be given an adequate hearing. Satisfactory solutions should also be found that mutually benefit both the complainants and the project.

Significance Rating for Impacts on Grievances

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Regional	Operation phase	Low	Likely	Minor
3	3	2	2	4	8 x 6
8			6		48
Recommended Mitigation Measures ▪ A Grievance Redress Mechanism (GRM) will be put in place to address complaints from both the workers and the community members on the road project ▪ Grievances will be expected to be resolved within 7-10 working days after they have been reported					
Modified Impact Assessment					
Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Regional	Operation phase	High	Almost certain	Moderate
3	3	2	4	5	8 x9
8			9		72

6.3.4 Positive Impacts on Biophysical Environment

There is no positive impact on the biological and physical environment associated with the rehabilitation of the Serenje-Mpika road.

6.3.5 Negative Impacts on the Biophysical Environment

Negative impacts on the physical and biological environment have been assessed based on how project induced activities or aspects are interacting with valuable ecosystem components.

6.3.6 Impacts on the Physical Environment

6.3.6.1 Impacts on Land and Soil

Impacts include alteration of the landscape during opening of quarries and borrow pits, modification of soil texture and structure in the immediate vicinity of the road through compacting from the operation of heavy construction equipment. Soil contamination due to improper storage of materials, fuels and poor waste oil disposal methods. During the operational phase there would be soil contamination by waste and spillages of road users and un-maintained vehicles.

Significance Rating for Impacts on Land and Soil

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Site	Operation phase	Medium	Likely	Minor
3	1	2	3	4	6 x 7
6			7		42
Recommended Mitigation Measures ▪ Storage of potential pollutants such as fuel, oil and chemicals should be done on sealed surfaces to prevent soil contamination. ▪ Only heavy equipment with pneumatic tyres shall be used on access roads.					

▪ Soil erosion should be prevented especially near culverts by construction of correctly designed culverts

Modified Impact Assessment

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Site	Operation phase	Medium	Unlikely	Minor
2	1	2	3	2	5 x 5
5			5		25

6.3.6.2 Impacts on Surface Water

Activities that may result in surface water pollution include spillages from refuelling of construction vehicles and inappropriate toilet facilities for construction workers. The areas cleared of vegetation, compacted ground for access routes. Oils, fuels and chemical storage areas and stockpiled excavated soil may lead to increased runoff (soil erosion), storm water contamination and reduced infiltration, thereby affecting surface water quality. Fuel/oil spills from bulk fuel tankers during the operational phase may be due to surface runoff on steep slopes as characterised by the terrain of the area result in contamination of surface water.

Significance Rating for Impacts on Surface Water

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Local Area	Operation phase	High	Unlikely	Minor
3	2	2	4	2	7 x 6
7			6		42

Recommended Mitigation Measures

- Vegetation clearance will be localized and kept reasonably small as possible
- Fuel/oil storage areas at the construction camp site shall be in bunded area and on impervious surface
- Stockpiles will be well bunded and located away from drainage channels.
- During the operational phase road signage will show drivers steep or curved areas to take caution in order to avoid spills
- Work sites shall be located no less than 5 km from any surface water sources;

Modified Impact Assessment

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Site	Operation phase	High	Rare	Minor
2	1	2	4	1	5 x5
5			5		42

6.3.6.3 Impacts on Ground Water

The compaction of access routes, the working areas for setting up drill rig, machineries and equipment may lead to increased runoff (soil erosion) and reduced infiltration, thereby affecting subsurface groundwater recharge and availability at local scale. In addition, chemical/fuel spillage or leakage from storage and/or refuelling of heavy vehicles/equipment can also result in ground water pollution.

Significance Rating for Impacts on Ground Water

Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Site	Operation phase	High	Occasional	Minor
2	1	2	4	3	5 x 7
5			7		35
Recommended Mitigation Measures ▪ Provision for sufficient bunding of fuel tank and chemical storage areas. ▪ Construction vehicles and machines will be maintained to ensure that oil spillages are kept at a minimum. ▪ Spill trays must be provided if refuelling of construction vehicles is done on site. ▪ Clean spills promptly and remove contaminated soils for safe disposal. ▪ Chemical, fuel and oil storage areas will be sufficiently contained, provided with HDPE liners and sheltered from weather conditions.					
Modified Impact Assessment					
Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Insignificant	Site	Operation phase	High	Unlikely	Insignificant
1	1	2	4	2	4 x6
4			6		16

6.3.6.4 Impacts on Air Quality

Air and dust noise pollution are already occurring along the project road. Air pollution is noticeable at wherever traffic deviates and rides along shoulders of the road and at roadside markets where there is degradation of asphalt. There other areas are in Mpika check point, Pensulo, Ndabala and Chitambo areas where trucks and buses queue to get through the checkpoint and the border crossing respectively. Dust is being generated where the paved section is so poor that it is easier to drive off the road, and at failed sections where no paved surface remains. Exhaust and engine emissions from vehicles will cause air pollution both during and after construction. The main pollutants are sulphur oxides, nitrogen oxides, and suspended particulate matter, all of which can have an impact on public health, as well as on soils, trees, grasses and crops. During construction, there will be air and dust emissions from road traffic, construction plant and equipment, and particularly from the aggregate crushing plants and asphalt plant. Dust emissions will also result from earthworks and borrowing activities, particularly in the dry season. After construction, it is expected that the amount of dust emitted along the road will reduce as the road surface will be sealed and vehicles will not have to drive off road.

Traffic levels are expected to rise moderately after construction, leading to an increase in greenhouse gas levels. The project area is generally open, and pollutants will be dispersed by wind, and moreover, there are no enclosed depressions along the road where heavy air pollutants can settle to cause smog. Thus, along the rural stretches of road the direct impact of air pollution is minor, although of course there will be a contribution to the cumulative impact on climate change. Vehicle emissions due to congestion at the check points present a major problem and will continue to be after the rehabilitation of the road unless the situation at these locations is addressed.

Significance Rating for Impacts on Air Quality

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	International	Operation phase	high	Almost certain	Major
3	5	2	4	5	10 x 9
10			9		90
Recommended Mitigation Measures ▪ Regular maintenance of construction equipment and vehicles to reduce emissions of noxious fumes and mitigate noise ▪ Emissions from asphalt and crushing plant will be reduced by locating the plant downwind of settlements. The asphalt plant should be fitted with hydrostatic dust collectors (filters and collection tanks). ▪ To minimise on GHG emissions, vegetation clearing shall be restricted to the Right of Way (ROW)					
Modified Impact Assessment					
Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	International	Operation phase	high	likely	Moderate
2	5	2	4	4	9 x 8
9			8		72

6.3.6.5 Impacts of Noise and Vibration

Construction works are always associated with noise, but in this case noise emissions and vibration due to construction will be temporary. Noise and vibration will result from activities such as earthworks, drilling, plant and equipment (including construction vehicles). It is possible that vibration due to construction activities (e.g. hydraulic drilling) may cause damage to structures particularly in Mpika (e.g. cracks or subsidence). It is difficult to assess how far off the road the impacts of vibration will be felt, but obviously dwellings and structures beside the road are more likely to be affected. Blasting will be necessary to obtain hardstone from rock outcrops. While this is also a temporary impact, it may have serious health and safety repercussions and therefore has to be carefully controlled. Increased traffic levels resulting from the improved road will cause noise and vibration.

Significance Rating for Impacts on Noise and Vibration

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Major	Local Area	Operation phase	High	Almost certain	Moderate
4	2	2	4	5	8 x 9
8			9		72
Recommended Mitigation Measures ▪ Construction equipment, vehicles and quarry operation will be limited to day light only. ▪ Construction equipment/vehicles will regularly be maintained to minimise on noise generation ▪ All drivers of vehicles shall be instructed to reduce speed when passing through settlements or near schools or RHCs to reduce on noise levels from vehicles					
Modified Impact Assessment					

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Site	Operation phase	High	likely	Minor
2	1	2	4	4	5 x8
5			8		40

6.3.6.6 Impacts on Landscape and Aesthetics

Visual impact of the road construction and construction could be substantial if designs do not consider the slope of the surrounding environment. Disfigurement of the natural landscape and aesthetic view due to construction works. Abandoned construction structures, excess construction materials of laterite, stone aggregate and concrete slabs left in areas of scenic beauty reduces the quality of scenery.

Significance Rating for Impacts on Landscape and Aesthetics

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Regional	Operation phase	Low	Likely	Minor
3	3	2	2	4	8 x 6
8			6		48
Recommended Mitigation Measures ▪ The surrounding environs along the project road should retain as much vegetation as possible ▪ Development of road designs must be environmentally safe enough and compatible with the natural terrain surrounding environment ▪ Abandoned structures in areas of scenic beauty shall be used for backfilling purposes were necessary and planted with endemic natural vegetation to maintain existing local amenity values					
Modified Impact Assessment					
Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Regional	Operation phase	Low	Unlikely	Minor
2	3	2	2	2	7 x4
7			4		28

6.3.6.7 Impacts on Solid and Hazardous Waste

Some of the likely waste materials to be generated include cans, wrappings, paper, and cement bags and plastics waste, among others at the base camps. Impacts may arise due to Improper disposal of faecal matter and poor sanitation at the exploration camp. Faecal waste and food remnants if not properly disposed may pose a health hazard as they will provide suitable breeding conditions for pathogens that cause infectious water borne diseases such as typhoid, dysentery and cholera.

Significance Rating for Impacts on Solid and Sanitary Waste

Consequence			Likelihood of Impact		Significance of Impact
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Local Area	Construction phase	High	Likely	Minor

3	2	1	4	4	6 x 8
6			8		48

Recommended Mitigation Measures

- Waste spoil should be used to reinstate borrow pits. Wherever possible, construction waste (eg. scrap metal, crushed concrete, waste oil) should be reused or sold.
- Biodegradable and Non-Biodegradable Waste will be disposed of at licensed waste disposal facilities in Serenje and Mpika
- The contractor will provide flushable mobile toilets

Modified Impact Assessment

Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Site	Construction phase	High	Unlikely	Minor
2	1	2	4	2	5 x6
5			6		30

6.3.7 Impacts on The Biological Environment

6.3.7.1 Impacts on Fauna

Although much of the road section is modified and the species' composition in the area is poor in terms of diversity due to the disturbance of natural habitats by anthropogenic activities, there are some sections of the road corridor with good standing miombo woodlands (i.e. between Serenje-Mpika), which will be affected by the proposed road upgrade (i.e. creation of road detours). In addition, while much of the rehabilitation of the road will follow the existing alignment, there will be a need for road widening in some areas to meet road design specifications. Vegetation clearing will result in habitat loss for reptiles, amphibians, birds, rodents, mammals and insects. Excessive noise generation will affect breeding patterns of sensitive animal species such as nesting for birds and result in their displacement from the area.

Significance Rating for Impacts on Fauna

Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Regional	Construction phase	Medium	Likely	Minor
3	3	1	3	4	7 x 7
7			7		49

Recommended Mitigation Measures

- Clearing of vegetation and trees should be restricted to the Right of Way (ROW)
- Noisy activities to be scheduled to occur within prescribed normal working hours
- The contractor should ensure that revegetation of cleared areas is done after road rehabilitation is complete
- Indiscriminate killing of reptiles such as snakes shall be discouraged.

Modified Impact Assessment

Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Insignificant	Regional	Construction phase	Medium	Unlikely	Minor
1	3	1	3	2	5 x5
5			5		25

6.3.7.2 Impacts on Protected Areas

In some road sections the project road is adjacent to forest reserves such as at the Serenje National Forest Reserve and Lavushi Manda National Park. Bush clearing in the Forest Reserves shall be restricted to the defined swath and shall comply with the Forests Act and the Statutory Instruments that define the costs of replacement for the removed trees. Trees shall be stumped as opposed to uprooting to avoid soil erosion. The workers and the local community shall be sensitized on the need to preserve the trees and other forms of vegetation in the Forest Reserve. The Forestry Department, as part of stakeholder engagement, shall be engaged to provide guidance on how best to manage the affected forestry resources. During the operational phase, protected areas will only be affected during routine maintenance works as overgrown vegetation affecting road visibility will be periodically cleared.

Significance Rating for Impacts on Protected Areas

Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Regional	Operation phase	Low	Likely	Minor
3	3	2	2	4	8 x 6
8			6		48
Recommended Mitigation Measures ▪ Some of the migrants will be employed as unskilled workers on the project road ▪ Contractors will be encouraged to buy available food items such as fruits and vegetables from the local community					
Modified Impact Assessment					
Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Regional	Operation phase	Low	Unlikely	Minor
2	3	2	2	2	7 x6
7			8		42

6.3.7.3 Impacts on Flora

Impacts will include vegetation loss during construction phase and retardation of vegetation growth due to contamination from dust particles and gas emissions.

