Economic Growth through Effective Road Asset Management (GEM)

Progress Report No. 6 (May to July 2018) Final

Civil Design Solutions

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For further information, please contact: Robert Geddes, Civil Design Solutions, rgeddes@cdsafrica.com

ReCAP Project Management Unit
Cardno Emerging Market (UK) Ltd
Level 5, Clarendon Business Centre
42 Upper Berkeley Street, Marylebone
London W1H 5PW United Kingdom

Cover photo: Scenes from the GEM Team visits to Sierra Leone and Uganda.

Quality assurance and review table

Version	Author(s)	Reviewer(s)	Date
Draft	R Geddes C Bopoto K Gongera C Lema J Haule	M Pinard	
		N Leta, ReCAP PMU	30 August 2018
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Abstract

Technical assistance is being provided to selected rural road agencies in sub-Saharan Africa to foster improvements in road asset management performance. The countries that are participating in the project are Zambia, Uganda, Sierra Leone, Tanzania and the Western Cape region of South Africa. District road networks have been selected in each country as a focus for the research project.

Performance in the management of these rural road networks is being monitored against a framework that covers the building blocks towards sustainable road preservation, namely: external/political factors, institutional arrangements, management, financing, technical and operational aspects of the road network.

Project activities in the period May to July 2018 included visits by the GEM Advisory Team to Sierra Leone, Uganda and Zambia. The participating roads agencies are preparing for the 2018 round of data collection. The data will describe the status of asset management in the project areas at end of 2018 which will be compared to the baseline of 2016 and the status at the end of 2017. This analysis will show whether there is progress with addressing shortcomings in road asset management in the project areas and will highlight any weak areas. The results will be discussed at the Project Implementation Team meeting to be held in Zambia in November 2018.

The 2017 analysis showed that there was not significant improvement in the condition of the GEM road networks in Sierra Leone, Zambia and Uganda-Kamuli due to the failure of central government to allocate adequate funds for road maintenance. Some maintenance works were carried out, but generally not on the networks selected for the GEM study. There was a need to strengthen policy and practice at the national level for the management of maintenance funds, and to identify new sources of revenue. This issue is being addressed through the inputs of the Africa Road Financing Exert, who is initially focussing on the situation in Zambia. His findings and recommendations are included in this report,

Despite the funding constraints at the district level, the GEM project is attracting considerable interest in the participating countries, with requests for support to expand the projects into other districts. There is a notable increase in confidence of the road network managers and buy-in to the GEM approach and research process.

Key words

Rural Roads, Road Preservation, Asset Management, Baseline, Performance Monitoring

Acknowledgements

The authors would like to acknowledge the significant contribution to the GEM project of the participating roads agencies in Tonkolili, Kamuli, Chongwe, UNRA, TARURA and the Western Cape.

Research for Community Access Partnership (ReCAP)

Safe and sustainable transport for rural communities

ReCAP is a research programme, funded by UK Aid, with the aim of promoting safe and sustainable transport for rural communities in Africa and Asia. ReCAP comprises the Africa Community Access Partnership (AfCAP) and the Asia Community Access Partnership (AsCAP). These partnerships support knowledge sharing between participating countries in order to enhance the uptake of low cost, proven solutions for rural access that maximise the use of local resources. The ReCAP programme is managed by Cardno Emerging Markets (UK) Ltd.

www.research4cap.org

Acronyms, Units and Currencies

$	United States Dollars
AfCAP	Africa Community Access Partnership
AM	Asset Management
ARMFA	African Road Maintenance Fund Association
ARTReF	African Road and Transport Research Forum
AsCAP	Asia Community Access Partnership
AWP	Annual Work Plan
CAV	Current Asset Value
CDS	Civil Design Solutions
CRV	Current Replacement Value
DFID	Department for Further International Development
DM	District Municipality
GAT	GEM Advisory Team
GDP	Gross Domestic Product
GPS	Global positioning system
GRZ	Government of the Republic of Zambia
IAMM	Infrastructure Asset Management Manual
IQL	Information Quality Level
KDC	Kamuli District Council
km	kilometre
KLG	Kamuli Local Government
LVR	Low Volume Road
MLGH	Ministry of Local Government and Housing
MOWT	Ministry of Works and Transport
mUSD	Million United States Dollars
NCI	Network Condition Index
NCI_F	Network Condition Index (Formation)
NCI_P	Network Condition Index (Pavement)
NFI	Network Functionality Index
NRFA	National Road Fund Agency (Zambia)
PCA	Public and Corporate Affairs
PMU	Project Management Unit
PIT	Project Implementation Team
PO-RALG	President's Office – Regional and Local Government
RAI	Rural Access Index
RA	Roads Agency
RAFI	Road Asset Funding Index
RAM	Road Asset Management
RAPI	Road Asset Preservation Index
RCI	Road Condition Index
RCI_F	Road Condition Index (Formation)
RCI_P	Road Condition Index (Pavement)
RDA	Road Development Authority (Zambia)
ReCAP	Research for Community Access Partnership
RFI	Road Functionality Index

RMFA	Road Maintenance Fund Administration
RSSG	Road Sector Sustainability Grade
RSSI	Road Sector Sustainability Index
RTSA	Road Transport and Safety Agency
RUC	Road User Charge
SADC	Southern African Development Community
SC	Steering Committee
SLoCaT	Partnership on Sustainable, Low Carbon Transport
SLRA	Sierra Leone Roads Authority
SLRF	Sierra Leone Road Fund
TARURA	Tanzania Rural and Urban Roads Agency
TC	Trading Centre
TDC	Tonkolili District Council
TMD	Trunk, Main and District roads
TMH	Technical Methods for Highways
UK	United Kingdom (of Great Britain and Northern Ireland)
UKAid	United Kingdom Aid
UoB	University of Birmingham
UNRA	Uganda National Road Authority
URF	Uganda Road Fund
ZMK	Zambia Kwacha
ZDF	Zambia Defence Force

Executive summary

Technical assistance is being provided to selected rural road agencies in sub-Saharan Africa to achieve sustainable improvements in road asset management practice. The countries that are participating in the project are Zambia, Uganda, Sierra Leone, Tanzania and the Western Cape region of South Africa. District road networks have been selected in each country as a focus for the research project.

Central to the achievement of the project's goal has been the development of a specification to enable road agencies to assess their performance in asset management as a basis for self-improvement. The specification is based on the development of an innovative, objectively determinable "Road Sector Sustainability Index" (RSSI) which measures the extent to which six inter-dependent, but hierarchically related building blocks, considered essential for achieving effective road asset preservation, are satisfied in practice. A road infrastructure score card system has also been developed to enable road agencies to compare their management performance against participating organizations in other countries, to determine gaps in their performance and to communicate the outcome to stakeholders.

Since the start of the project, periodic measurements of the condition of the project road networks have been undertaken, using a set of relatively simple tools developed by the project team for that purpose. This information, coupled with the collection of socio-economic data, has been used to assess the effectiveness of, and improvements in, asset management practice, as well as the impact of road condition on community well-being, as reflected in the RSSI.

More recently, during the reporting period May to July 2018, project activities have included visits by the GEM advisory team to Zambia, Sierra Leone and Uganda with the objective of assisting the roads agencies to prepare for the 2018 round of data collection.

Whilst the GEM Project has made significant in-roads in assisting participating road agencies in attending to all of the six inter-dependent building blocks of the Road preservation Pyramid, one critical issue affecting rural road asset preservation is the inadequacy of funding for the maintenance of rural roads. This has been confirmed in the course of determining the RSSI for each participating country. In order to address this crucial issue, the GEM project has started to engage increasingly at a higher level in governments to address the related "External" issues, with a "Scoping Study" carried out of road maintenance funding constraints in Zambia. The study has recommended a range of policies and strategies to improve the funding situation, including modifications to legislation governing road sector agencies, improved operational procedures for the national road fund agency, and greater discipline in the sector. These initiatives are expected to result in increased funding for road maintenance in the participating countries and a related improvement in the RSSI.

The GEM project is assisting Chongwe District in Zambia to develop and implement a Communications Strategy whereby the findings from the socioeconomic and road condition surveys are communicated effectively to decision-makers as well as road users and local communities. The purpose is to raise awareness of the impact of lack of maintenance on the rural network. The Public and Corporate Affairs Department of the Uganda National Roads Authority (UNRA) has requested data from the GEM socioeconomic studies in Uganda to inform the publicity campaign for the UNRA 10th Anniversary.

Preparations commenced during the reporting period for activities to be carried out during the next reporting period. These will include:

- follow-up visits to Tanzania to assist them to become fully established as a GEM participating country;
- communications activities in Chongwe municipality in Zambia to raise awareness of the importance of reliable rural access;

- the Project Implementation Team (PIT) meeting in Zambia in November 2018, when each participating road agency will present the status of their current performance in rural road asset management;
- preparation of the first draft of the GEM "Guideline for Rural Road Asset Management", which is a key output of the project;
- possible expansion of the GEM project to three districts bordering Kamuli District in Uganda;
- possible expansion of the GEM project to all 13 rural districts of Sierra Leone; and
- Possible inclusion of a basic level of assessment of climate vulnerability of rural roads for local roads agencies which can be carried out as part of their road asset management and based on the Guideline prepared under the Regional AfCAP Climate Adaptation Project.