Significance Rating for Impacts on Flora

Consequence			**Likelihood of Impact**		**Significance of Impact**
Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Moderate	Regional	Operation phase	Medium	Likely	Minor
3	3	2	2	4	8 x 6
8			6		48
Recommended Mitigation Measures ▪ Dust on access roads will be suppressed using a water bowser ▪ Vegetation clearing will be restricted to the road reserve ▪ Revegetation in areas cleared of vegetation such as detours, quarry, borrow pits and construction camp to be done after the road rehabilitation is complete					
Modified Impact Assessment					
Consequence			**Likelihood of Impact**		**Significance of Impact**

Severity	Spatial Scope	Duration	Receptor Sensitivity	Frequency of Impact	Positive
Minor	Regional	Operation phase	Low	Unlikely	Minor
2	3	2	2	2	7 x6
7			8		42

CHAPTER 7

7 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The ESMP has been developed based on the environmental and social impact evaluation under section 6.3. The ESMP provides a vehicle through which the developer and the contractor will minimise the effects of the negative impacts whilst maximising on the effects of the positive impacts. The evaluation focused on some of the following parameters

- Nature of impact
- Type of impact (direct or indirect)
- Spatial extent (local, regional or national)
- Duration (short, medium, long and permanent)
- Intensity (low, moderate, high)
- Probability (unlikely, possible, probable, definite)
- Significance (negligible, low, moderate, high)

To mitigate the potential negative environmental and social impacts of the road rehabilitation project, the envisaged mitigation measures included in the Environmental and Social Management Plan (ESMP) are summarized in the Table below:

Table 11: Environmental and Social Management Plan

Impact	Mitigation Measure	Objective	Actions to be taken for its implementation	Project Phase	Implementing Agency	Cost of Mitigation	Source of Funding
Impact on Land and Soil							
Soil contamination due to improper storage of materials, fuels and poor waste oil disposal methods.	Petroleum products dispensing points shall have drip pans.	To trap any fuel or oil spillage from getting to the soil.	Petroleum products dispensing points shall be inspected and approved by RDA ESMU before commissioning.	Construction Phase	⇨Contractor, SHE Officer ⇨ESMU RDA	Concrete loading bay Approx. US$ 200/m^3	Project funds
	Storage of potential pollutants such as fuel, oil and chemicals should be done on sealed/impervious surfaces to prevent soil contamination.	To avoid direct contact of soil with oil, fuel and chemicals in case of accident.	Sites for storage of fuel, oil and chemicals shall be inspected and approved by ESMU Officers from RDA before commissioning.	Construction Phase	⇨ESMU RDA ⇨Contractor, SHE Officer	Tanks to be placed on concrete hard standing. Concrete @ US$200/$m^3$	Project funds
	Collection and recycling of used oil & lubricants.	To reduce on the amounts of oil waste generation and its disposal on soil.	Containers for collection of used oil shall be made available on site.	Construction Phase	⇨Contractor, SHE Officer ⇨ESMU RDA	Metal drums for collection and storage. One drum @ US$20	Project funds
Soil contamination due to improper storage of materials, fuels and poor waste oil disposal methods.	Petroleum storage tanks shall have bund walls around them and shall be high enough to contain any spillage.	To contain any petroleum spillage from spreading in case of an accident.	Petroleum storage tanks shall be inspected and approved by ESMU Officers from RDA before commissioning.	Construction Phase	⇨Contractor, SHE Officer ⇨ESMU RDA	Reinforced concrete wall and slab at the bottom. US$55/$m^2$	Project funds
Impact on Land and Soil							
Exposed soil is prone to erosion by water or wind.	Limitation of earth moving to dry periods;	To avoid erosion of soil by fast flowing rainwater.	Period of construction shall be specified in the Tender Document	Tendering Process Construction Phase	⇨Contractor, SHE Officer ⇨ESMU RDA	US$6.50/$m^3$ of gravel	Project funds
	Protection of susceptible soil surface with grass;	To control the current of the fast-flowing rainwater.	Mitigation measures for this impact shall be in the overall Tender Document.	Tendering Process Construction Phase	⇨Contractor, SHE Officer ⇨ESMU RDA	US$2/$m^2$ for planting turf/grass	Project funds
Exposed soil is prone to erosion by water or wind.	Installation of sedimentation basins or planting of erodible surfaces as soon as possible.	To trap soil particles from the current of the fast-flowing water.	Mitigation measures for impacts on soils shall be part of the overall Tender Document.	Tendering Process Construction Phase	⇨Contractor, SHE Officer ⇨ESMU RDA	Excavate in common soils @ US$3/$m^3$ Excavate in rock @ US$50/$m^3$	Project funds

Stripping and stockpiling of topsoil could lead to erosion and degradation of soil quality.	Exposed soil should be avoided by selective soil stripping;	To prevent highly prone soils from getting exposed to erosion.	Mitigation measures this impact is part of the Tender Document.	Tendering Process Construction Phase	⇨Contractor, SHE Officer ⇨RDA	US$2/m^3	Project funds
	Areas requiring less clearing shall be preferred for stockpiles. Clearing shall be limited to the approved site plan	To limit on the size of area prone to erosion.	Mitigation measures for this impact are part of the Tender Document.	Tendering Process Construction Phase	⇨Contractor, Officer ⇨RDA	US$1.50/m^3	Project funds
Impact on Land and Soil							
Soil compaction could result following construction activities.	Only heavy equipment with pneumatic tyres shall be used on access roads.	To limit the size of area prone to compaction.	Mitigation measures for impacts on soils compaction shall be part of the overall Tender Document.	Tendering Process Construction Phase	⇨Contractor ⇨Road Engineers at RDA	For rolling activities use the rate of US$30/hr	Project funds
Soil contamination by waste and spillages of road users and un-maintained vehicles.	Soil contamination by waste and spillages of road users and un-maintained cars.	To control waste disposal methods worth & ensure cars that are maintained use the road.	Enforcement of ZEMA Regulations on waste management & Road Traffic Regulations.	Operational Phase	⇨Road users ⇨ZEMA ⇨RTSA	ZEMA monitoring activities	ZEMA operational funds
Impacts on Vegetation and Protected Areas							
Retardation of vegetation growth due to contamination from dust particles and gas emissions.	Dust control by application of water.	To suppress dust generation	Mitigation measures for this impact are part of the overall Tender Document.	Construction Phase	⇨Contractor ⇨ESMU RDA	Water bowsers to water gravel roads @ U$50/hr	Project funds
	Haulage trucks shall not exceed the speed limit of 60km per hour.	To reduce the amount of dust generation.	Mitigation measures for impacts on vegetation shall be part of the overall Tender Document.	Construction Phase	⇨Contractor ⇨ESMU RDA	N/A	Project funds
Loss of vegetation due to Camp site clearing which will lead to loss of habitat and displacement of fauna species, especially avifauna.	Less vegetated areas shall be preferred;	To reduce the extent of the area without vegetation.	Mitigation measures for this impact is part of the overall Tender Document	Construction Phase	⇨Contractor ⇨ESMU RDA	US$1.50/m^2 to clear less vegetated area	Project funds
Impact	**Mitigation Measure**	**Objective**	**Actions to be taken for its implementation**	**Project Phase**	**Implementing Agency**	**Cost of Mitigation**	
Impacts on Fauna and Wildlife Habitat							

Disturbance to animals (mammals, birds and reptiles) Vegetation clearing resulting habitat loss for biodiversity	Construction activities to be confined to approved site plan	To reduce on the extent of the area to be impacted upon.	Mitigation measures provided for impacts of noise shall be part of the overall Tender Document	Construction Phase	⇨Contractor, SHE Officer ⇨ESMU RDA	No extra cost	Project funds
Impacts on Surface and Ground Water							
Siltation of water courses due to soil erosion	Silt traps shall be put along drainage systems;	To protect surface water pollution through filtering finest particles in water current.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Tender Document	Construction Phase Operational Phase	⇨Contractor ⇨ESMU RDA,	Approx. US$10/m	Project funds
	Spoon drains shall have scour checks.	To control excessive flow and risks of erosion.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Tender Document	Construction Phase Operational Phase	⇨Contractor ⇨ESMU RDA,	US$15 each	Project funds
Ground water contamination due to construction of sub-standard campsite pit latrines for workers.	Proper siting of pit latrines away from waterlogged areas;	To filter pollutants from getting to the ground water.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Tender Document	Construction Phase	⇨Contractor ⇨ESMU RDA	VIP latrine @ US$600 each	Project funds
	Good hygienic standards and proper maintenance of pit latrines.	To promote cleanliness and avoid epidemics in the construction camp.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Tender Document	Construction Phase	⇨Contractor ⇨ESMU RDA	Cleaning activities @ US$150/ month	Project funds

Impacts on Surface and Ground Water							
Sedimentation and increased turbidity in surface water caused by erosion of bare areas and runoffs resulting from excavation and grading works and drainage channels left after construction.	Erosion control measures must be implemented to prevent introduction of sediment-laden runoff into surface waters (e.g. gabions, hay bales, silt screens, settling basins, sediment traps)	To prevent or minimize introduction of sediments into the river	Mitigation measures provided for impacts on Water Quality shall be part of the overall Tender Document	Construction Phase	⇨Contractor ⇨ESMU RDA	For gravel soil @ U$6.50/$m^3$ For topsoil spreading and compacting @ US$2/$m^2$	Project funds
Sedimentation and increased turbidity in surface water caused by erosion of bare areas and runoffs resulting from excavation and grading works and drainage channels left after construction.	Sides of drainage channels shall be planted with grass or stone pitched;	To filter off the sediment particles in the fast-flowing rainwater with grass and also to avoid erosion of soil surfaces by stone pitching.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Tender Document	Construction Phase Operational Phase	⇨Contractor ⇨ESMU RDA	For loose soil/ susceptible soil, grassing @ US$3/m2 For firm soil US$3/m3	Project funds
	Drainage systems shall have scour checks.	To reduce the current of rainwater flow.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Tender Document	Construction Phase Operational Phase	⇨Contractor ⇨ESMU RDA	US$12 each stone masonry	Project funds
Impacts on Air Quality							

Air pollution caused by exhaust fumes and dust from excavators, bull dozers, graders as well as site clearing will affect human, vegetation and also disturb habitats for birds and insects.	Regular maintenance of construction vehicles and equipment in order to reduce emission of exhaust fumes;	To check for defects and servicing of the vehicles and equipment so that they are in good operation condition.	Logbook on vehicle & equipment maintenance shall be kept on site for inspection and shall be part of the overall Tender Document	Construction Phase	⇨Contractor ⇨ESMU RDA	US$30,000/ month for medium to old equipment	Project funds
Air pollution caused by exhaust fumes and dust from excavators, bull dozers, graders as well as site clearing will affect human, vegetation and also disturb habitats for birds and insects.	Periodically water down on temporary roads;	To suppress dust.	Logbook on dust control showing watering times shall be kept on site for inspection and shall be part of the overall Tender Document	Construction Phase	⇨Contractor ⇨ESMU RDA	US$50/ hr	Project funds
Unpleasant odours due to poorly maintained toilets and poor waste management.	Cleaning and regular maintenance of toilets to avoid unpleasant odours.	To maintain and promote a healthy environment at campsites and prevent the spread of diseases.	Public Health standards as provided under the Public Health Act Cap 295 shall be noted and enforced under the Tender Document	Construction Phase	⇨Contractor ⇨ESMU RDA ⇨Local Authority	US$150/ month	Project funds
Impacts on Air Quality							
Unpleasant odours due to poorly maintained waste management.	Waste should be carefully managed to prevent unpleasant odours.	To maintain and promote a healthy environment at campsites and prevent the spread of diseases.	Public Health standards as provided under the Public Health Act Cap 295 and ZEMA Regulations on Waste Management shall be enforced and be part of the overall Tender Document	Construction Phase	⇨Contractor, SHE Officer ⇨ESMU RDA	US$100/ month	Project funds
Excessive exhaust fumes from heavily polluting vehicles	Heavily polluting vehicles not to be allowed to use the road	To prevent pollution of the aquatic and terrestrial environment of the wild	Routine monitoring of the T2 road by the concerned government departments	Operational Phase	⇨ZEMA, ⇨RTSA	N/A	ZEMA and RTSA operational funds
Impacts of Noise and Vibration							
Noise and vibration caused by construction machinery, equipment and drilling.	Working hours limited to day light only;	To avoid disturbance to noise nuisance at awkward hours	Routine monitoring by ESMU, Local authority and RDA	Construction Phase	⇨Contractor ⇨ESMU RDA ⇨Local Authority	Cost not applicable as Programme is based on 9-day working hours.	-RDA operational funds -Local Councils operational funds

Noise and vibration caused by construction machinery, equipment and drilling.	Daily Maintenance of construction equipment i.e. greasing, oiling of moving parts, provision of ear plugs to those working in excessively noisy sections	To promote occupational health and safe working conditions among the construction workers	Daily monitoring of construction equipment	Construction Phase	⇨Contractor, SHE Officer ⇨ESMU RDA	US$3,000/yr	Project funds
Noise from increased traffic.	ZEMA Regulation on Noise Abatement;	To monitor and control noise generation.	N/A	Operational Phase	⇨ZEMA	Cost Saving	ZEMA operational funds
Impacts on Landscape and Aesthetics							
Visual impact	Development of road designs must be environmentally safe enough and compatible with the surrounding environment.	To maintain areas of scenic beauty.	Road design shall be environmentally safe enough and compatible with the surrounding environment.	Design Phase Construction Phase	⇨Contractor ⇨RDA ⇨ESMU RDA	Cut to fill/ spoil @ US$3.50/$m^3$	Project funds
Disfigurement of the natural landscape and aesthetic view due to construction works.	Development of road designs must be environmentally and compatible with the natural landscape and the surrounding environment.	To ensure that construction activities do not impose major landscape and visual impacts	Road designs shall be environmentally and compatible with the natural landscape of the surrounding environment.	Design Phase Construction Phase	⇨(contractor) ⇨ESMU RDA	Cut to fill/ spoil @ US$3.50/$m^3$	Project funds
Abandoned construction structures, excess construction materials of laterite, stone aggregate and concrete slabs left in areas of scenic beauty reduces the quality of scenery.	Wherever possible, ensure that large construction equipment are positioned in places where they will not block the visibility of important areas	To prevent distortion of the scenic beauty of the surrounding environment.	Ensure that the site is kept visibly orderly by arranging construction equipment in a suitable manner	Design Phase Construction Phase	⇨Contractor, SHE Officer	Might result in cost saving	N/A
Impacts of Road Traffic and Safety							
Excessive dust from construction could disturb nearby communities.	Control of dust through watering of dust roads.	To avoid respiratory and visibility problems and the gathering of dust on other protected areas and property	Mitigation Measures for impacts of construction traffic shall be part of the overall Tender Document.	Construction Phase	Contractor, RDA, Local Council	Water bowser US$50/hr	Project funds
Increased accidents due to increased traffic flow.	Provision of adequate warning road signs in black spot areas and speed retarders at pedestrian crossing sites.	To save lives and injury that could arise because of accidents	Mitigation Measures for impacts of traffic shall be part of the overall Tender Document.	Operational Phase	Contractor, RDA, Local Council	US$100/ road sign	Project funds
Impacts of Occupational and Public Health							
Advanced planning of safety equipment requirements	Development of safety procedures and operational manual.	To ensure that people undertaking these tasks know exactly what is to be done.	Mitigation Measures for impacts of work accidents shall be part of the overall Tender Document.	Construction Phase Operation Phase	Contractor, RDA, Local Council	US$800/ month	Project funds

Lack of enforcement of adequate safety and public health regulations could impact negatively on construction workers and the public	Enforcement of Public health and safety regulations.	To safeguard the health and safety of workers and the public	Mitigation Measures shall be part of the overall Tender Document.	Construction Phase	RDA, Local Councils	US$3,000/ month	RDA and Local Council Operational funds
Impacts of Construction Camps							
Loss of vegetation at construction site.	Clearing for camp siting must be limited to the actual site to avoid vegetation loss on a larger scale.	To conserve vegetation around the camp site and protect the site from extensive loss of vegetation	Mitigation Measures for impacts of construction camps shall be part of the overall Tender Document.	Construction Phase	RDA, Contractor	Site clearance @ US$0.99/$m^2$	Project funds
Waste generation at campsite.	Waste disposal to be done at designated sites approved by the local authority.	To control waste disposal practices and avoid illegal dumping	Mitigation Measures for impacts of construction camps shall be part of the Tender Document	Construction Phase	Contractor, RDA, ZEMA, Local Council	Disposal of waste @ US$0.10/ton.km	Project funds
Interaction of construction workers with nearby communities may lead to transmission of sexually transmitted diseases.	Provision of education both to the local community and camp workers on STDs and HIV/AIDS using aids such as video shows, pamphlets, talks, etc.	To prevent the transmission of sexually transmitted diseases between the local community and construction workers.	Mitigation Measures for impacts of construction camps shall be part of the overall Tender Document.	Construction Phase	Contractor, RDA, ZEMA, Local Council	US$15,000 Lump Sum	Project funds
Impacts on Cultural and Historic Resources							
Impacts on cultural values such as shrines, graves etc	Construction activities to be confined to approved site plan Chance finds to be reported to National Heritage Conservation Commission	To avoid impacts on cultural or historic resources To avoid loss of such resources	Mitigation measures shall be part of the overall Tender Document	Construction Phase	⇨Contractor, SHE Officer ⇨ESMU RDA	No extra cost	Project funds
Impacts on Land Use							
Construction of temporary detours will disturb the environment within the immediate and surrounding environment.	Detours, access roads and equipment park site location shall be done in consultation with local people and shall consider the existing land use in settled areas (BEP)	To avoid conflicts between the Contractor and the local community and to monitor land-use change.	Mitigation measures for impacts on land-use shall be part of the overall Tender Document	Design Phase Construction Phase	Contractor	To construct detours @ US$76/m	Project funds
The project road will require the uptake of additional land currently been used as arable, residential, or commercial land to pave way for the ROW	Project affected persons shall be compensated based on their eligibility criteria and assisted with resettlement to other available land.	To ensure land use in the area is consistent with the respective district's district development plan	RDA shall engage the local authority and chiefs on how to find alternative land for persons affected by the project.	Design Phase	RDA SDC MDC	Cost of compensation for PAPs	RDA/GRZ funds

Impacts on Solid and Sanitary Waste							
Generation of biodegradable and non-biodegradable waste may negatively affect the environmental quality of the environment	Waste will be transported to designated dump sites in Lavushi Manda and Mpika district on a weekly basis	To ensure that waste is disposed of at a licensed facility	A licensed waste transporter shall be engaged in line with the provisions of SI 112 of 2013	Construction Phase	RDA Contractor	US$ 5,000	Project funds
Impacts on The Local Economy (Enhancement)							
Employment	For unskilled workers priority will be given to local people	To ensure that the local community benefits from the project	Mitigation Measures for impacts on employment shall be part of the overall Tender Document.	Design Phase	RDA Contractor Traditional Authority	US$5 per day/worker	Project funds
Local Procurement	Construction materials and food items that are locally available in Serenje and Mpika district shall be sourced locally	To empower suppliers and traders in the two districts	Contractors demonstrating this aspect in their bids shall be more competitive	Design Phase	RDA Contractor	Included in project costs	Project funds
Impacts Due To Improved Socioeconomic Conditions (Enhancement)							
Improved access to social amenities such as markets, schools, hospitals and others via the great north road	The road will be upgraded to a very good standard to ensure that comfort and safety of users	To ensure that the road meets the expectations of users	The contractor to be engaged will have to meet the detailed engineering design of the road	Design Phase	RDA Contractor	Cost of consultancy	Project funds
Impacts on Demography							
The project road might influence in migration and settlement along the Serenje-Mpika road section	People with the necessary skills shall be employed for the road works.	To avoid mushrooming of unplanned settlements which may lead to land-use change and future encroachment into the road reserve	Recruitment of local people for unskilled labour shall be the priority and as part of the overall Tender Document.	Design Phase Construction Phase	RDA Contractor	Included in project costs	Project funds
Impact	**Mitigation Measure**	**Objective**	**Actions to be taken for its implementation**	**Project Phase**	**Implementing Agency**	**Cost of Mitigation**	
Impacts on Grievances							

Construction activities are likely to bring about grievances from the workers and the surrounding community members	A Grievance Redress Mechanism will be put in place	To ensure, that people that have been adversely affected (or about to be affected) by the implementation of the project have a forum through which they are able to raise their grievances and dissatisfactions about actual or perceived impacts to find satisfactory solutions that mutually benefit both the affected persons and the project.	A GRM will be one of the documents that the Contractor will be expected to develop. Other documents that will be developed are • Emergency Response Plans • Traffic Management Plans • Code of Conduct • GBV/SEAH Prevention and Response Plans	Construction Phase	RDA Contractor	Included in project costs	Project funds

7.1 Impacts enhancement measures

This section proposes feasible and cost-effective measures to improve the benefits that accrue from the project to the beneficiaries and line stakeholders. These include:

7.2 Information Disclosure about the project

The project is envisaged to employ about 500- 800 people during implementation. This number represents a large positive impact on poverty reduction at household levels. To enhance this impact and provide information on available job opportunities to the wider community, it is proposed that, the project works closely with the Districts Labor Officers in the areas crossed by the project to disclose available employment opportunities through credible public notices and radio announcements and radio talk shows. Through these, it is hoped, the wider public will have access to employment opportunities.

7.2.1.1 Staffing of the Contractors and the consulting engineers/Resident Engineers

To enhance effective implementation of the mitigation measures, it is important that both the contractor and the supervising consultant (Resident Engineers-REs) have in their teams Environmental/Social Management Specialists whose roles will be to guide and oversee the implementation of the mitigation measures proposed in this ESIA. For the contractors, the Environmental/Social Specialist ought to be a full-time employee on the project. In addition, these Specialists should be attending project monthly site meetings to ensure that, environmental and social issues are adequately discussed in such meetings and follow up actions are undertaken.

7.2.1.2 Integrating Environmental costs in the BoQs

The Bills of Quantities (BoQs) as well as the contract documents should integrate environmental and mitigation measures as outlined in the ESIA as well as ESIA Decision Letter issued by ZEMA. Such costs should include but will not be limited to; measures for soil erosion control, tree planting and re-grassing, dust control measures, provision of PPEs to the workers, storm water control, mobilization and awareness sensitization, and HIV/AIDS interventions.

7.2.1.3 Conducting an Environmental Audit

One of the measures to verify compliance of project works will be to conduct an Environmental Audit of the Project which should be in accordance with the environmental audit requirements as provided in the ZEMA Audit requirement. The Audit should also take into account, compliance requirements for AfDB. The Audit will highlight levels of compliance in the project and propose corrective measures. Furthermore, there will be monthly site progress meetings to discuss matters and progress of the project. In those meetings, environmental and social compliance of the project will be reported.

Internal and Independent External Annual E&S Compliance Audits

The internal and independent external annual environmental and social compliance audits will be undertaken to ensure that the project remains complaint with the national and the AfDB safeguard requirements. A budget of **US350,000.00** will be needed to cater for these audit services.

7.2.1.4 Preparation of thematic management plans

The project will likely trigger issues of HIV/AIDS, gender concerns, grievances on a number of aspects, traffic management, labour management and occupational health safety amongst others. It's suggested that the project contractor puts in place amongst others, the following plans.

a. Contractors Environmental and Social Management Plan.
b. Grievance Redress Mechanism,
c. labour management plan,

d. Traffic Management Plan,
e. HIV/AIDS Management Plan,
f. Gender Mainstreaming Plan, and
g. Occupational Health and Safety Plan.
h. Emergency Response Plan
i. GBV/SEAH Prevention and Response Plan
j. Code of Conduct

These plans will require to be developed based on the ground specifics to ensure that they are responsive to the details and requirements of the project activities at hand. These plans will be submitted to the Bank for review and clearance.

7.2.1.5 Capacity building of RDA ESMU

During implementation of the road project, oversight compliance role will rest with RDA ESMU implying the staff ought to be well placed both technically and logistically to accomplish this role. Though the Unit is staffed with four specialists, they need to be supported in terms of skills development and logistics.

The Unit staff will need to attend some short-term specialized trainings in areas such as:
a. Mainstreaming climate change into the development process.
b. Gender, OHS and HIV/AIDS mainstreaming.
c. Strategic Environment Assessment (SEA/SESA).
d. Project Monitoring, Evaluation and Reporting

These trainings can be arranged within the region at centres such as ESAMI, Swaziland and South Africa. Operationally, support in terms of additional two 4WD vehicles is deemed adequate to facilitate the unit operations. A budget of **US175,000.00** will be needed to cater for ESMU capacity needs.