In summary, since the commencement of the GEM project in mid-2016, it has had a number of positive impacts in road asset management performance in the participating countries including:

- An enhanced appreciation as to the key factors that affect the performance of roads agencies in road asset management;
- Strengthened linkages and dialogue between local government agencies and their parent ministries;
- Significant improvements in the reported RSSI indicator values since the baseline of 2016; and
- Request in each of the participating countries to extend the project to other rural roads networks in the country.

Notwithstanding the above successes, they can best be described as "a road partially travelled". In looking to the future, it is expected that the increased financing of rural road maintenance will improve in the participating countries in 2019 following increased engagement on financing issues in the participating countries. This will provide an opportunity to focus more on other building blocks of the Road Preservation Pyramid (RPP) such as the Management and Operation building blocks, which consider the use of the funding by the roads agencies. However, the GEM project is currently due to close in April 2019. Should this be the case, then it is likely that such opportunities to consolidate on past successes will not materialise. For this important reason, it is recommended that project should be extended for another year to April 2020 to allow for a fourth round of data collection (and analysis), training of additional road agency personnel, including from new participating districts, and to consolidate the gains that have been made under the current phase of funding for the project. It would also be possible during the extension period, to explore mechanisms for expanding the GEM methodologies to other countries based on the experience with the extension to Tanzania.

1 Introduction

1.1 Background

The Research for Community Access Partnership (ReCAP) is supporting research and capacity building activities in Africa (Africa Community Access Partnership – AfCAP) and Asia (Asia Community Access Partnership – AsCAP). The programme is funded by UK Aid and is managed by Cardno Emerging Markets. Cardno entered into a contract with Civil Design Solutions (CDS) of Mauritius to provide technical support for the delivery of a three-year regional research project on improved management of rural roads.

The project is known as 'Economic Growth through Effective Road Asset Management – GEM" and is initially being implemented in sub-Sahara Africa. Sierra Leone, Uganda, Zambia, Tanzania and the Western Cape Province of South Africa are participating in the project. The research process and outcomes are being shared with other ReCAP-participating countries through regional meetings of the Project Implementation Team (PIT) and other dissemination activities. Plans are under consideration to roll out the project approach on a wider scale in Africa and Asia.

The Implementation Phase of the project commenced in July 2016 and is scheduled to end in April 2019.

1.2 Purpose of the Project

The purpose of the project is to achieve economic and social benefits for local communities as a result of improved performance in road asset management. The ultimate beneficiaries of the project are rural communities in sub-Saharan Africa.

1.3 Research Objectives

The objectives of the project are to:

- Review literature and reports on existing and recent road management and maintenance programmes and identify 'what works' and 'what doesn't work' in the type of environment likely to be encountered in the project area.
- Develop a framework for measuring performance in road asset management appropriate to rural road networks and apply it in selected project areas.
- Develop simple and appropriate tools for monitoring road condition and apply them in the project areas.
- Develop simple indicators of economic and social impact of rural roads and monitor them in the project areas.
- Achieve incremental (and measurable) improvements to asset management performance in the project areas over a three-year period.

1.4 Approach

The approach to the project is intended to foster self-reliance in road agencies in the project areas and to encourage greater accountability to road users and other sector stakeholders. It provides flexibility and space for the participating road agencies and their stakeholders to determine their own performance in rural road asset management. The approach focuses more on improved performance in road asset management than on any specific or pre-conceived road asset management systems or institutional, management and funding arrangements. Support to this process is being provided through demand-led technical assistance.

1.5 Participating Agencies

The roads agencies that are participating in the project are:

- Tonkolili District of Sierra Leone;

- Chongwe Municipality of Zambia;
- Kamuli District of Uganda;
- The Uganda National Roads Authority (UNRA);
- The Tanzania Rural and Urban Roads Agency (TARURA); and
- The Department of Transport and Public Works of the Western Cape (RSA)[1].

The project representatives of the participating countries are as follows:

Uganda:

- UNRA: Dr Mark Henry Rubarenzya (AfCAP Representative for Uganda) and Emma Mbabazi (Research Fellow)
- Kamuli District: Eng Grace Mulondo (District Engineer)

Zambia:

- Road Development Agency (RDA): Eng Presley Chilonda (Research Engineer)
- Chongwe Municipal Council: Eng Patrick Mushinge (Director of Engineering Services)

Sierra Leone:

- Sierra Leone Roads Authority (SLRA): Eng Tamba Amara (Feeder Roads Department) and Eng Mahomed Lahayi (District Engineer)
- Tonkolili District: Eng Sallieu Konneh (District Engineer)

Tanzania:

- TARURA: Eng. Vincent Lwanda (Materials Laboratory Manager) and Eng. Joseline Kagombora (Research Engineer)

Western Cape:

- Eng Melanie Hofmeyer.

1.6 Advisory Team

The CDS team that is supporting the implementation of the project is as follows:

- Team Leader: Robert Geddes
- Road Maintenance Expert: Kingstone Gongera
- Road Condition Monitoring Expert: Charles Bopoto
- Rural Transport Economist: Camilla Lema
- Institutional and Financing Expert: Mike Pinard
- Communications Expert: Grace Muhia
- Africa Road Financing Expert: Joseph Haule
- Road Asset Management Expert: Gerrie van Zyl.

The University of Birmingham (UoB) is providing expert support in Road Asset Management to the project under the guidance of Dr Michael Burrow. Two UoB PhD candidates are using the GEM project for their research projects, namely Robert Kakiiza (Uganda) and Peter Kome (Sierra Leone).

[1] The Western Cape participation is self-supporting and is not benefitting from ReCAP support.

1.7 Purpose of this Report

This report presents a summary of activities carried out under the project in the period from May to July 2018 and plans for the next quarter. It includes the review of road maintenance funding constraints in Zambia.

This report refers to data collected under the 2017 socio-economic surveys, agency self-assessment and road condition monitoring since the 2018 data collection had not been undertaken at the time of reporting.

2 Progress Report

2.1 Country Visits

The following activities were carried out during the reporting period:

- Visit of the Rural Transport Economist to Sierra Leone
- Visit of the Team Leader, Rural Transport Economist, Road Maintenance Expert and Road Condition Monitoring Expert to Uganda
- Visit of the Africa Road Financing Expert to Zambia.

2.2 Meetings and Workshops

Meetings were held with staff of the roads agencies and road fund agencies in the participating countries. The visit of the Africa Road Financing Expert to Zambia included higher level meetings including the Ministry of Finance and the Ministry of Local Government.

A technical paper was accepted for presentation at the SARF/IFR/PIARC Regional Conference for Africa to be held in Durban from 9th to 11th October 2018. The title of the paper is "Economic Growth through Effective Rural Road Asset Management". The authors are Robert Geddes, Michael Pinard and Charles Bopoto and it responds to Conference Focus Area FA3 – Preserving Africa's Roads Assets.

2.3 Reporting

The following reports were submitted during the reporting period:

- the Fifth Quarterly Progress Report;
- the May 2018 Monthly Progress Report; and
- the June 2018 Monthly Progress Report.

3 Socio-Economic and External Communications Component

3.1 Sierra Leone

3.1.1 Introduction

Tonkolili District Council (TDC) conducted a socio-economic survey in November 2017 following the baseline survey in January 2017. Both surveys were facilitated (including funding) by the Sierra Leone Roads Authority (SLRA). The repeat survey data were reviewed and analysed by the GEM Rural Transport Economist and comments communicated to the TDC/SLRA team. The purpose of the survey is to demonstrate linkages between road conditions and the well-being of rural communities.

The Rural Transport Economist for the GEM project, Camilla Lema, visited Sierra Leone from 4th to 8th June 2018. Details of the visit programme and the persons met are included in Annex 1.

3.1.2 Objectives of the Visit

The main purpose of the visit was to follow-up on the progress in the implementation of socio-economic component of the GEM project in Tonkolili District focusing on the repeat survey results and the next steps in the socio-economic study, including timing and resources in preparation for the next survey and the identification of possible challenges for achieving the project milestones.

3.1.3 Activities

The country visit included the following activities:

- *Introductory meeting in SLRA* in Freetown with the Deputy Director General, five other directors and other staff. The meeting served to confirm the programme for the visit and present the purpose and overview of progress in the implementation of the GEM socio-economic component in Tonkolili District. SLRA confirmed their continued support to TDC to ensure that the objective of the socio-economic study is achieved. The SLRA Senior Environmental Officer, who is responsible for socio-economic issues has been assigned to oversee the implementation of study and has been very instrumental in supporting TDC to undertake the surveys. Without the support from SLRA it would have been difficult for TDC to fund and manage the socio-economic surveys.
- *Meeting with the Road Maintenance Fund Administration (RMFA)* to discuss monitoring and evaluation of rural roads maintenance in Sierra Leone. A summary of key issues from the meeting is covered under Section 3.2.2 and the attendance list is included in Annex A.
- *Meeting with the newly elected TDC Chairperson* (Mrs. Yabom Sesay), the Chief Administrator and other staff of TDC/SLRA. The SLRA engineer for Tonkolili District presented an overview of the GEM project and progress to date. Since the Chairperson had been in the office for only about two weeks since election she advised the team to arrange a follow-up meeting for a detailed briefing on the project. She is keen to support the project which will contribute to alleviating the economic burden on the local communities in Tonkolili. She considers poor access a major contributing factor.
- *Working session for socio-economic impact assessment in TDC* to discuss the repeat survey data and preliminary analysis of the results. The meeting was attended by four members from SLRA led by the Senior Environmental Officer and two members from TDC. The participants discussed the status of maintenance of roads connecting to the ten trading centres for socio-economic impact assessments, as well as the next steps after the repeat survey.