7.2.1.6 Summary ESMP costs

The table below illustrates a summary of the ESMP costs

S/N	Element	Cost (US$)
1	ESMP implementation	1,270,000.00
2	ESMP monitoring	634,000.00
3	RDA - ESMU Capacity Building	175,000.00
4	E&S Compliance Audits	350,000.00
		2,429,000.00

CHAPTER 8

8 ENVIRONMENTAL AND SOCIAL MONITORING PROGRAMME

The general approach to effect monitoring is to compare the pre- and post- project situations, measuring relevant environmental impacts against baseline conditions. Baseline data already in place establishes a reference basis for managing environmental impacts throughout the life of the project. The monitoring process will be instituted to check progress and the resultant effects on the environment arising from infrastructure works of the project.

The Contractors and RDA will undertake the necessary monitoring measures for short- and long-term monitoring programme respectively. However, during monitoring, close links should be maintained with other relevant lead agencies and the Local Governments in the areas crossed by the road project. Much of the work during the construction stage can form part of the contractor's routine inspection activities that will be included in the construction contract. The planned mitigation measures should, therefore, be included on the list of contractual items. These should be planned and checked against their effectiveness in reducing the negative impacts/or enhancing the benefits identified in this report.

Table 12: Environmental and Social Monitoring Plan

Element to be Monitored	Method of Monitoring	Frequency of Monitoring	Indicator	Means of Verification	Authority Responsible	Monitoring Costs (US$)
Land and Soil						
Land and Soil	• Site Engineer to make inspections of sites for storage of materials, oil and fuels and ensure they have sealed surfaces.	• Periodical inspections throughout the Construction Phase	• Clean storage sites free from any oil or fuel spillage maintained throughout Construction Phase.	• Inspection Report available	• Contractor's Site Engineer	• 36,000.00
	• Site Engineer to inspect the waste disposal sites.	• Periodical inspections throughout the Construction Phase	• Waste oil is being disposed of in designated sites and in the approved method.	• Inspection Report is available	• Contractor's Site Engineer	
	• Site Engineer to ensure used oil is being collected for recycling.	• Periodical inspections throughout the Construction Phase	• Containers for collection of used oil are available on site.	• Used oil from serviced plant machinery has been collected in containers.	• Contractor's Site Engineer	
	• Site Engineer to inspect storage tanks and ensure they have bund walls around them high enough to contain any spillage.	• Once before the fuel storage tanks are put to use.	• Bund wall design and construction plan has been developed approved and is available.	• Bund walls around fuel storage tanks have been constructed.	• Contractor's Site Engineer	
Land and Soil (Cont'd)						
Land and Soil (Cont'd)	• The Site Engineer to make inspections and ensure that heavy construction equipment is confined to operational areas only and avoids croplands.	• Daily inspections throughout the Construction Phase.	• Absence of caterpillar trampling in croplands.	• Complaints from the local community on invasion of croplands by construction equipment are non-existent.	• Contractor's Site Engineer	• 36,000.00
	• The Site Engineer to undertake inspection of earthworks and ensure that slopes are graded to specifications.	• Daily inspections throughout the Construction Phase.	• Absence of rills, gullies	• Absence of erosion features.	• Contractor's Site Engineer	

Element to be Monitored	Method of Monitoring	Frequency of Monitoring	Indicator	Means of Verification	Authority Responsible	Monitoring Costs (US$)
	• Once earthworks are completed, the Site Engineer should monitor the restoration measures to be implemented such as re-vegetation	• Each time earthworks are completed throughout Construction Phase	• Presence of re-vegetation in erosion prone areas.	• Restoration programmed for re-vegetation of exposed soils is available and is being implemented.	• Contractor's Site Engineer	
Vegetation						
Vegetation	• Site Engineer to ensure that excessive clearance of vegetation is avoided and should be confined to the project site.	• Each time clearance of vegetation is being done throughout Construction Phase	• The area of vegetation cleared is minimal	• Area for vegetation clearance is clearly marked and is confined to the designs.	• Contractor's Site Engineer	• 12,000.00
Wildlife and Wildlife Habitat						
Wildlife and Wildlife Habitat	• The Site Engineer to carry out inspections and report evidence of wildlife intrusion onto the project site and to check that wildlife access corridors are maintained.	• Periodical inspections throughout Construction Phase	• Absence of animal damage to project site.	• Inspection report	• Contractor's Site Engineer	• 12,000.00
Water Quality						
Water Quality	• Site Engineer to inspect and satisfy that interceptors are put in place and working well.	• Periodical inspections throughout the Construction Phase.	• Clean water supply maintained throughout the Construction Phase.	• Absence of water pollution incidents	• Contractor's Site Engineer	• 12,000.00
Water Quality (Cont'd)						
Water Quality (Cont'd)	• Site Engineer to inspect and satisfy those areas where hazardous liquids are stored are bunded.	• Periodical inspections throughout the Construction Phase.	• Clean water supply maintained throughout the Construction Phase.	• Absence of water pollution incidents	• Contractor's Site Engineer	• 36,000.00
	• Site Engineer to inspect and satisfy that water from concrete batching plants is treated.	• Periodical inspections throughout the Construction Phase.	• Clean water supply maintained throughout the Construction Phase.	• Absence of water pollution incidents	• Contractor's Site Engineer	
	• Site Engineer to inspect and satisfy that silt traps are put along drainage systems;	• Periodical inspections throughout the Construction Phase.	• Clean water supply maintained throughout the Construction Phase.	• Absence of water pollution incidents	• Contractor's Site Engineer	

Element to be Monitored	Method of Monitoring	Frequency of Monitoring	Indicator	Means of Verification	Authority Responsible	Monitoring Costs (US$)
	• Site Engineer to inspect and satisfy that spoon drains have scour checks.	• Periodical inspections throughout the Construction Phase.	• Clean water supply maintained throughout the Construction Phase.	• Absence of water pollution incidents	• Contractor's Site Engineer	
	• Site Engineer to inspect and satisfy that siting of pit latrines is done away from waterlogged areas;	• Before construction of pit latrines.	• Construction is done according to design specifications.	• Pit latrine siting and construction report	• Contractor's Site Engineer	
Water Quality						
Water Quality (Cont'd)	• Site Engineer to inspect and satisfy that written detail of the procedures to be followed in the event of pollution incident is given to the Site Engineer by the Contractor.	• Immediately there is a pollution incident during Construction Phase.	• Operational procedures are being followed.	• Presence of Operational Manual on site.	• Contractor's Site Engineer	• 12,000.00
Air Quality						
Air Quality	• Site Engineer to observe the level of dust generated during Construction. Watering down should be done if dust levels are unacceptable.	• Regular inspections throughout the Construction Phase.	• Deposition of dust on surfaces such as grasses, shrubs, trees, and rooftops should decrease with watering.	• Dust deposition on the immediate surroundings is controlled.	• Contractor's Site Engineer	• 44,000.00
	• Site Engineer to check and ensure that construction vehicles and equipment are maintained to reduce emission of exhaust fumes;	• Regular inspections throughout the Construction Phase.	• Exhaust fume emissions are controlled.	• Maintenance logbook is available on site.	• Contractor's Site Engineer	
Air Quality						
Air Quality	• Site Engineer to inspect and ensure that toilets are cleaned and maintained to avoid unpleasant odours.	• Regular inspections throughout the Construction Phase.	• Unpleasant odours are controlled.	• Clean toilet environment free from unpleasant odours.	• Contractor's Site Engineer	• 24,000.00
	• Site Engineer to inspect and ensure waste is carefully managed and disposed of in designated places to prevent unpleasant odours.	• Regular inspections throughout the Construction Phase.	• Controlled waste disposal method.	• Waste is dumped in designated places.	• Contractor's Site Engineer	
Noise and Vibration						

Element to be Monitored	Method of Monitoring	Frequency of Monitoring	Indicator	Means of Verification	Authority Responsible	Monitoring Costs (US$)
Noise	• Sit Engineer to monitor noise and vibrations on an ad-hoc basis to establish noise levels at the project site and the nearest sensitive receptors and should not exceed 90-decibels.	• Regular inspections throughout the Construction Phase.	• Noise levels at the nearest sensitive receiver are minimised.	• Number of complaints of noise disturbance is controlled.	• Contractor's Site Engineer	• 30,000.00
Noise and Vibration						
Noise Cont'd)	• Site Engineer to check and ensure that working hours are limited to day light only;	• Daily inspections throughout the Construction Phase.	• Sleep disturbance is minimised.	• Number of complaints of sleep disturbance is minimised.	• Contractor's Site Engineer	• 6,000.00
Landscape and Aesthetics						
Landscape and Aesthetics	• Site Engineer to make visual inspection of earth works to ensure that excessive excavation other than those agreed upon is not carried out, particularly at borrow pit sites, temporary and approach roads and around the contractor's camp.	• Daily inspections throughout the Construction Phase.	• Landscape alterations are reduced to a minimum.	• Final landscape and aesthetic view is compatible with the surrounding environment.	• Contractor's Site Engineer	• 12,000.00
Land-use and Surrounding Environment						
Land-use and Surrounding Environment	• Contractor shall ensure that local people with the necessary skills are employed to work on the road project to avoid migration and settlement near the road by construction workers who are taken from far areas.	• Before recruitment planning for labour requirements shall be done during the Pre-Construction Phase.	• Potential construction workers from the local community are identified.	• Construction workers are recruited from the local community	• Contractor • CDC Engineering Department	• 6,000.00

Element to be Monitored	Method of Monitoring	Frequency of Monitoring	Indicator	Means of Verification	Authority Responsible	Monitoring Costs (US$)
	• The Site Engineer to monitor and ensure that detours, access roads and equipment park site location considers the existing land use in settled areas.	• Planning for detours, access roads and equipment park site location shall be done during the Pre-Construction Phase.	• Designs for detours, access roads and equipment park site location have considered the existing land use in settled areas.	• Designs for detours, access roads and equipment park site location are being implemented according to specifications.	• Contractor's Site Engineer	• 24,000.00
Socio-economic Environment						
Socio-economic Situation	• Contractor shall conduct and ensure that education is given both to the construction workers and local community on STDs and HIV/AIDS using aids such as video shows, pamphlets, and talks is disseminated.	• Planning for education both to the construction workers and local community on STDs and HIV/AIDS shall be done during the Pre-Construction Phase.	• Programme for education both to the construction workers and local community on STDs and HIV/AIDS is developed during the Pre-Construction Phase.	• Target group for receiving education on STDs and HIV/AIDS is identified and the programme is being implemented during the Construction Phase.	• Contractor's Site Engineer	• 60,000.00
	• Site Engineer to check and ensure that adequate warning road signs in black spot areas and speed retarders at pedestrian crossing site are erected.	• Planning for erection of warning road signs in black spot areas and speed retarders at pedestrian crossing site shall be done in the Pre-Construction Phase.	• Black spot areas are identified for erection of warning road signs and speed retarders and are included in the overall road designs	• Warning road signs and speed retarders in black spot areas and pedestrian are constructed.	• Contractor's Site Engineer	• 12,000.00
Cultural and Historic Sites						

Element to be Monitored	Method of Monitoring	Frequency of Monitoring	Indicator	Means of Verification	Authority Responsible	Monitoring Costs (US$)
Cultural and Historic Sites	• Site Engineer to monitor and ensure that detours, access roads and equipment park sites are not constructed through heritage sites.	• Planning for construction of detours, access roads and equipment park sites shall be done in the Pre-Construction Phase.	• A Road design, which takes into account protection of the sensitive sites is developed.	• Detours, access roads and equipment park sites are not constructed in sensitive sites during the Construction Phase.	• Contractor's Site Engineer	• 24,000.00
Quarries and Borrow Pits						
Quarries and Borrow Pits	• Site Engineer to monitor and ensure that quarries and borrow areas are not located near surface water sources.	• Planning for exploitation of construction materials from quarries and borrow areas shall be done in the Pre-Construction Phase.	• A road design, which takes into account protection of the water resources is developed.	• Quarries and borrow areas are located outside the water resources catchment areas during the Construction Phase.	• Contractor's Site Engineer	• 24,000.00
	• Site Engineer to monitor and ensure that quarries and borrow areas are not located near sensitive sites.	• Planning for exploitation of construction materials from quarries and borrow areas shall be done in the Pre-Construction Phase.	• A road design, which takes into account conservation measures of the sensitive sites is developed.	• Quarries and borrow areas are located far away from the sensitive sites during the Construction Phase.	• Contractor's Site Engineer	
Quarries and Borrow Pits						

Element to be Monitored	Method of Monitoring	Frequency of Monitoring	Indicator	Means of Verification	Authority Responsible	Monitoring Costs (US$)
Quarries and Borrow Pits (Cont'd)	• Site Engineer to monitor and ensure that quarries and borrow areas are not located near communities.	• Planning for exploitation of construction materials from quarries and borrow areas shall be done in the Pre-Construction Phase.	• A road design, which considers protection of the local community is developed.	• Quarries and borrow areas are located far away from the local community during the Construction Phase.	• Contractor's Site Engineer	• 12,000.00
Occupational Health and Safety						
Occupational Accidents	• Site Engineer to monitor and ensure that the procedures on Safety, Health and Environment for construction workers are being followed during the Construction Phase.	• Periodical inspection throughout the Construction Phase.	• Operational Manual on Safety, Health and Environment for construction workers is developed and available on site.	• Operational Manual on Safety, Health and Environment for construction workers is being implemented during the Construction Phase.	• Contractor's Site Engineer	• 44,000.00
Solid and Sanitary Waste						
Construction Camps	• Site Engineer to monitor and ensure that waste disposal is done in designated sites approved by the local authority and ZEMA.	• Periodically throughout the Construction Phase.	• Designated waste disposal site is identified and available.	• Waste is being dumped in designated sites.	• Contractor's Site Engineer	• 24,000.00
Subtotal						**502,000.000**

Environmental and Social Monitoring Plan for the other Mitigation Measures

Aspect	Impact	Mitigation measure	Frequency of monitoring	Performance Indicator	Time Frame	Responsible person	Cost
Site clearing and levelling	Distorted visual appearance due to the removal of vegetation	Limit the removal of vegetation to worksites only.	Quarterly	% area of site cleared vs remaining un-cleared land	Construction	RDA-ESMU	24,000.00
		Land restoration by way of planting of trees around the borrow pits and quarry sites to obscure aesthetic intrusion.	Quarterly	Area of land rehabilitated	Construction - closure	RDA-ESMU	
Area clearing and levelling	Disturbed ecological integrity of the site due to clearing	Carry out progressive as well as end of life rehabilitation on disturbed areas.	Quarterly	Area rehabilitated	Construction – Closure	RDA-ESMU	12,000.00
		Practice topsoil stripping and re-vegetate with species consistent with the surrounding vegetation.	Annual	Area rehabilitated	Construction	RDA-ESMU	
Anti-social behaviour	Loss of skilled manpower because of contracting HIV/AIDS	Use of local labour unless the required expertise cannot be obtained locally	Quarterly	List of local employees	Construction	RDA-ESMU	24,000.00
		Educate and sensitize workers on the dangers of HIV/AIDS and promote self-protection, abstinence from casual sex and the use of condoms	Quarterly	# sensitisation campaigns held	Construction	RDA-ESMU	
Generation of waste	Poor waste management practices	All solid wastes will be appropriately stored on site and removed from the site to approved waste disposal sites.	Quarterly	Amount of waste, kg, generated and disposed off	Construction	RDA-ESMU	12,000.00
Emission of dust	Dust emission	Regularly water down cleared areas to reduce emissions of dust.	Quarterly	Absence of dust at operational areas	Construction	RDA-ESMU	24,000.00
		Use personal protective equipment (dust masks) in the event of excess dust being generated	Quarterly	Use of PPE among workforce	Throughout the project	RDA-ESMU	
		Construct speed retarders at places where there are village centres	Quarterly	#speed retarders constructed	Construction	RDA-ESMU	

Aspect	Impact	Mitigation measure	Frequency of monitoring	Performance Indicator	Time Frame	Responsible person	Cost
Use of machinery and equipment	Generation of occupational health and safety risks	Ensure that adequate OHS measures are put in place and adhered to.	Quarterly	# occupational related incidences	Construction	RDA-ESMU	12,000.00
Gender Based Violence (GBV)	Increased risks of Gender Based Violence as a result of project implementation	-Mobilisation and sensitization of the project stakeholders that include the local communities, construction workers, School going youths on matters of GBV.	Monthly	# categories of people mobilised and sensitized	Throughout the project	RDA-ESMU	24,000.00
		-Dissemination of available information on laws and services for GBV issues to the communities and construction workers.	Monthly	# of GBV survivors accessing the services	Throughout the project	RDA-ESMU	
		-Incorporate GBV issues in the Code of Conduct prepared by the Contractors	Yearly	Code of Conduct with GBV elements	Mobilisation	RDA-ESMU	
Subtotal							**132,000.00**

CHAPTER 9

9 CONSULTATIONS

Public consultations

Public consultations were undertaken at various levels to enlist the perceptions of the different stakeholders on the impacts of the road project. During the ESIA study of 2018, discussions were held with district officials in the project district headquarters at Serenje, Chitambo and Mpika while informal discussions were held with beneficiaries along the road. The key stakeholders consulted during the ESIA included: District Commissioners and District Administrative Officers (DAO), officers responsible for lands, forestry, gender, and labor officers among others. Consultations were also held with the PAPs to inform them mainly about the project land requirements, resettlement principles and processes. These meetings were also used to get wider public input from both primary and secondary stakeholders. The meetings were conducted at Serenje, Kanona, Lapula, Nkushi, Kapengwe, Kalonje, Muso, Chilonga and Mpika areas. The objective of consultations was to disseminate information, identify and address legislative, community and environmental concerns and seek information on appropriate mitigation for project negative impacts.

During the RAP inventory that was conducted by RDA in September 2022 for the 60Km stretch, meetings were conducted at Kaole, Chibansa, Kasenga, Makantaulo, Kaombe, Mufubushi, Nachikufu cave and Kapoko areas to disseminate information to the local people about the road rehabilitation and the road reserve aspects.

Most of the respondents in the project area have a positive outlook towards the rehabilitation of the project road. The youth are looking forward to employment opportunities during the construction phase while the Project Affected Persons were mainly concerned about compensation aspects. Though these findings and observations reveal that, the wider population and the PAPs are largely in favour of the project, efforts need to be made by RDA and the District administration to sensitize and mobilize the PAPS so that they can sustainably benefit from the road project. Of concern is the need to assist PAPs on strategies of managing and utilizing compensation packages for improvement of their livelihoods and replacement of lost assets.

Public Disclosure

The ESIA will be disclosed on the RDA website and at the Bank's Public Information Centre in compliance with relevant GRZ regulations and the Bank Operational Policies. Further RDA will provide copies of the ESIA and RAP reports to Mpika and Lavushi Manda Council offices for public access. The ESIA and RAP summaries will be disclosed in the Bank Infoshop for 120 days since it is a Category 1 project.

Stakeholder Engagement Plan

Prior to the start of civil works, RDA will prepare a Stakeholder Engagement Plan (SEP) which will be a tool that will provide a mechanism for the continued engagement of stakeholders throughout the lifespan of the project.

CHAPTER 10

10 CONCLUSIONS AND RECOMMENDATIONS

i. The planned rehabilitation of the Serenje-Mpika road and specifically the 60Km stretch is of importance to Zambia as it is part of the main highway linking the country with neighbouring to the COMESA/EAC/SADC road corridor route. As such, it is central in terms of national and regional trade facilitation. No doubt, in view of its regional connectivity, the road is an important trunk road which should be in good all-weather motorable condition.

ii. The road will trigger both short and long-term positive impacts to the population in its corridor and beyond and improve living standards and household incomes.

iii. During its implementation, to a large extent, road works will be limited to existing carriageway with envisaged limited displacement of communities in its road reserve and those who will be impacted by the road project will move back on to available land upon compensation; and

iv. The study has put in place an Environmental and Social Management Plan and an Environmental Monitoring Plan to address the management of the identified environmental issues in the road project. The plans are explicit in terms of roles and responsibilities as well as budgetary requirements for their operationalization. It is therefore incumbent upon RDA as a lead implementing agency to ensure the plans are fully implemented to ensure compliance and sustainability of the road project.

v. The project has some of its aspects such materials extraction sites, water abstraction sites, sites for setting up of campsites whose locations during the time of the ESIA were not yet well established. It is recommended that, at the start of road works, activities to be undertaken in such areas or those activities as a whole need to have their independent ESIA conducted and approved by ZEMA; and

vi. Inevitably, the project will likely lead to some environmental and social impacts which need to be mitigated during project implementation. This means, there should be deliberate effort to recruit matching experts to oversee compliance with environmental and social requirements in the project in line with ZEMA Decision Letter conditions and the environmental and social requirements of AfDB.

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12 APPENDICES

12.1 APPENDIX 1: SCOPING MEETINGS/CONSULTATIONS

1. SCOPING MEETING

1.1 INTRODUCTION

As a legal requirement as well as part of the Environmental Impact Assessment (EIA) process, scoping meetings were arranged and held in Serenje and Mpika Districts on 22nd October 2017, 7th November 2017, 8th November 2017 and 9th November 2017.

1.2 COMPOSITION AND EXPERTISE OF THE CONSULTANCY TEAM

The ESIA team consisted of four persons (Jere Mwila, Jacob Chishiba, Alex MacDonald and Lewis Tumbama). The team has specialization in Highway Engineering, Environment and Natural Resources Management, Transport Economics, Socioeconomics and Traffic Counts. The contents of meetings are presented below.

KABAMBA PRIMARY SCHOOL-LAY-BY

MINUTES OF THE CONSULTATIVE MEETING FOR THE RESETTLEMENT ACTION PLAN AND ESIA HELD AT KABAMBA PRI. SCHOOL TURN OFF/ LAY-BY ALONG SERENJE MPIKA ROAD HELD ON 22nd OCTOBER 2017.

Opening Remarks

The meeting started at 11Hrs. The area Chairperson called the meeting to order at 12hrs. He gave the opening remarks and asked the ASCO/RDA sociologist from the consulting team and asked him to explain the purpose of the meeting.

Presentation on the Project

The sociologist introduced himself and told the gathering the purpose of the meeting and visit to the area was twofold:

- Introduce the project and the proposed activities to the communities along the road,
- Inform the communities along the road of the effects of proposed civil works on all their assets located with the road reserve/ or 100m right of way (ROW), which is 50metres from the Centre of the road-both sides,
- Get views and concerns from the affected property owners and other stakeholders regarding the proposed resettlement and the ESIA, and
- Introduce the ESIA process in Zambia and the steps to be followed in updating the ESIA for the Serenje to Mpika Road.

He explained to the participants that in conducting the RAP, the team will be guided by the provisions of the Resettlement Policy Framework developed by the Road Development Agency as well as ADB policy on resettlement.

The presenter said that based on the findings of the socio-economic survey conducted along the Road in 2013, which was based on the 60 metres (30m radius on either side of the road) which confirmed several impacts as falling within the Right of Way (RoW), the resettlement action planning process has been triggered.

The RAP will be based on the 100metres Right of Way, which means all properties found within this corridor need to move to clear the RoW.

In terms of process and steps to be followed, the presenter also explained that all affected properties will be measured and described in full by a team of census and asset valuation officers employed.

The presenter made it very clear that the role of the team was to compile a full report with values for each asset impacted clearly assigned. This information is required by the RDA and their cooperating partners to plan for implementation.

He assured the participants that all owners of impacted assets will be compensated before construction works begin.

Updating and preparation of the Environmental and Social Impact Assessment Report (ESIA) would as well be guided by the Zambia Environmental Management Act No.11 of 2012 as well as provisions of the AfDB policy. The presenter explained the exact steps to be followed when ding the proposed environmental assessments and preparation of the ESIA, which starts with consultations and that the whole process, has been combined with the RAP consultative meetings in order to save time.

He explained that there is a four (4) man team comprising Highway Engineer, Transport Economist, Environmentalist and Sociologist who are part of the assessment team and that they will be coming at different times as they are handling different aspects of the ESIA.

In concluding the presentation, he reminded them that they should be free to ask questions, air their views and concerns as it is a requirement in Zambia when conduction the EIA and planning for resettlement that people are consulted and allowed to make submissions.