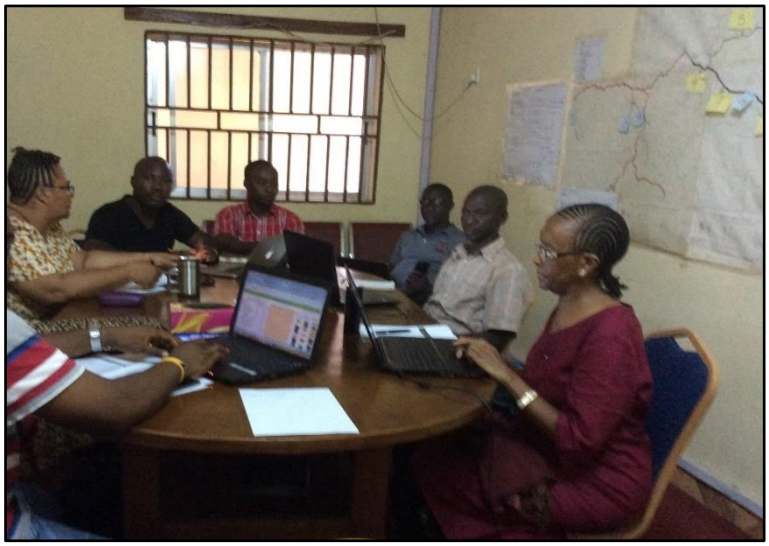


Figure 1: Workshop in Tonkolili District Council

- *Field visit to Manasi Trading Centre* (TC) along Makoni – Manasi road (4.6 km), one of the GEM project roads. This helped the group to get a visual perspective of the status of road maintenance, as well as to obtain first-hand information from the local communities on the effects of road condition on their socio-economic welfare. The road was rehabilitated in 2016/2017 under the Ministry of Agriculture programme – 'Linking Farmers to the Market' and is still under the defects liability period. There are no vehicles for regular public transport using this road, apart from hired and private vehicles coming to the village. The dominant mode of transport to the TC for both freight and passengers is motorcycle. Health facilities are more than 4 km from the village and many people, particularly women, have to walk this distance to reach a clinic.

Figure 2: Manasi Trading Centre

Figure 3: Manasi traders taking goods to Makoni market

3.1.4 Key issues from working session in Tonkolili District Council

The issues outlined below refer to the survey conducted in November 2017 and associated challenges for socio-economic impact assessment in Tonkolili District.

Socio-economic survey for 2017

Key issues arising from the 2017 survey are as follows:

- *Management and funding of the survey:* The repeat survey was conducted under resource constraints leading to limited data collection based on interviews with people in and around the Trading Centres (6 or 7 people were interviewed). The survey took 4 days with a team of 3 people – 1 from TDC and 2 from SLRA using one vehicle. They spent approximately half a day for each TC including travelling and interviews. This repeat survey was inadequate especially for those TCs that are far from the district centre. One day per TC would have resulted in more reliable data.

  TDC was unable to fund the survey due to lack of funds. Even though the TDC was advised to submit a budget request to SLRA they failed to do so on time thus SLRA decided to lead the exercise in order to rescue the situation. This led to a misconception by TDC staff that SLRA had received money from the GEM project that they were hiding in Freetown. Consequently, one of the TDC staff declined to participate in the survey. This showed that attitudes at district level regarding external support can be a hindrance to achieving ownership and sustainability of the socio-economic impact assessment at the district level. It is expected that the district will be better prepared for the 2018 survey.

  No significant maintenance works had been carried out on the roads connecting the ten project trading centres between the 2016 and 2017 surveys. The poor performance in road maintenance has led to increased focus of the GEM project on road maintenance funding.

- *Overview of the survey results:* There was not much positive change observed during the 2017 survey in comparison with the baseline situation in 2016. This was due to inadequate maintenance of the GEM project roads, coupled with irregularities in the baseline data collection. Even those roads that had previously been improved were not being maintained.

- *Transport charges:* Motorbikes (okada) are the dominant modes of transport of people and goods in Tonkolili district. According to the survey data, variations in travel times (as an indication of road condition) with distances do not necessarily influence transport costs. For example, on the road to Masanga that has been improved recently, there was an increase in the passenger fare from the district centre to Masanga TC from Le 5,000 in 2016 to Le 10,000 in the 2017 survey. An explanation is that okadas sometimes increase their fares because they are not sure of getting passengers for the return trip.

- *Prices of goods in the Trading Centres*: Data on imported and exported items into the TCs were not well captured during the baseline survey thus making it difficult to do a fair comparison with the 2017 survey data. For example, in five TCs there was an average reduction of prices of imported batteries from the 2016 to 2017 surveys, but a substantial reduction in the average price of batteries in Makong TC (~45%) that has quite difficult access. One possible explanation offered by the team collecting the data is that Makong, being a mining area, is highly populated by foreigners so some batteries may have come from the neighbouring country rather than from local suppliers.
- *Level of service:* In the baseline study, eight TCs had the connecting roads from the district centre closed for several days during the rainy season, while in the 2017 survey only 4 TCs had their roads closed during the rainy season.
- *Road safety:* A reduction in road accidents was observed in two communities: Manasi from 35 accidents recorded in the baseline to 4 recorded in the 2017 survey, and Masanga from 25 accidents recorded in the baseline to 8 recorded in the 2017 survey. However, there was a substantial increase in accidents in Makong from 0 in 2016 to 15 in 2017, in Masonbrie from 20 to 75 and Mayira from 5 to 20. It was reported that the Makong road is prone to accidents due to poor alignment of the road coupled with recklessness of the drivers. Most of the accidents are not fatal.
- *Economic Activities:* Two new vendor stalls were established in Masanga TC as a result of improvement works on the Matham – Masanga road.

Road maintenance issues

- Maintenance has continued to suffer from serious budget constraint at district level, coupled with inadequate capacity for planning and prioritization of projects and timely submission of budget requests for consideration by higher authorities.
- Eight out of ten GEM priority roads are in a poor state having gone through more than two rainy seasons without maintenance. These roads may fail to qualify for RMFA funding since they require rehabilitation, which must be funded from other sources.
- There was a misconception (genuine or political) by some TDC officials that the ten GEM project roads were to receive external funding for maintenance through the GEM project. Therefore, they would not need to be presented for funding by RMFA. It is clear that there has not been much effort by TDC to push for funding of the project roads through RMFA or other available sources.
- The Makoni – Manasi road (4.6 km) was rehabilitated by a private contractor in 2016/2017 through a Ministry of Agriculture rural infrastructure development programme, and is still under the defects liability period before it is handed over to the DC. But many parts of the road are already in poor condition with long stretches of side drains completely covered by grass and most of the carriageway flat without camber (see Figure 4). It is evident that the work was not done properly. The TDC was not directly involved at any stage in the rehabilitation of the road, from identification to implementation, yet will be expected to maintain the road after the expiration of defects liability period. This road will be included in the programme for maintenance for 2018/2019 to be submitted to RMFA.

Figure 4: Manasi-Makoni road

3.1.5 Meeting with the Road Maintenance Fund Administration (RMFA)

The meeting was held in RMFA office in Freetown with participants from the Planning Programmes Monitoring and Evaluations Department. The following is a summary of issues discussed. Some of the issues were discussed on previous visits to Sierra Leone, but there have subsequently been changes to the senior management of the RMFA. The meeting focused on the socio-economic component of the GEM project.

- The RMFA was established by an Act of Parliament in 2010. The main sources of funds are the fuel levy (90%) and vehicle licenses. The central government receives the money from the main sources and determines the allocation to the RMFA. Thus, RMFA is a first-generation type of a Road Fund. RMFA receives about US$ 3 million per year out of which 70% is allocated to main roads, 20% to rural and feeder roads, and 10% for administration. The total amount covers less than 20% of maintenance needs in the country.
- RMFA has a monitoring and evaluation tool for rural roads maintenance, namely *'Tools for Socio-economic Impact Assessment for Maintenance of Feeder Roads'*, 2015. Rural roads are categorized as social roads whose provisions are justified mainly by social benefits rather than the cost-benefit analyses due to low volumes of traffic. The methodology used is 'before and after' assessment based on eleven indicators that are mostly qualitative. They include ride quality, travel time, accident, traffic volumes, transportation charges, etc. M&E is conducted jointly with local councils and SLRA district engineers. However, it was not clear from the discussions how far the tool and indicators have been applied to bring tangible results for further planning and policy advocacy as no reports appeared to be available.
- In approving the local councils' plans, RMFA works closely with SLRA district engineers to ensure that priorities submitted are well informed. The districts that are not receiving any donor support are given preference for higher allocation in order to make the best use of limited funds available.
- The lack of funding for the GEM project roads in Tonkolili District comes from the council. The council knows the project roads but when it comes to presenting priorities to RMFA they choose to select others. The RMFA was aware of the GEM project but thought it had a specific package for maintenance. Thus, if TDC had submitted requests for funding of project roads consistently then at least some of them would have been funded.