Question and Answer Session

No.	Name of Participant	Contribution/ Question/Concern	Response Given
1.	Chisala George	He wanted to find out if those with structures on roads joining the Great North Road would also be considered for compensation so that government does not have problems of expanding roads in future?	No, the current exercise was only targeting properties along great north road
2.	Chisenga Elvis	He wanted to know what would happen to all those who will build in the road reserve after this exercise. He asked because he was so sure that people would want to be compensated because there is money available and will take advantage?	All those who will build after the on-going census and asset inventory is completed will be deemed as opportunistic persons and will not be compensated. Immediately after this exercise, there will be a Cut-off date. A cut-off date of completion of conducting the census and

			asset inventory and is a date beyond which no one will be considered for compensation
3.	Kalale Oscar	He wanted to know if RDA will compensate for all the maize fields and wanted to know if he should cultivate the field this year	Yes, and should go ahead with cultivation of crops until they are told to discontinue.
4.	Chongo Roy	He wanted to know if the proposed road works could at least be extended to the palace so that the chief benefits as well	No. The proposed road rehabilitation works are for the Great North Road only. Government, could however consider extending tarred road to the palace in future.
5.	Chalwe Gabriel	Requested that RDA extends the size of the lay-by as well	Will take note of that and will be brought to RDA's attention through the meeting minutes
6.	Silungwe Brown	Requested that youths in the area are given jobs during construction so that they can also benefit and improve their lives	Noted
7.	Beatrice Mambwe	She wanted to know if maize fields will be considered for compensation because the network providers who were laying optic fibre cables destroyed people's fields and did not compensate anyone	All assets within the road reserve will be compensated for. If at the time of construction, they find crops in the field then the crops will be compensated for but if they harvest, then only land could be considered
8.	Mumba Lubingu-Area Chairperson	He explained that MTN, Airtel and Zamtel all have their optic cables laid within the road reserve. He wanted to know what would happen to the cables, who will move them and if RDA will	RDA will ask the companies to move the Optic Fibre Cables from the road reserve. RDA will not compensate the companies because they got permission to lay the cables within the road

		compensate these companies?	reserve and there are conditions given to them.
9.	Boniface Kunda	He wanted to know if people will be paid first or after construction	People will be paid before commencement of works

After all the questions were exhausted, the area Chairperson thanked the participants for attending the meeting at short notice and said that people would be waiting for further instructions and hoped that they will be given notice to vacate the reserve.

The consultant thanked the community for coming to the meeting and participating freely during the deliberations. He assured them that the team measuring all affected structures would soon be in the area and appealed to everyone to corporate with them and provide all the requested for information which will be kept in confidence.

Summary of Concerns from the meeting

Main concerns/questions were based on whether compensation will be paid before or after, possibility of employment opportunities, notice of vacation from the road reserve, compensation for crops.

The meeting which started at 11 hours, closed at 13.30hrs.

CHANSA LAYBY

MINUTES OF THE CONSULTATIVE MEETING FOR THE RESETTLEMENT ACTION PLAN AND ESIA HELD AT CHANSA LAY-BY AREA ALONG SERENJE MPIKA ROAD HELD ON 7th NOVEMBER 2017.

Opening Remarks

The meeting started at 09:00hours. The Business Association Representative gave the opening remarks and called for an opening prayer which was given by one of the residents.

After the prayer, he asked the ASCO/RDA sociologist from the consulting team and asked him to explain the purpose of the meeting.

Figure 7: Chansa Layby Group that Attended the Meeting

Presentation on the Project

The sociologist introduced himself and told the gathering the purpose of the meeting and visit to the area was twofold:

- Introduce the project and the proposed activities to the communities along the road,
- Inform the communities along the road of the effects of proposed civil works on all their assets located with the road reserve/ or 100m right of way (ROW), which is 50metres from the Centre of the road-both sides,
- Get views and concerns from the affected property owners and other stakeholders regarding the proposed resettlement and the ESIA, and
- Introduce the ESIA process in Zambia and the steps to be followed in updating the ESIA for the Serenje to Mpika Road.
- He explained to the participants that in conducting the RAP, the team will be guided by the provisions of the Resettlement Policy Framework developed by the Road Development Agency as well as ADB policy on resettlement.

The presenter said that based on the findings of the socio-economic survey conducted along the Road in 2013, which was based on the 60 metres (30m radius on either side of the road) which confirmed

several impacts as falling within the Right of Way (RoW), the resettlement action planning process has been triggered.

The RAP will be based on the 100metres Right of Way, which means all properties found within this corridor need to move to clear the RoW.

In terms of process and steps to be followed, the presenter also explained that all affected properties will be measured and described in full by a team of census and asset valuation officers employed.

The presenter made it very clear that the role of the team was to compile a full report with values for each asset impacted clearly assigned. This information is required by the RDA and their cooperating partners to plan for implementation.

He assured the participants that all owners of impacted assets will be compensated before construction works begin.

- Updating and preparation of the Environmental and Social Impact Assessment Report (ESIA) would as well be guided by the Zambia Environmental Management Act No.11 of 2012 as well as provisions of the ADB policy. The presenter explained the exact steps to be followed when ding the proposed environmental assessments and preparation of the ESIA, which starts with consultations and that the whole process, has been combined with the RAP consultative meetings to save time.

He explained that there is a four (4) man team comprising Highway Engineer, Transport Economist, Environmentalist and Sociologist who are part of the assessment team and that they will be coming at different times as they are handling different aspects of the ESIA.

In concluding the presentation, he reminded them that they should be free to ask questions, air their views and concerns as it is a requirement in Zambia when conduction the EIA and planning for resettlement that people are consulted and allowed to make submissions.

Question and Answer Session

No.	Name of Participant	Contribution/ Question/ Concern	Response Given
1.	Muyunda Mukenani	He wanted to know exactly when the exercise to relocate will start so that traders can plan	Clear and exact timelines will be communicated by RDA, but everything is planned for the year 2018
2.	Dorothy Chibuye	Complained that the team that was taking measurements did not find her at her shop and plot which are all affected and wanted to know what will happen? She also wanted to know if her house and shop foundation will be compensated for	The team is not yet done with the area and have several call backs to attend to, which might include her property
3.	Mutambo Chanje	Wanted to know if RDA would find the affected traders land to move to	RDA may not commit to finding land for all affected persons but will ensure

		because at the back of the shopping area lies a rail line and immediately after, there is a river running along. After the shopping area, along the tarred road, there was no space and traders will not set up shops where there is no lay-by.	that Chiefs and Municipal leaders along the road are very much part of the project as they are the custodians of land. Cash compensation is guaranteed and not in-kind replacement of land and impacted structures
4.	Muyunda Mukenani	Added to Mutambo's concern and requested that the traders would like to know what RDA's plan is considering shortage of suitable trading space.	Sure, noted. Clear and exact timelines will be communicated by RDA, but everything is planned for the year 2018.
5.	Kelvin Chola	He wanted to know if, at the time of road rehabilitation, the contractors will consider employing the local people especially the youths.	Standard practice demands that they do that. Not up to the consulting team to provide a guarantee but suggested that the local people work hand in hand with local leadership.
6.	Lastone Tembo	Wanted to know when the project will start so that they can plan the relocation programme as well	Sometime in 2018 but RDA will communicate exactly when they would want everybody with an asset within the RoW moved
7.	Godwin Mulenga	He wanted to know if he should continue building at the back of the shops, where he had already started building	Yes, provided he is building outside the RoW. If within, he should know that RDA will only compensate for what the RAP team will find on the ground and measure. All new buildings should be outside the RoW.

He thanked the participants for attending the meeting at short notice and assured them that the team measuring all affected structures will capture all the assets impacted and that all those who were left out would be revisited before leaving the area.

Summary of Concerns from the Meeting

Main concerns/questions were based on inadequate space to move to after compensation is received, whether to stop on going constructions or not and consideration to pay for bare parcels of land.

The meeting closed at 10.30hrs.

MUSO LAY-BY

MINUTES OF THE CONSULTATIVE MEETING FOR THE RESETTLEMENT ACTION PLAN AND ESIA HELD AT MUSO LAY-BY ALONG SERENJE MPIKA ROAD HELD ON 7th NOVEMBER 2017.

Opening Remarks

The meeting started at 12:00Hr by a representative of the business owners at MUSO Lay-by who introduced sociologist from the consulting team and asked him to explain the purpose of the meeting.

Presentation on the Project

The sociologist introduced himself and told the gathering the purpose of the meeting and visit to the area was twofold:

- Introduce the project and the proposed activities to the communities along the road,
- Inform the communities along the road of the effects of proposed civil works on all their assets located with the road reserve/ or 100m right of way (ROW) right of way, which is 50metres from the Centre of the road-both sides,
- Get views and concerns from the affected property owners and other stakeholders regarding the proposed resettlement and the ESIA, and
- Introduce the ESIA process in Zambia and the steps to be followed in updating the ESIA for the Serenje to Mpika Road.

He explained to the participants that in conducting the RAP, the team will be guided by the provisions of the Resettlement Policy Framework developed by the Road Development Agency as well as ADB policy on resettlement.

The presenter said that based on the findings of the socio-economic survey conducted along the Road in 2013, which was based on the 60 metres (30m radius on either side of the road) which confirmed several impacts as falling within the Right of Way (RoW), the resettlement action planning process has been triggered.

The RAP will be based on the 100metres Right of Way, which means all properties found within this corridor need to move to clear the RoW.

In terms of process and steps to be followed, the presenter also explained that all affected properties will be measured and described in full by a team of census and asset valuation officers employed.

The presenter made it very clear that the role of the team was to compile a full report with values for each asset impacted clearly assigned. This information is required by the RDA and their cooperating partners to plan for implementation.

He assured the participants that all owners of impacted assets will be compensated before construction works begin.

Updating and preparation of the Environmental and Social Impact Assessment Report (ESIA) would as well be guided by the Zambia Environmental Management Act No.11 of 2012 as well as provisions of the ADB policy. The presenter explained the exact steps to be followed when ding the proposed environmental assessments and preparation of the ESIA, which starts with consultations and that the whole process, has been combined with the RAP consultative meetings in order to save time.

He explained that there is a four (4) man team comprising Highway Engineer, Transport Economist, Environmentalist and Sociologist who are part of the assessment team and that they will be coming at different times as they are handling different aspects of the ESIA.

Figure 8: Muso Layby Group that Attended the Meeting

In concluding the presentation, he reminded them that they should be free to ask questions, air their views and concerns as it is a requirement in Zambia when conduction the EIA and planning for resettlement that people are consulted and allowed to make submissions.

Question and Answer Session

No.	Name of Participant	Contribution/ Question/Concern	Response Given
1.	Mapule Noreen	She wanted to know if RDA will just compensate only those within the 50-metre radius and not those at the edge.	RDA will just consider those within the RoW for compensation and not any structures outside the RoW.
2.	Simyon Makwaya	He wanted to know the exact number of metres from the edge of the existing tarred road	RDA was only concerned with properties within the RoW. The exact number of metres from the edge of the RoW was not prescribed but if the structures are far away from the 50m corrido, the better
3.	Abian Chanda	She wanted to know what would happen or where the property owners would move their businesses to as there was no space at the	The shops or indeed any impacted structures should be moved outside the RoW (50m + away from the centre line of the road)

		back of the shops at Muso trading area	The commitment I can make is that the structures should be 50m plus away from the centre of the road.
4.	Derrick Bwalya	He also wanted to know the exact number of metres from the edge of the RoW to reconstruct their impacted shops	
5.	Harriet Mwape	She was concerned that there have been other groups before our team which went round registering affected properties and did not know who to believe and trust any more. She also wanted to know if people should stop developments.	He assured her that as far as RDA was concerned, this is the only RAP they are doing in 2017. If there have been other groups in the past, either early or mid-2017, then it is another project for other organisations and not the RDA RAP.
6.	Prosperine Ngosa	She was concerned that there was completely no space both at the back of the shops-where there are houses and across the road where is a hill? Where will government move or want traders to move to?	Alternative trading space could be found anywhere near that place and along the road provided there is a Lay-by because that is where cars stop. He promised to take note of this concern and present it in the document and before RDA so that it is factored into the road designs. I doubt if government would re-instate the impacted structures in-kind. Cash compensation is more of a preference given the number of impacted structures along the road. Therefore, it should be the traders' responsibility (once compensated) to move off the RoW.
7.	Simyoni Makwaya	Wanted to know the timeframe when the project will start and when to expect compensation? He also wondered if government would honor this and not just demolish people's properties.	Possibly 2018 but cannot confirm the month. RDA will ensure people are informed in advance before commencement of compensation for all impacted structures. RDA would ensure all affected families are compensated considering the RDA as well as the DB guidelines on compensation.