- RMFA advised TDC to include the GEM roads in the plan for 2018/19 to be submitted between June and July. This message was well communicated during the team meeting in TDC.

3.1.6 Next Steps

- *The next socio-economic survey* in Tonkolili District is planned in October 2018 subject to availability of funds. SLRA team will prepare their budget estimate for participation to be submitted to the Director of Feeder Roads ahead of time for approval by the Director General who is supportive of the project. TDC has to allocate a budget from their side to confirm commitment for the study. Also, TDC was once again advised to request support from SLRA, but this time with a clear understanding that it is SLRA's money and not from the GEM project.
- *Impact assessments:* Considering the significant constraints at district level, it may be worth harmonizing the GEM and RMFA tools for socio-economic impact assessment to come up with one comprehensive but simple tool for application in Sierra Leone. This monitoring might best be managed by RMFA to ensure uniformity and coordinated application in the country. To achieve this would require more discussion with the RMFA and, if agreement is reached, additional TA input from AfCAP.

  Meanwhile SLRA has plans to start conducting socio-economic impact assessments on rural roads to build up a database for the country. Even though there is a problem of funding it is considered important to establish an evidence base to be able to justify more funding for rural roads maintenance, especially at this time that there is a new government in place. SLRA has assigned an engineer to work out modalities for the task.
- *Road maintenance financing:* TDC was urged to prepare a work plan and budget for 2018/19 ahead of time for the RMFA call for local council's plans normally in June-July. The Council will include all 10 GEM priority roads in the work-plan so that those that are not selected under RMFA can be submitted to other possible sources of support to rural roads maintenance (for example the European Union, which is active in the rural road sector in Sierra Leone). The SLRA district engineer was advised to be more involved in scrutinizing TDC priority roads for submission to RMFA. Given the new senior management in the RMFA it is expected that funding for road maintenance through the SLRA and the districts will improve.
- *Misconception of the GEM project approach by new council personnel:* There seems to be a general problem of mindset of new councillors and staff at district level regarding external support. They have not been provided with accurate information about the GEM project by the technical staff. This misunderstanding was a constraint to the implementation of the GEM project through the district council, and particularly the socio-economic impact assessment which is considered a soft issue (but critical to justify investments in rural roads). Going forward the TDC Engineers were advised to accurately inform the incoming councillors (following recent elections) and any new management staff about the project purpose, objectives and approach in order to manage expectations and make it clear that the project has no funds for road maintenance. (It is noted that the contribution of AfCAP to the project and the roles and responsibilities of the various project participants have been discussed between the GEM team and council officials during the previous visits to Tonkolili District).

  Cognizant of the above situation, the importance of the GEM *external communications component* cannot be overemphasized. It is recommended that the communications component be extended to cover all three GEM participating countries to widen the information and knowledge platform about the project locally and countrywide. This would build on experience with the External Communications pilot project in Zambia and would require an extension to the current project.

3.2 Uganda

3.2.1 Introduction

Uganda National Roads Authority (UNRA) conducted the socio-economic baseline survey in Kamuli District in September 2016 followed by the repeat survey in September 2017. Kamuli District Council (KDC) completed its baseline survey in January 2017, followed by the repeat survey in October 2017. The 2017 survey data were reviewed and analysed by the GEM Rural Transport Economist and comments communicated to UNRA and KDC before the country visit.

The GEM project advisory team including the Rural Transport Economist, Camilla Lema visited Uganda from 23rd to 28th July 2018. This report summarizes the issues covered in the visit for the socio-economic component of the project. The joint programme and persons met are outlined in Annex 2.

3.2.2 Objectives of the Visit

The main purpose of the visit was to follow-up on the progress in the implementation of socio-economic component of the GEM project in Uganda focusing on the repeat survey results for UNRA and KDC and ways forward.

3.2.3 Programme of Activities

The GEM country visit covered the following activities in relation to socio-economic impact assessments in Uganda – UNRA and KDC.

- *Introductory meeting and progress review* in UNRA Kampala with the AfCAP National Coordinator and officials responsible for the GEM project. The meeting confirmed the purpose and programme of the GEM team visit, followed by detailed discussion of specific aspects of the GEM project implementation under UNRA. This report dwells on the discussion of socio-economic component with overview of progress in the implementation, specifically the repeat survey results and the way forward to the third survey in 2018.
- *Introductory meeting with the District Engineer* and working session with the Head of Department – Natural Resources Office in KDC to discuss in detail the repeat survey data, preliminary analysis results and the way forward.
- Overall the meetings with UNRA and KDC provided useful information to enable understanding of the status of the socio-economic impact assessments in Uganda, challenges and possible implications for the achievement of the GEM project objectives. These issues are discussed in Sections 3.2.4 and 3.2.5.
- *Field visit to Kiwungu Trading Centre* along Bulunda – Kakindu road (17km). This is one of the ten TCs that are subject for socio-economic impact assessment along the GEM project roads under KDC. The road was rehabilitated in 2016 and currently under routine maintenance. The dominant mode of transport for both freight and passengers to/and from the TC is the motorcycle (boda boda). The field visit provided a visual perspective of the road condition and first-hand information from the local communities on the effects of the road on their socio-economic welfare.

3.2.4 Issues Arising from the Field Visit

The following issues arose from the field visit to Kiwungu Trading Centre:

- Safety issues were raised in relation to the design of drainage ditches at the TC that they are hazardous to some school children. Safe crossings may be needed at demarcated areas to allow for safe crossing of children and particularly girls who are more prone to fall in deep ditches.
- Littering of drainage ditches was said to be a problem around the TC thus awareness needs to be created to the local communities regarding basic care of the road.

Figure 5: Kiwungu Trading Centre

- A woman trader (Ruth Mbakire) who owns a kiosk, shop and a bicycle in the TC highly commended the road improvement during a brief interview. She said she has benefitted from the good road because she can now send a hired boda boda to Kamuli town to buy her merchandize instead of riding there by herself on a bicycle. This allows her more time to take care of her three young children and her business. She also observed that there is more movement of people coming into the village since the road was improved, including casual laborers looking for work in sugarcane farms that have been opening up in the area. As a result, she has been selling more of her merchandise that includes cooked food /chips. In 2016 she had only a small kiosk, but as her business flourished she managed to open a shop behind her kiosk in 2017. She intends to expand her business further to a third kiosk if the road condition remains stable.

Figure 6: Ruth Mbakire at Kiwungu Trading Centre

3.2.5 Issues from the meetings with UNRA and Kamuli District Council

The following issues arose during the meetings with UNRA and Kamuli District Council:

- The UNRA and KDC surveys were conducted in the same vicinity. Thus, most of the facts representing the general transport situation in Kamuli District apply to both surveys.

- As was the case with the baseline surveys, both agencies faced challenges in terms of the availability of resources to conduct a comprehensive survey within the scope of the GEM study. The survey teams spent about half a day per trading centre (TC) for interviews, which does not allow adequate time to cross-check on responses. Ideally, at least one day is required per TC for such surveys to ensure adequate time to probe on answers and ensure accurate data are collected. This would also reduce the amount of time spent clarifying the data after the field survey has been completed.
- Due to financial constraints, the GEM project roads under UNRA and KDC are lagging behind schedule for the expected maintenance. These are the roads connecting to the ten trading centres that are part of the socio-economic survey.

Socio-economic 2017 repeat survey - UNRA

The socio-economic baseline survey for UNRA was conducted in September 2016 followed by the repeat survey in September 2017. The ten Trading Centres (TCs) served as the unit of observation in both surveys. The following summary provides an overview of the transport situation in the surveyed area based on the results of the two surveys.

- *Mode of transport:* The dominant mode of transport on UNRA road network connecting to the 10 TCs is motorcycle/boda boda. There are also bicycles, taxis, trucks and a few light vehicles available on the routes to some of the TCs.
- *Transport costs and charges:* Passenger fares and freight transport charges for all modes of transport varied from one place to another between the 2016 and 2017 surveys, but not necessarily correlated with changes in the average travel times. Passenger fares on boda bodas experienced significant variations on some routes, e.g. in Irundu the average travel time to the nearest district centre decreased from 150 minutes to 60 minutes in 2016-2017 but fares almost doubled. In Iyingo the average travel time doubled from 2016 to 2017 most likely due to further deterioration of the connecting road. However, fares reduced by more than 50% rather than increasing as would have been expected. Also, the cost of freight transport from Namwendwa TC more than doubled between 2016 and 2017 despite a slight reduction in the average travel time over the same period, as well as the connecting road being in good condition. These discrepancies in the data are subject to clarification during the third survey in 2018.
- *Prices of goods* in the Trading Centres: There were slight variations in the prices of goods exported (maize, rice, sugarcane, etc.) and imported (sugar, salt) from most TCs between the two surveys. But also, there were some significant price reductions and increases unrelated to the changes in the average travel times from 2016-2017. It is noted that for some items produced locally like maize the variations in prices in general may not be directly related to the changes in the average travel times. There are seasonality effects to be considered (harvest and off-harvest) in such prices, and a significant component of the transport cost for such items is likely attributable to the "first mile" from the farm, rather than on the district or UNRA road network[i2]
- *Level of service:* Several roads on the UNRA network were under a term-maintenance programme before the GEM project started. The overall achievement on maintenance of the GEM project roads connecting to the 10 TCs was more than 50% during the 2017 survey, but only two roads were improved between the 2016 and 2017 surveys.
- During the baseline survey in 2016 there were road closures to 5 TCs ranging from 1 to 3 days per year. By the time of the repeat survey in 2017 there were more road closures on all roads connecting to the 10 TCs ranging from 2 to 16 days per year. All road closures were due to heavy rains, there having been more rain in 2017 than in 2016. It was reported during the GEM PIT-2017 meeting in Uganda that examination papers arrived late in one education station in Namasagali due

[2] Research carried out under ReCAP has shown that transport costs on the "first mile" of the journey from the farm gate to the market can be more than twice the cost per kilometre of transport on the district or national road network due to the poor condition or non-existence of "first mile" roads.

to a road closure for a few hours in the morning because of flash floods. Unfortunately, this happened in the peak hours for schools during examination period.

- *Economic Activities:* There were significant variations in the number of local industries and shops/kiosks in the 10 TCs between the two surveys. But these have no direct correlation with the average travel times to the nearest district centres using boda bodas, thus other factors must apply. A substantial reduction in small industries was observed in 3 TCs and establishment of 9 new small industries in 1 TC. Also, there was an increase in the number of shops/kiosks in 6 TCs ranging from 10% to over 100%. Influencing factors will be identified and confirmed during the third survey.
- *Education:* The main mode of travel to reach the nearest schools from the respective TCs is walking. However, more than 50% of all trips are conducted on boda bodas and bicycles. Variations in travel times were noted for all modes of transport between the 2016 and 2017 surveys, but it is noted that trips to schools are not necessarily conducted on the GEM project roads connecting to the 10 TCs. Some of the pupils come from remote areas on routes that are off the project roads.
- *Health:* Modes of transport to the health centres are walking, boda bodas and bicycles. Light vehicles were available in 3 TCs during the 2016 and 2017 surveys and a few others had taxi services. There were no ambulance services recorded in the 2016 and 2017 surveys. The most significant variation was observed in one area with more than 100% increase in travel times for boda bodas and bicycles heading to Irundu Health centre around Iyingo TC. This is most likely due to further deterioration of the Irundu – Iyingo road.

UNRA intends to use the socio-economic impact analysis results to develop marketing material for their public relations campaign linked to the current celebration of its 10-year anniversary. This will include communication to communities and policy makers on why all roads are important for the socio-economic well-being of the population, rather than the current focus on high traffic roads. The GEM team in UNRA intends to work with the Public and Corporate Affairs (PCA) Directorate to compose illustrative stories needed to publicize the importance of rural roads. Most of the enumerators for the baseline and repeat surveys were staff from PCA.

Socio-economic 2017 repeat survey – Kamuli District Council

The socio-economic baseline survey for Kamuli District was completed in January 2017 followed by the repeat survey in October 2017, focusing on the ten TCs. The following summary provides an overview of the transport situation in the district.

- *Mode of transport:* The dominant mode of passenger and freight transport in Kamuli District is a motorcycle/boda boda due to availability and convenience in terms of time saving and door-to-door service. The data recorded for both the 2016 and 2017 surveys on the average travel times from the TCs to the district centre is for boda boda transport.
- *Transport costs and charges:* The charges for both passenger and freight transport in Kamuli District are determined by distance and demand and not necessarily the road condition and travel times. Passenger transport charges for boda bodas generally remain constant between 1km and a threshold of 5km. Likewise, the price for freight transport remains more or less the same between 1km and a threshold of 40km distance. Light vehicles serving 5 TCs for freight transportation during the baseline survey in 2016 had diminished to zero by the time of the repeat survey in 2017 due to poor roads. Thus, boda boda transport prevailed with a few truck services available to all TCs. Transport is not regulated in Kamuli District but the Association of Boda Bodas in the district facilitates the setting of fares.
- *Prices of goods* in the Trading Centres: Considering that the dominant mode of freight transport is boda boda, and that there were no variations in the travel times between the 2016 and 2017 surveys, the prices of goods imported and exported from the TCs did not change significantly. However, prices of goods produced locally, e.g. maize is affected by the harvest and off-harvest seasons hence the observed overall reduction from the 2016 to the 2017 survey. The price of maize was UGX 1100 per kg in December 2016 (out of season) whereas it was UGX 700 per kg during the

repeat survey in 2017 September (the peak of harvest season). The price can go down to UGX 300 per kg depending on demand. The price of the main cash crop produce (coffee) per kg remained more or less constant in all TCs from 2016 to 2017.

- *Level of service:* By the time of the repeat survey in 2017 progress in maintenance of the GEM project roads connecting to the 10 TCs was close to 50% mainly due to financial constraints. However, the results of 2016 and 2017 surveys indicate that there were no road closures on any of the district roads connecting to the 10 TCs despite low maintenance.
- *Economic Activities:* The number of factories and local industries remained constant in 5 TCs from the 2016 to the 2017 surveys. In Namaira TC, the number increased from 1 to 4 local industries, whereas in Namaganda TC the number reduced from 4 to 1, noting that one of the industries was moved to Bulopa TC which is more active. Since maintenance had been done on the roads to the two TCs it implies that the variations in the number of industries is not necessarily related to road condition. There was also an increase in the number of shops/kiosks in all TCs except Namaira, and a substantial increase of about four times in Kagumba TC between the 2016 and 2017 surveys. Notably, the road to Kagumba had been maintained before the 2017 survey, and also the TC was elevated to headquarters of the new sub-county called Kagumba, thus there were two contributing factors for the observed increase in economic activity.
- *Education:* The average travel times to reach the nearest school from the respective TCs by boda boda reduced in 8 TCs (between by 10% and 60%) from the 2016 to 2017 surveys, while remaining constant in 2 TCs. (The data will be cross-checked during the third survey to ensure that the same mode of travel is considered for all surveys in order to allow a fair comparison with the baseline situation). Notably 8 schools are located along the GEM project roads connecting to the TCs, apart from schools in the vicinity of Kiwungu and Namaira TCs that are off the district roads. Factors influencing the travel times to schools will be confirmed after the third socio-economic survey in the district.
- *Health:* There were no changes in the average travel times to reach the nearest health centre from the TCs by boda boda. These trips are not necessarily conducted on the GEM project roads.

3.3 Next Steps

The next steps below are related to the purpose of the visit as well as to the achievement of the objective of socio-economic component of the GEM project.

- *The next (third) socio-economic survey* for UNRA is planned in early October 2018, whereas for Kamuli District Council it is planned in August – September 2018. Both agencies confirmed availability of resources to conduct the surveys.
- *Socio-economic impact stories:* Both UNRA and KDC were reminded of the need for illustrative and transformational stories on the impact of rural road maintenance to accompany the socio-economic data from the field as qualitative information. These stories are a priority for presentation in the next PIT meeting in November 2018.
- *Capacity building for socio-economic impact assessment:* Both UNRA and KDC confirmed the need for training of trainers as a way of replicating and scaling up the GEM project interventions beyond Kamuli District. This will require commitment of additional resources from the country as well as from the GEM project support.
- *Stakeholder involvement:* UNRA intends to involve other key organizations (e.g. Uganda Bureau of Statistics-UBOS) in the socio-economic studies beyond the current phase of the GEM project. This will allow the possibility of using the UBOS household survey data to enhance information on socio-economic impacts of rural roads, as well as to widen the platform for knowledge sharing.

3.4 External Communications Component

3.4.1 Purpose and Objectives

The purpose of the External Communications component is to investigate and demonstrate how different media outlets and platforms can be deployed to increase awareness at different stakeholder levels to influence the perceptions related to the importance of rural roads and their maintenance. At decision maker level this is expected to lead to increased policy support and funding for the construction, upgrading and maintenance of rural roads. At the community level, the communication and outreach activities are intended to create awareness, promote a buy-in and embed an understanding of how the rural roads are having an impact on the communities.

The External Communications component is closely linked to the socio-economic studies being carried out in the participating countries. The intention is that the participating roads agencies will package the findings of the socio-economic study in a way that they can be brought to the attention of key stakeholders at the local and national levels and be clearly understood by them.

3.4.2 Pilot Activities in Zambia

The External Communications component is initially being implemented in Chongwe District of Zambia as a pilot for one year. The Zambia Road Development Agency (RDA) has provided support to the district to develop a communications strategy and programme of communication activities. Details of these are included in the GEM 5th Progress Report[3]. Progress with the implementation of the activities was delayed due to funding constraints but will commence in August 2018.