8.	Nelson Bwalya	Wanted to know who will provide the value for all impacted structures.	There is an experienced, registered and certified Asset valuation specialist who is part of the RAP team.
9.	Prosperine Ngosa	She wanted to know if disturbance allowance will be factored in or not because it takes a while to rebuild what is impacted and there will be loss of business on the part of traders	Compensation will be given to all affected families before project implementation, which will allow every affected family to reinstate their lost properties before moving off the Row. They will therefore be no disturbance in term of business as there will be no gap but smooth continuation of their businesses. The key is paying compensation before commencement of works or moving off the RoW.
10.	Abian Chanda	She was concerned with what would happen at the time of impact capturing if the owner of the property was not around and ta the time of implementation	Anyone from the nuclear family who is 16years and above could provide the information required on behalf of the property owner. Besides all information collected now will have to be verified at implementation stage.
11.	Nelson Bwalya	Was very grateful that the traders were consulted and sensitized but wondered how the team was sensitizing all the affected property owners along the road.	It was not possible to sensitise everyone given the timeframe within which the RAP has to be prepared and the strategy was to ensure all property owners- (some from the same communities along the road) are targeted. We are targeting all the most populated areas for consultations.
12.	Harriet Mwape	Wanted to know how the buildings which had collapsed would be considered for compensation because the owners are about to reinstate them because all land along the road are bought and not just given by traditional authorities.	Could not make a straight commitment to that but informed the gathering that in resettlement and valuation, you value what you see and not what used to be there or an intention or plan. Land could be considered as long there was any proof of ownership availed.

A total of 48 traders attended the consultative meeting as per attached attendance list.

Summary of Concerns from the meeting

Main concerns/questions were based on inadequate space to move to after compensation is received, and the distance off the edge of the Row, adequacy of compensation.

The meeting which started at 12 hours, closed at 13.20hrs.

CHILONGA MISSION

MINUTES OF THE CONSULTATIVE MEETING FOR THE RESETTLEMENT ACTION PLAN AND ESIA HELD AT CHILONGA MISSION SHOPPING AREA/ LAY-BY ALONG SERENJE MPIKA ROAD HELD ON 8th NOVEMBER 2017.

Opening Remarks

The meeting started at 09:00hours. The Business Association Vice Chairperson, Mr. Shinga, gave the opening remarks and called for an opening prayer which was given from the Pastor which was given by Pastor Zimba.

After the prayer, he asked the ASCO/RDA sociologist from the consulting team and asked him to explain the purpose of the meeting.

Presentation on the Project

The sociologist introduced himself and told the gathering the purpose of the meeting and visit to the area was twofold:

- Introduce the project and the proposed activities to the communities along the road,
- Inform the communities along the road of the effects of proposed civil works on all their assets located with the road reserve/ or 100m right of way (ROW), which is 50metres from the Centre of the road-both sides,
- Get views and concerns from the affected property owners and other stakeholders regarding the proposed resettlement and the ESIA, and
- Introduce the ESIA process in Zambia and the steps to be followed in updating the ESIA for the Serenje to Mpika Road.

He explained to the participants that in conducting the RAP, the team they will be guided by the provisions of the Resettlement Policy Framework developed by the Road Development Agency as well as ADB policy on resettlement.

The presenter said that based on the findings of the socio-economic survey conducted along the Road in 2013, which was based on the 60 metres (30m radius on either side of the road) which confirmed several impacts as falling within the Right of Way (RoW), the resettlement action planning process has been triggered.

The RAP will be based on the 100metres Right of Way, which means all properties found within this corridor need to move to clear the RoW.

In terms of process and steps to be followed, the presenter also explained that all affected properties will be measured and described in full by a team of census and asset valuation officers employed.

The presenter made it very clear that the role of the team was to compile a full report with values for each asset impacted clearly assigned. This information is required by the RDA and their cooperating partners to plan for implementation.

He assured the participants that all owners of impacted assets will be compensated before construction works begin.

Updating and preparation of the Environmental and Social Impact Assessment Report (ESIA) would as well be guided by the Zambia Environmental Management Act No.11 of 2012 as well as provisions of the ADB policy. The presenter explained the exact steps to be followed when ding the

proposed environmental assessments and preparation of the ESIA, which starts with consultations and that the whole process, has been combined with the RAP consultative meetings in order to save time.

He explained that there is a four (4) man team comprising Highway Engineer, Transport Economist, Environmentalist and Sociologist who are part of the assessment team and that they will be coming at different times as they are handling different aspects of the ESIA.

In concluding the presentation, he reminded them that they should be free to ask questions, air their views and concerns as it is a requirement in Zambia when conduction the EIA and planning for resettlement that people are consulted and allowed to make submissions.

Question and Answer Session

No.	Name of Participant	Contribution/ Question/ Concern	Response Given
1	Prisca Chulu	She wanted to know if RDA would compensate for the two plots she bought because there was no space at the back of the plots to move to.	Provided there was proof of ownership for the land parcels in question, RDA would compensate for the land. The issue of lack of space at the back of most properties along the road was common and there will be need to ensure that either Village Heads or the Chief or Municipal Authorities are brought in when dealing with alternative lands as these are the custodians of land,-depending on the land tenure of the particular case being dealt with
2	Francis Mwila	He wanted to know if government had money to compensate all those whose properties are within the RoW?	Yes, for RDA to start this process, it means there is money for the exercise or at least with their cooperating partners, although suffice to say that we are not guaranteeing anyone as to exactly when people will be compensated. RDA will communicate accordingly. What we can assure everyone who has an asset within the RoW is that it will be compensated for.
3	Dyness Mwaba	She wanted to know if RDA will compensate for all the houses located within the RoW	Yes

4	Annie Chanda	She was wanted to know if RDA will take it upon themselves and find people alternative parcels of land which are located within the RoW OR pay cash compensation so that people find alternative land themselves She also wanted to know what will happen to all those who were currently building within the RoW and whether they should stop construction or continue	Given the number of affected parcels of land, RDA will be very hesitant to commit to finding each person an alternative land. Cash compensation seems to be the best option so that people can find their own alternative land in a place and area of their choice, provided it is outside the RoW.
5	Mumbi Manyanya	He wanted to know what would happen to those with storage containers or makeshift stalls called Kantemba in terms of compensation	They will be compensated, except for them it will be the cost of moving the container outside the RoW since it is a movable asset. For Tuntembas, the RAP team will just take note of them and bring it to the attention of RDA. No Kantemba will be captured at this stage.
6	Francis Mwila	In addition to what Mumbi Manyanaya had asked, he also wanted to know if land where the container is located would be factored into the compensation package	Yes, if there is evidence that land has been bought
7	Mulaita Peter	He wanted to know what would happen to those houses just at the edge of the 50m RoW?	All structures outside the RoW (50m plus away) will not be captured.

He thanked the participants for attending the meeting at short notice and assured them that the team measuring all affected structures was 100km away and that within a week or so, they will be at Chilonga and appealed to everyone to corporate with them and provide all the requested for information which will be kept in confidence.

Summary of Concerns from the meeting

Main concerns/questions were based on inadequate space to move to after compensation is received, and the distance off the edge of the Row, Government readiness to compensate and adequacy of compensation, consideration to pay for bare parcels of land.

KANONA LAY-BY

MINUTES OF THE CONSULTATIVE MEETING FOR THE RESETTLEMENT ACTION PLAN AND ESIA HELD AT KANONA ALONG SERENJE MPIKA ROAD HELD ON 8th NOVEMBER 2017.

Opening Remarks

The meeting started at 15:00Hr with an opening prayer which was given by Mrs.Sinkala Daisy (District Secretary). Thereafter, opening remarks were given by the same lady, who explained that the Government through the RDA was in the process of widening all roads in the country and that soon it would be time for the Mpika to Serenje Road. She called upon the consultant from the consulting team and asked him to explain the purpose of the meeting.

Presentation on the Project

The sociologist introduced himself and told the gathering the purpose of the meeting and visit to the area was twofold:

- Introduce the project and the proposed activities to the communities along the road,
- Inform the communities along the road of the effects of proposed civil works on all their assets located with the road reserve/ or 100m right of way (ROW) right of way, which is 50metres from the Centre of the road-both sides,
- Get views and concerns from the affected property owners and other stakeholders regarding the proposed resettlement and the ESIA, and
- Introduce the ESIA process in Zambia and the steps to be followed in updating the ESIA for the Serenje to Mpika Road.

He explained to the participants that in conducting the RAP, the team they will be guided by the provisions of the Resettlement Policy Framework developed by the Road Development Agency as well as ADB policy on resettlement.

The presenter said that based on the findings of the socio-economic survey conducted along the Road in 2013, which was based on the 60 metres (30m radius on either side of the road) which confirmed several impacts as falling within the Right of Way (RoW), the resettlement action planning process has been triggered.

The RAP will be based on the 100metres Right of Way, which means all properties found within this corridor need to move to clear the RoW.

In terms of process and steps to be followed, the presenter also explained that all affected properties will be measured and described in full by a team of census and asset valuation officers employed.

The presenter made it very clear that the role of the team was to compile a full report with values for each asset impacted clearly assigned. This information is required by the RDA and their cooperating partners to plan for implementation.

He assured the participants that all owners of impacted assets will be compensated before construction works begin.

Updating and preparation of the Environmental and Social Impact Assessment Report (ESIA) would as well be guided by the Zambia Environmental Management Act No.11 of 2012 as well as provisions of the ADB policy. The presenter explained the exact steps to be followed when ding the proposed environmental assessments and preparation of the ESIA, which starts with consultations and that the whole process, has been combined with the RAP consultative meetings to save time.

He explained that there is a four (4) man team comprising Highway Engineer, Transport Economist, Environmentalist and Sociologist who are part of the assessment team and that they will be coming at different times as they are handling different aspects of the ESIA.

In concluding the presentation, he reminded them that they should be free to ask questions, air their views and concerns as it is a requirement in Zambia when conduction the EIA and planning for resettlement that people are consulted and allowed to make submissions.

Question and Answer Session

No.	Name of participant	Contribution/ Question/Concern	Response Given
1.	**Daisy Sinkala (District Secretary)**	She thanked the consultant for coming to address the meeting as a lot of people had started asking questions wanting to know what was going on because they had seen some officers, measuring people's properties along the road. She also wanted to know whether payment or compensation for all the impacted structures would be in-kind or cash. Lastly, she wanted to know if RDA will pay those whose names will appear twice because they own property on both sides of the road, and within the 50M corridor	Thanked her for taking up the responsibility to attend to the residents who were coming with questions. Most likely, it will be cash compensation for most properties except, communal properties like markets/market sheds and or any other structures belonging to government. Irrespective of the number of times one's name appears on the list, if they have properties which are within the RoW, they will be eligible for compensation.
2.		She wanted to know what would happen to the shops the team had left out because the owners were not around She also informed the consultant that the issue of	Team will be asked to go back and capture all the impacts where the owners were not around at the time of assessment.

		land is critical in the area because very few people have title deeds. She requested that people be notified in advance so that they can prepare letters from traditional leadership to present as proof of ownership. She wanted to know if people will be paid for the plots or land parcels because they are bought from traditional leadership	In response to the issue of land pieces without title deeds, she was assured that the matter will be considered. That before any decision is made, RDA will be notified of the developed and a clear position will be communicated to all losing pieces of bare lands especially at the time of implementation.
3.	Dawell Musonda	He wanted to know how far off the edge of the 50m buildings should be reconstructed/moved to? He also wanted to know if bare pieces of land will be compensated for.	RDA was only concerned with properties within the RoW. The exact number of metres from the edge of the RoW was not prescribed but if the structures are far away from the 50m corrido, that should be ok
4.	Mwape Musonda		In response to the issue of land pieces without title deeds, he was assured that the matter will be considered. That before any decision is made, RDA will be notified of the developed and a clear position will be communicated to all losing pieces of bare lands especially at the time of implementation.
5.	Mr.Kananda	He also wanted to know the exact number of metres from the edge of the RoW to reconstruct their impacted shops He was concerned because 50m terminates right in front of his house and wanted to know if it will be safe. He also said that his well and borehole as well as tanks were impacted and wanted to know whether all of them would be paid for.	The shops or indeed any impacted structures should be moved outside the RoW (50m + away from the centre line of the road) The commitment I can make is that the structures should be 50m plus away from the centre of the road. All assets including the well, tanks etc within the RoW will be compensated.
6.	Barbara Chisenga	There is no space at the back of my impacted	Alternative trading space could be found anywhere near that place and

		shops. Where should we move the shops to?	along the road provided there is a Lay-by because that is where cars stop. He promised to take note of this concern and present it in the document and before RDA so that it is factored into the road designs.
7.	Dawell Chalwe	He wanted to know if the cost of disconnection and reconnection of electricity will be factored in the compensation of affected shops and houses	The cost of connection and reconnection will be factored into the total compensation
8.	Harrison Musonda	He wanted to know if compensation for all shops would consider the electricity reconnection fee He also wanted to know if all shops which are partially impacted could be considered as fully impacted as they may not be used again.	All partially impacted shops will be considered as full impacts. The idea and understanding are that they will remain unviable.
9.	Fackson Chisenga	He also wanted to know if all shops which are partially impacted could be considered as fully impacted as they may not be used again, and his shop was one such an example.	All partially impacted shops will be considered as full impacts. The idea and understanding is that they will remain unviable.
10.	Jennipher Kalunga	She wanted to know if undeveloped pieces of land would be considered for compensation or not.	In response to the issue of land pieces without title deeds, he was assured that the matter will be considered. That before any decision is made, RDA will be notified of the developed and a clear position will be communicated to all losing pieces of bare lands especially at the time of implementation.