The communications activities will initially include public meetings and radio programmes. The Chongwe Municipal Council (CMC) has started a radio programme called "Chongwe Municipal Council and the Community" where information on all developmental projects is disseminated to the public. The CMC Manager for Communications coordinates the radio programme and it is held every week on Thursday. It was agreed between RDA and the CMC Manager for Communications that the radio programme could be used as part of the media campaign planned for the GEM project. It is also planned to conduct five community meetings in trading centres in August/September 2018.

The GEM Communications Expert and the Road Condition Monitoring Expert will provide support to RDA and the Council on the identification of appropriate material to be disseminated through the communications activities.

[3] Geddes, R.N. et al, Civil Design Solutions (2018). Economic Growth through Effective Road Asset Management (GEM), Quarterly Progress Report No. 5 (February to April 2018), Project No. 10636A GEN2018A, London: ReCAP for DFID.

4 Road Asset Management

4.1 Introduction

This chapter covers road asset management issues arising during the visit made of the GEM Advisory Team to UNRA and Kamuli District in Uganda over the period from the 23rd to 27th of July 2018. The itinerary of the visit and the people met are given in Annex 2.

The overall objectives set for the visit were as follows:

- Discuss the status of the GEM project activities and overall road asset management issues in the project area.
- Obtain an understanding of the funding of maintenance through the Road Fund.
- Discuss future structuring of the GEM project for UNRA and Kamuli Districts.
- Review RAM Self-evaluation and Socio-economic data analysis.
- Updating of GEM Work Plan including preparations for the PIT meeting to be held in November 2018.

4.2 Current Status of Road Asset Management

The following observations were made following consultation with representatives of UNRA and Head Office and Jinja Station, and Kamuli District Council. The record of observations given below is made with reference to the Road Preservation Pyramid (see Figure 7). The GEM project has been assisting road agencies in improving their performance in six main areas whose importance relative to each other is represented by the position within the pyramid structure. On the whole significant progress has been made in Kamuli district in attending to the aspects that form the foundation of the Road Preservation Pyramid.

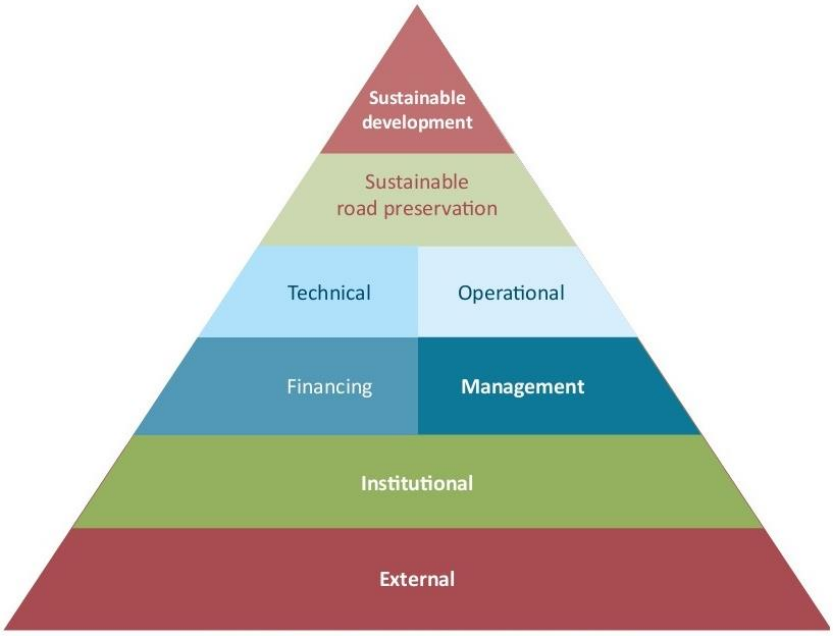


Figure 7: Road Preservation Pyramid

- UNRA and Kamuli district have developed draft road asset management (AM) policy statements as part of the institutional development under the GEM project, but the draft policies have not yet been adopted by the Ministry of Works or the Council respectively. In Kamuli there was a change of Chief Administration Officer which led to a delay in the process of adoption of the policy. For both Kamuli and UNRA the draft policy includes statements for defining level of service, drawing up maintenance priorities and ensuring the efficient use of resources. The policy also takes into

account stakeholder needs through consultation during prioritization of maintenance works. The concept of asset preservation is well articulated.

- Kamuli District has a new Chief Administrative Officer (CAO) who needs to be informed of the GEM project and the draft AM policy statement. The change in the top management position has not been disruptive to progress with the GEM project in the district, but it was noted that the District Engineer has become increasingly active in promoting AM approaches and was therefore in a good position to introduce the GEM principles to the incoming CAO. The District Engineer has ably demonstrated newly acquired skills which include the preparation of a draft "Road Asset Management Plan" which provides a description of the road assets, level of service requirements, investment plans (e.g. sealing of priority roads), etc. The District Engineer is also preparing a "Communication Plan" to guide interaction with stakeholders. It is intended to use local radio stations, community meetings, web site etc. to convey information on the road network and asset management plans. Internal communication within the Council is achieved through monthly district planning meetings and weekly management meetings.
- Road asset management at district level in Uganda is constrained by staff shortages. New districts are being established yet no new recruitment of engineers is currently allowed. It was noted that the Assistant District Engineer in Kamuli will likely be transferred to a neighbouring district. This would result in additional work pressure on the District Engineer but would result in the benefits of the GEM project being immediately felt in the neighbouring district.
- Political influence continues to play a role in the prioritisation of roads for maintenance, with a need to spread the available resources evenly across the district. The selection of maintenance projects is based on the roads in worst condition being given priority followed by responses to political demands. The current practice in both UNRA and Kamuli District does not focus on asset preservation. The lack of preventative maintenance means that the roads require heavy rehabilitation every two to three years. Jinja Station reported that all roads are graded once a year, after the rains.
- The effectiveness of road maintenance is constrained by delays in the procurement of contractors. UNRA is planning to implement 3-year framework contracts on 50% of the network but these have been under procurement for 2 years. As a result, UNRA is moving away from out-sourcing of road maintenance and increasing its force account operations. However, force account operations are affected by delays in the procurement of fuel and spare parts.
- The financing of maintenance works carried out by UNRA and Kamuli District depends on the Uganda Road Fund (URF). Each road agency is expected to prepare a work programme with details of intended activities and cost break down. Based on this submission, the URF then releases an indicative figure to the road agencies to prepare the work plans based on the figures provided. The road agencies revise their work plans to suit the budget figures provided by the road fund. These plans are submitted back to the road fund and disbursements are based on the plans. The actual release of funds to the road agencies is usually delayed till mid-way or even later in the quarter. This late release of funds affects the road agencies as they are left with very little time to procure services and implement their plans. At the end of each quarter the road agencies are expected to submit a summary report of achievements and expenditure. The report influences the release of the next quarterly disbursement. Due to the limited time for implementing the funded programmes, road agencies fail to spend all the money allocated and this leads to a reduced provision in the following quarter[4]. The time required at the end of each quarter to prepare the report delays the disbursement of the next tranche
- During discussions at Kamuli District it was clarified that funds had been received from the URF for maintenance in 2017, which is contrary to information provided by Kamuli District at the 2017 PIT

[4] UNRA Jinja Station reported that of its 2017/2018 allocation of UGX 4,065 million it had received UGX 2,293 million and spent UGX 2,250 million.

meeting. However, these funds were not used for maintenance of the roads on the GEM network in the district. The District Engineer reported that about UGX 5 billion is required annually to maintain the district road network whereas the annual budget from the Road Fund is only UGX 1.2 billion. In hindsight it might have been better to include the whole of the district network in the GEM study rather than selecting a part of the network.

- In 2017 Kamuli District received new equipment and plant through a programme that is being implemented centrally by the Ministry of Local Government. The equipment consists of a grader, a front-end loader, a 15-tonne vibratory roller, two tipper trucks and one 10,000 litre water bowser. As was noted in 2017 that the equipment was still under-utilised due to lack of fuel etc. At the time of the visit the equipment was observed undertaking road maintenance work on behalf of a sugar factory in the area. The team was informed that the private company was to provide only the fuel and not pay a hire fee for the use of the equipment.
- Following the allocation of equipment to the district councils, they are now better equipped than UNRA to carry out in-house road maintenance. UNRA's Jinja Station is now "borrowing" equipment from the ten district councils in the Jinja area and paying for the fuel and operator allowances.
- A site visit was made on the Bulunda – Kakindu Road, which is part of the GEM network. Routine and spot improvement works were undertaken on the road by Kamuli District Council in 2017/18. The road was generally in fair condition although a section across a swampy area that had been regravelled as spot-improvement had now deteriorated to a poor to very poor condition, in a time period of less than a year. The district is aware of the problem and indicated that it would deploy resources to build up the road prism across the swampy area.

Figure 8: Meeting with Kamuli District Engineer

4.3 GEM Project Monitoring Tools

4.3.1 Road Condition Data Collection

UNRA will undertake the next round of data collection on the GEM network in the month of October 2018. The same team that conducted the 2017 assessment will be used. The established GEM method of determining the degree and extent of each defect on 5km segments will be used. UNRA indicated that they use the MOBICAP[5] system for their overall network condition monitoring (paved and unpaved roads) which records the condition of each one-kilometre segment.

UNRA's network planning section is considering the implications of adopting the GEM approach into their MOBICAP system. The difference between the two system is that the GEM approach captures the degree

[5] MOBICAP is a mobile road assessment data capturing program for the real-time capturing of road condition assessment data using touch-screen tablet PCs.

and the extent of defects and road condition indices are then calculated independently of the data collector, whereas the system in MOBICAP calls for the data collector to make a judgement of the condition of the road segment in the field, that is classifying on the Good to Poor scale.

Kamuli district will carry out their 2018 data collection exercises in the August/September 2018 period. Funds for this purpose have been budgeted but their release will depend on agreement from the CAO. The 2017 condition survey cost UGX 2.3 million but the 2018 survey is expected to cost about UGX 15 million due to a large increase in government staff allowances. The District Engineer plans to train third year student interns from Chambo University to carry out the condition surveys.

4.3.2 Road Condition Data Analysis

Both UNRA and Kamuli District confirmed that they had completed data analysis and were fully familiar with the methods that had been introduced under the GEM Project. The same analysis method will be adopted for analysing the data to be collected in October 2018. It is expected that the Jinja Station will be more involved in the collection and analysis of the road condition data than was the case for the 2016 and 2017 surveys.

4.3.3 Structuring of Analysis Tool for Entire Network

One outcome of the previous monitoring visit in 2017 by the Road Condition Monitoring Expert was the request by Kamuli district to modify the Excel spreadsheet to allow updating by users to enter more road information. The tool was seen as useful in attending to all roads on the district network, not just the GEM designated network. The spreadsheet was updated to allow addition of more roads and segments and was handed over to the project engineers. Kamuli indicated that the tool will be applied to their entire network in the next round of data collection.

4.3.4 Asset Valuation

UNRA has reviewed their method of calculating road asset value to match that being used under the GEM project. Prior to this, UNRA did not include the replacement cost of the formation and drainage structures in determining the current replacement cost of the roads. This resulted in under-reporting of the asset value. UNRA has therefore adopted the GEM-introduced method that calculates the full value of the road components and then relates this to current condition to determine the current asset value.

4.3.5 Road Asset Management Self-Assessment

Results of the 2017 RAM self-assessment process, as included in the draft Quarterly Report No. 5, had indicated positive changes for both UNRA and Kamuli. The quantum of the improvement was higher for UNRA than Kamuli. It was agreed that some of the indications of improvement were corrections for reporting errors at baseline stage rather than real improvements in asset management. Modifications were made to the draft version of Quarterly Report No. 5 to:

- clearly indicate changes that were due to correction of the baseline data;
- make reference to the annexes to provide justifications as issued by the agencies; and
- attempt to identify improvements which were due to non-GEM interventions.

The UNRA self-assessment is coordinated by the Research Unit in UNRA with inputs from the various departments at head office level as well as Jinja Station. The average of scores provided by the various respondents is used. The 2018 self-assessment will be conducted before the November PIT meeting.

The Kamuli self-assessment is completed by the works committee and technical staff as a team effort. The GEM team noted the importance of providing justification on the self-assessment form wherever a “yes” answer is given.

4.3.6 Updating of GEM Country Action Plans

Both UNRA and Kamuli Districts undertook to review their GEM Action plans and send these to the GEM Advisory Team by email. They will be part of the agency presentations at the PIT meeting in November 2018.

4.4 Meeting with the Uganda Road Fund

A meeting was held at the Uganda Road Fund (URF) to discuss the operation of the fund and the procedures involved in financing of rural road maintenance. The following points and observations arose at the meeting:

- The Uganda Road Fund could be classified as 1st generation road fund since it receives allocations from the central consolidated revenue fund and then distributes the funds to the road agencies; hence the fund has no autonomy and does not control or directly access road user charges.
- The following agencies receive funding for routine and periodic maintenance: UNRA, Kampala City Council, 127 districts, 412 Town Councils and 41 Municipalities following approval of their annual maintenance plans.
- The funds are allocated according to a formula that takes the following into account: population served by the road network, road network length, road class, road condition, traffic volumes, traffic loading, surface type, terrain and climate.
- The funds are disbursed quarterly to the road agencies who in turn were expected to employ the funds solely for routine and periodic maintenance.
- For the 2018/19 financial year the road fund's budget is set at UGX 412 billion for municipalities, UGX 1230 billion for districts and UGX 211 billion for sub-counties.
- A total of 1255 sub-counties receive funding for attending to bottlenecks on the community roads; these funds are received via the districts.
- It was noted that unused funds only revert to the treasury annually, and not quarterly as had been indicated by Kamuli District.
- The URF has entered into annual performance contracts with all road agencies. The road agencies are expected to account for funds disbursed on a quarterly basis. The URF carries out regular monitoring and technical audits of maintenance works.
- The URF employs 37 staff members and used to rely on external consultants to monitor the usage of funds. The fund is now seeking to engage its own staff to undertake the monitoring as there is a lack of capacity in the local consulting industry.
- The URF has established a Regional Technical Support Unit in a pilot exercise in six districts in the northern part of the country to provide support for the organisation of road maintenance. It was agreed that there could be room for cooperation between the URF and the GEM project on this aspect of road asset management.
- The URF indicated that adequate guidance was provided to districts on the format of submission of requests or acquittal of expenditure and the documents were said to be on the URF website. However, these could not be accessed by the GEM team.

4.5 Conclusions and Recommendations

The following conclusions and recommendations are made following the visit:

- The lack of adequate funding for routine and periodic maintenance continues to negatively impact on Kamuli's road network, however significant improvements have been realised in the way the district staff in Kamuli approach the management of their network. For example, there is an

increased awareness of the importance of involving stakeholders. More work needs to be done on strengthening policy for rural road maintenance and planning for the use of maintenance funds.

- There is a lack of clarity at district level on the requirements for accessing, utilising and accounting, for allocations from the URF. This, however, can be expected to improve over time. The EU is funding long term TA in URF which should lead to improved operations. Meanwhile, it is recommended that the Road Fund prepares simple documentation that can guide districts in preparing funding proposals and acquitting for disbursed funds. This information should be distributed to the districts and posted on the website for ease of access by road agencies.
- The GEM Project should focus on the planning and organization of road maintenance works as the funding of road maintenance improves. A workshop focussing on these issues will be held during the Project Implementation Team (PIT) meeting in November 2018.
- There is potential for expanding the GEM project to other districts in Uganda. Kamuli district expressed readiness to share their experience with the following neighbouring districts: Buyende, Kaliro and Lwuuka. Expansion of the project to these districts would provide a capacity building opportunity for Kamuli staff as they will be expected to be in the fore-front of training their colleagues. The exercise would double up as a Train-the-Trainer exercise, with the Kamuli staff empowered to guide other districts in the three areas of AM self-assessment, setting up road inventories and undertaking road condition surveys, as well as collecting and analysing data on social and economic impact of interventions.

5 Financing Rural Roads Maintenance in Zambia

5.1 Introduction

The Scoping Study of Issues Concerning the Financing of Rural Roads Maintenance in Zambia is a sub-component of the GEM project. The purpose of the study is to identify issues that need to be addressed to improve funding for road maintenance in Zambia and to develop recommendations for funding that can be applied in other countries.

The specific objectives are to:

- review policies, legislation, management and funding mechanisms related to road maintenance in Zambia;
- assess planning, budgeting and auditing procedures of road works funded by the Road Fund;
- assess options for expanding road fund revenue base;
- propose revisions to relevant Acts and Legislation; and
- develop general guidelines for accessing funding for rural roads.

5.2 Context

5.2.1 Road Maintenance Initiative

Since the late 1990s, the SADC countries have undertaken a number of reforms in their approach to road management and financing. Experience gained so far indicates that traditional approaches, which have relied on management of roads through a government department and financing of maintenance through general budget allocations, have generally not worked satisfactorily. The reforms in the SADC region are hinged on the SADC Protocol on Transport, Communications and Meteorology. Its strategic vision is to provide a “safe, sustainable, efficient and effective road transport system” in support of regional socio-economic growth and development.

The SADC Protocol commits member states to the development of a harmonized regional road sector policy with the following main features:

- Clear demarcating and allocating of authority and responsibilities for road funding and road management;
- Establishing accountable and autonomous roads authorities with public and private sector participation in key decision-making and the ability to source expertise outside civil service;
- Adopting commercial management practices to foster institutional, economic and technical efficiency, amongst others, by introducing competition in undertaking any road-related activity and adopting a preference for the contracting out of all types of road construction and maintenance activities;
- Adopting appropriate financing principles and practices to secure adequate and sustainable sources of funding through incremental expansion of road user charging to ensure a regular flow of funds;
- Preserve assets vested in the road infrastructure;
- Dedicating revenues from roads to their provision, operation and maintenance; and
- Monitoring the adequacy and quality of the regional infrastructure.