Summary of Concerns from the meeting

Main concerns/questions were based on inadequate space to move to after compensation is received, and the distance off the edge of the Row, adequacy of compensation and whether the cost of electricity reconnection will be factored into the final compensation values or not.

12.2 APPENDIX 2: LIST OF PEOPLE CONSULTED

CONSULTATIVE MEETINGS FOR THE UPDATING OF THE FINANCIAL AND ECONOMIC ANALYSIS INCLUDING ENVIRONMENTAL IMPACT STATEMENT AND RESETTLEMENT ACTION PLAN FOR THE SERENJE TO MPIKA ROAD-238.3KMS

VENUE: KABAMBA PRIMARY SCHOOL DATE: 22-10-17

No	Name	Organisation/Department/Village	Position
1	OSCAR KALALE	CHIKONAIKA	MEMBER
2	BEAUTY KALALE	ANDSON KUNDA	MEMBER
3	IREEN KAFUKANYA	CHIKONAIKA	MEMBER
4	GABRIEL CHALWE	LUBEMBA	“
5	JOSEPHINE NJIPIKA	FIVE NJIPIKA	“
6	MICHEAL MWINSHA	CHIKOMBOLA	“
7	ANGELA NDASHE	MWAPE MUKWASA	“
8	BEATRICE MAMBWE	DAVID MAMBWE	“
9	BROWN SHILUNGWA	ANDSON KUNDA	“
10	LINDA KALUNGA	FIVE	“
11	PATRICIA NAMUKUNDA	DAVID MAMBO	“
12	JIM CHALWE	FISAPA SECTION	“
13	PECOS KALUNGA	JOSEPHAT MUMBA	“
14	ANET MUKOSHA	NASEVEN FARM VILLAGE	‘
15	LABAN SILUNGA	ANDSON FARM VILLAGE	“
16	CATHERINE MAMBO	NJIPIKA FARM	TREASURER
17	MIRRIAM MWAPE	NAMESON KUNDA	
18	INESS MAMBWE	NJIPIKA FARM	
19	STELLA MAINA	STELLA VILLAGE	
20	JANET NYIRENDA	OLIVER FARM	

VENUE: LUKULU MARKET DATE: 06-11-17

NO	NAMES
1	NGOSA VINCENT
2	KAPESO CHARLES
3	BERNAD BWALE
4	CHISALA NEWTON
5	NKANDU EVINSON
6	CHARLES MISELO
7	CHANDA GODFREY
8	MWAPE CHITAMBO
9	CHOLA GRADICE
10	MUKOSHA KEZIA
11	PRUDENCE NKANDU
12	CHEMBE RUTH
13	BWALE NORIA
14	KACHASU JENE
15	CHANDA VINCENT
16	MEVERENE CHISENGA
17	MWAPE CLEVAN
18	KABUSWE MERCY
19	MUTELE RONTIA

20	HENLY NG'AMBI

VENUE: CHANSA LAYBY DATE: 07-11-17

No	Name
1	ENERST CHISENGA
2	SILVIA CHISENGA
3	MUTAMBO CHANJE
4	SUSAN MUSHILI
5	GODWIN MULENGA
6	JOHN NGOSA
7	MUPIKA PETER
8	EVANS MWELWA
9	OBED BWALYA
10	TENFORD CHALWE
11	ESTON CHIBUYE
12	CHIBUYE DOROTHY
13	MUKENANI INESS
14	BLESSED CHANDA
15	ALBERT MUKENANI
16	MUYUNDA MIKE
17	CHOLA ANTONY
18	MULENGA JEFF
19	CHISENGA NEBERT
20	MUKONDE PETER
21	MWEWA CHIKAKA
22	BWALE KENNEDY
23	IDAH LWENGA
24	KINGSTONE CHESHA
25	MISELO INNOCENT
26	FREEDOM MULENGA
27	MULENGA THERESA
28	MWILA MEMORY
29	MANYEPA RAY
30	LASTON C. TEMBO
31	MIBENGE EDWARD
32	CHITASHA KAPAMBWE
33	MIKE SEKELANI
34	MUKENANI KALUNGA
35	MUKOSHA STEPHEN

VENUE: CHANSA DATE: 07-11-17

No	Name	Organisation/Department/Village	Position
1	CHISALA GOERGE		CHAIRMAN
2	MUMBA LUBINDA	MWANSA MARGARET	MEMBER
3	JONATHAN KUNDA	LUBEMBA VILLAGE	TREASURER
4	JONAS MPETA	CHIKONAIKA VILLAGE	MEMBER
5	TYSON KUNDA	LUBEMBA VILLAGE	MEMBER
6	DORIS LUBINGU	CHIKONAIKA VILLAGE	"
7	BRIAN MWELWA	KASAMA VILLAGE	"
8	CHISENGA ELVIS	TOFI VILLAGE	"
9	MUSONDA EVANS	TAMBALIKA VILLAGE	"
10	BONFACE KAPILYA	KABAMBA VILLAGE	"
11	MEMORY CHILEKWA	DAVID MAMBO	"
12	KELVIN CHIBONI	KABULUMA	"
13	CECILIA KUNDA	PANA SEVEN	"
14	MIZANI MUKOSHA	CHISENGA VILLAGE	'
15	ACKSON SIAME	KABULUMA	"

VENUE: MUSO LAYBY DATE: 07-11-17

No	Name	Organisation/Department/Village
1	DERRICK BWALYA	MUSO
2	SYDNEY CHOLA	MPOMFU
3	MWAPE JOSEPH	
4	CHIBUYE KENNEDY	MPOMFU
5	DANIEL SIMUKOKO	MPOMFU
6	NOAH CHIBUYE	MPOMFU
7	MWELWA BETHSHEBA	MPOMFU
8	MWANSA RABECCA	MPOMFU
9	RUTH MOFYA	MUSO
10	SIMON MAKWAYA	MUSO
11	GOLIATH CHEWE	MUSO
12	PICKSON CHALWE	MUSO
13	ROBSON KUNDA	MUSO
14	KUNDA ODFREY	MUSO
15	MUSONDA KELVIN	MUSO
16	KALUBA CHISNGA	MPOMFU
17	OLIVER MWADE	MPOMFU
18	DORCAS MWILA	MPOMFU
19	OSCAR MUSONDA	MPOMFU
20	LINES CHANDA	MPOMFU
21	HARRIET MWAPE	
22	CATHERINE KABAMBA	
23	BARBARA BWALE	
24	ADRIAN CHANDA	
25	GLADYS CHIBWE	
26	LOREEN CHANDA	
27	IREEN CHALWE	MUSO
28	JANET CHUMA	
29	OBBREY BOMBO	

30	ANNE CHOLA	
31	MUPETA TREVOR	MPOMFU
32	CHRISTOPHER CHANSA	
33	CAIAPHAS MUKOSHA	
34	OSCAR MWAPE	
35	MAPULE NOREEN	MPOMFU
36	CHIKONKOLO VENTER	MPOMFU
37	MWAPE FRANK	MPOMFU
38	FLORENCE MUKOSHA	MPOMFU
39	KUNDA MEMORY	MPOMFU
40	RHONAH KALUBA	MPOMFU
41	SINESS MAGAMA	MPOMFU
42	BEINA KAUBA	MPOMFU
43	KALUBA LEVY	MPOMFU
44	HELLEN C CHILIMBA	MPOMFU
45	KALUBA DELPHISTER	MPOMFU
46	BWALYA NELSON	MPOMFU
47	IDAH CHIBUYE NOAH.M	MPOMFU
48	CHARLES MUKELEBAI	MPOMFU

VENUE: CHILONGA DATE: 08.11.17

No	**Name**	**Organisation/Dept/Village**	**Position**
1	MUMBI MANYANYA		BUSINESSMAN
2	VICTOR MWANSA		
3	PRISCA CHULU		BUSINESSMAN/LADY
4	VICTOR CHLESHE		BUSINESSMAN
5	MWANZA CLEMENT		BUSINESSMAN
6	FUEL. M. MWANSA		BUSNESSMAN
7	DAVIES MULENGA		BUSINESSMAN
8	NGOMA KAPELE LAMECK	MALAMA	
9	BWALYA SILOMBA	MALAMA	BUS
10	RUEBEN NKATYA	MALAMA	SALES AGENT
11	GRADICE LUKUTA	KONI	BUSINESSWOMAN
12	MULAITA PETER	KONI	BUSINESSMAN
13	ANTHONY CHOMBA	KALAMATA	BUSINESSMAN
14	JOSEPH KAUNDA	POLITO	BUSINESSMAN
15	SARAH CHEWE		BUSINESSLADY
16	MABLE ZIMBA		
17	GABRIEL MULENGA		
18	PASCAL MUKUKA CHISANGA		
19	MIRACLE MWILA		
20	DORIKA SIKATUNGA		
21	EMMA KASANKALA		
22	MCFANNY SILUNGWE		
23	FRANCIS MWILA		
24	DIANESS MWABA		
25	NICOLUS NGOMA		
26	CHARITY CHIBESA KUNDA		
27	MACWANCE MWANGO		
28	DYNA CHISHALA		

29	KANSANKALA MORIAH		
30	ANGELO MFULA		
31	ANNIE CHANDA		
32	CHANDA HARRIET		
33	JENIPHOR KABUSWE		
34	ROSEMARY KANGWA		
35	CHARITY CHANDA		
36	THERESA MWANSA		
37	BERLIN CHIBUYE		
38	MWIA JOSEPH MUPANSA		
39	SUNGA CLEMENT		
40	PATIENCE CHIBUYE		

VENUE: SANSAMUKENI DATE: 08.11.17

No	Name	Organisation/Dept/Village	Position
1	FACKSON MAMBWE CHISENGA		BUSINESSMAN
2	KAPENDA MWAPE		BUSINESSLADY
3	H. MUSONDA		FAMA
4	CHIBALE REBERT CHATE		BUSINESSMAN
5	CHANDOR CACIOUS		BUSINESSMAN
6	DAWELL CHALWE		BUSNESSMAN
7	BONFACE KALUNGA		PIESONT FARMER
8	WILLIAM C. KANYANDA		CHITAGOSALI
9	MUSONDA STAINLEY		BUSINESS
10	PATICKI CHUNGA		BUSINESS
11	LABAN KUNDA		BUSINESS
12	KALUNGA M. GHOSTINA		BUSINESS
13	REEGAN MWELWA		BUSINESS
14	MERCY BANJI		BUSINESS
15	EMMANUEL MAMBWE		BUSINESS
16	JENNIPHA KALUNGA		BUSINESS
17	BARBARA CHISENGA		BUSINESSLADY
18	DEBORA MAMBWE		BUSINESS
19	SIAME RONARD		BUSINESS
20	GIVEN MAMBWE		BUSINESS
21	PRUDENCE MWANSA	KANONA	BUSINESSLADY
22	MWAPE MUSONDA	KANONA	BUSINESSLADY
23	ROYCE MBEWE	KANONA	BUSINESSLADY
24	ELETINA CHISENGA	KANONA	BUSINESSLADY
25	DORREEN NKANDU	KANONA	BUSINESSLADY
26	YVONE KUNDU	KANONA	BUSNESSLADY
27	LILIAN NKANDU	KANONA	BUSINESSLADY
28	SINKALA DARSEY	KANONA	FAMA
29	SICHANDA M. GIFT	KANONA	BUSINESSMAN

12.3 APPENDIX 3: ENVIRONMENTAL APPROVAL OF THE PROJECT

(The ZEMA Decision Letter of May 2014 has been attached to the PDF copy of the Final Updated ESIA report)