The agreed SADC institutional framework clearly differentiates between the separate roles played by key road sector stakeholders in terms of policy formulation, policy delivery and works executions as follows:

Policy formulation

The overall legal authority for the road network is vested in a single Ministry with the responsibility for all regulatory, policy, standards, specifications and legislative matters. The Ministry has authority over the Roads Agency. The authority over the Road Fund is limited to approving the level of road user charges recommended by the Board to finance road maintenance and improvement works, and to monitoring the Board's compliance with the terms set out in the legislation under which it was established. The Ministry also functions as a policy co-ordination forum in respect of national, regional and local authorities. It plays an important role in promoting transparency and accountability and democratizing decision-making with regard to roads.

Management

The Roads Agency and Roads Fund Board must operate at "arms-length" as autonomous or semi-autonomous agencies. Their functions are basically that of strategic management and planning of the development, maintenance and rehabilitation of the national road network to be carried out in a commercial manner. The institution is overseen by a majority private sector Board and managed on a day-to-day basis by a Chief Executive Officer (CEO) appointed on a competitive basis.

Financing

An "arms-length" autonomous or semi-autonomous Road Fund operates as a commercial agency with responsibility for road financing. In so doing, it:

- acts as a channel for the receipt of all revenues destined for roads;
- disburses funds to roads agencies based on simple, transparent procedures;
- audits compliance with well-defined financial auditing principles; and
- ensures funding stability by providing a committed and known/predicted flow of funds in the interests of efficient planning and meeting contractor obligations.

Sustainable funding for road maintenance is based on the "user pays" principle and is secured through the levying of a Road User Charge. Such a charge reflects the usage of roads and typically consists of:

- fuel levy on petrol and diesel;
- vehicle licence fees including supplementary heavy vehicle fees;
- fines imposed on overloaded vehicles;
- cross border charges; and
- and any other user charges that may be adopted from time to time.

The funds available from road user charges should not necessarily be spent directly according to traffic level. Low-volume "social" roads need to be subsidized to some extent from the revenues from high-volume "economic" roads. However, in the case of Tolling, it is prudent to invest the fees collected in the same road for its maintenance to ensure sustainability of the road.

The second-generation road fund has become a significant feature of sector reform programs and strategies for improving road maintenance. The key characteristics of these road funds are as follows:

- Sound legal basis – a separate road fund administration with clear rules and regulations;
- Road fund agency which is a purchaser not a provider of road maintenance services;
- Strong oversight with broad based private and public representation at board level;
- Revenues incremental to the budget and coming from charges related to road use and channelled directly to the Road Fund bank account;
- Sound financial management systems and a lean efficient administrative structure; and
- Regular technical and financial audits.

Works Execution

All types of road construction and maintenance works should be contracted to the private sector through competitive bidding process rather than undertaken in-house by Force Account or Direct Labour operations. The procurement of works through performance-specified term contracts and the use of Petty Contractors is increasingly being viewed as the preferred method of contracting out maintenance works, in contrast to the traditional type of contract which is based on rather prescriptive input specifications and utilizes large, foreign contractors.

Experience from parts of Africa indicate that where road users have confidence that revenues which derive from their payment of the road user charges and fees are being allocated for road maintenance in a transparent way, and that this is both tangible and measurable through road pavements constantly being in fair to good condition, this will serve to reinforce their trust in the road user charging system. They will generally be prepared to pay more in the form of road user charges.

5.3 Zambia Road Network

5.3.1 Extent of Road Network

Zambia has a total classified road network of 67,671km of public roads comprising Trunk, Main, District, Primary, Secondary and Tertiary Feeder, Urban and Park Roads (Table 1). The Public Roads Act of 2002 defines the functions of the Road Development Agency (RDA) as: ***"To provide care and maintenance and construction of public roads in Zambia; to regulate maximum weights permissible for transmission on roads; and to provide for matters connected with and incidental to the foregoing."***

The RDA has delegated some responsibility to 114 Local Road Authorities in line with Section 20 (1) (2) (3) and Section 73 (1) of the Public Roads Act No. 12 of 2002 which states as follows:

- The Minister may, on the recommendation of the Agency, by statutory order, appoint any person or institution as a road authority in respect of any public road.
- The road authority appointed under subsection (1) shall be responsible for the construction, care and maintenance of the roads specified in the statutory order.
- All expenses incurred in the construction, care and maintenance of roads, for which the road authority appointed under subsection (1) is responsible, shall be paid under the Fund.

Table 1: Zambia Road Network Classification and Lengths (kilometre)

Road Class		Core Road Network (CRN) paved	unpaved	Non-core unpaved	Total
Trunk	T	3,024	92		3,116
Main	M	2,205	1,496		3,701
District	D	1,362	12,345		13,707
Urban	U	2,812	2,785		5,597
Primary Feeder	PF		14,333		14,333
Secondary Feeder	SF			10,060	10,060
Tertiary Feeder	TF			4,424	4,424
Park Roads				6,607	6,607
Community Roads				6,026	6,026
Totals		**9,403**	**31,051**		
		40,454		**27,117**	**67,572**

Due to inadequate financial resources, the Government has been experiencing great difficulty in meeting the financing requirements of the whole network and decided to concentrate only on the CRN of 40,454 kilometres leaving 27,117 kilometres unattended. The unattended network is mainly in rural areas and has been a bottleneck toward reducing poverty in Zambia.

5.3.2 Road Condition

Table 2 shows the current overall condition of the Core Road Network (CRN) broken down into the various categories of roads. The information is based on the road condition survey undertaken in 2014. The last comprehensive road condition survey was done in 2015 but the information was not made available to the team.

Table 2: Summary of Road Condition by Road Class for 2014

Proposed Intervention			Routine & Periodic Maintenance			Rehabilitation	
Road Class		**Condition**	**Good**	**Fair**	**Good + Fair**	**Poor**	**Totals**
Trunk	Paved	%age	90	7	97	3	100
		km	2,722	212	2,933	91	3,024
	Unpaved	%age	1	16	17.0	83	100
		km	1	15	15	75	91
Main	Paved	%age	89	8	97.0	3	100
		km	2,567	231	2,798	87	2,885
	Unpaved	%age	1	22	23.0	77	100
		km	7	156	163	545	707
District	Paved	%age	79	7	86.0	14	100
		km	1,667	148	1,815	296	2,111
	Unpaved	%age	6	25	31.0	69	100
		km	640	2,667	3,307	7,360	10,667
TMD[6] Unpaved/Impassable					0	984	984
Primary Feeder	Paved	%age	93	7	100.0	0	100
		km	28	2	30	0	30
	Unpaved	%age	3.2	11.3	14.5	65.9	80.4
		kms	503	1,761	2,265	10,316	12,581
	Impassable	%			0.0	19.6	19.6
		km			0	3,067	3,067
Urban	Paved	%age	46	19	65.0	35	165.0
		Kms	945	390	1,336	719	2,055
	Unpaved	%age	2.4	8.1	10.5	70.4	91.5
		km	90	301	391	2,619	3,010
	Impassable	%age				19.0	19.0
		km				708	708
Totals					**15,053**	**26,866**	**41,919**

Source: Integrated 10-Year Road Sector Investment Programme

It can be noted that a total of 26,866km of road of all categories are in poor condition as of 2014 and requiring rehabilitation. Table 2 shows that 86 per cent of the paved TMD network was in good condition while only 3 per cent of the unpaved TMD network was in good condition. About 66 per cent of the unpaved Primary Feeder Roads were in poor condition with additional 20% being completely impassable. The Urban roads on the other hand recorded 48 per cent in good condition.

5.3.3 Governance Structures

The National Road Fund Agency (NRFA) Board includes private sector representatives who occupy half of the 14 available seats that include two Ex-Officials. The private sector Board members are nominated by their constituencies and the Chairman is appointed by the Minister responsible for Finance. The Board also appoints the CEO of the NRFA upon approval by the Minister.

[6] Trunk, Main and District roads.

The Road Development Agency (RDA) Board has 15 members including two Ex-Officials namely the Director of the Road Transport and Safety Agency and the Director of the National Road Fund Agency who are also Ex-officio members in NRFA Board. Currently the Board is composed of members from the following institutions:

i) Zambia Association of Chambers of Commerce and Industry (ZACCI);

ii) National Council for Construction (NCC);

iii) Law Association of Zambia (LAZ);

iv) Zambia Institute of Chartered Accountants (ZICA);

v) Chartered Institute of Logistics and Transport (CILT);

vi) Representative from the Attorney General's Office;

vii) Representative from the Ministry Responsible for Communications and Transport;

viii) Representative from the Ministry Responsible for Finance;

ix) Economics Association of Zambia (EAZ);

x) Road Transport and Safety Agency (RTSA);

xi) Road Development Agency (RDA);

xii) Transporters Association;

xiii) An appointee of the Minister Responsible for Finance; and

xiv) National Road Fund Agency as Board Secretary.

RDA Board is appointed by the Minister responsible for Roads who also appoints the CEO. Both Boards report to the Committee of Ministers on the Road Maintenance Initiative comprising the Minister responsible for Communications and Transport who is the Chairperson, the Minister responsible for Works and Supply who is the Vice-Chairperson and the Ministers responsible for Finance and National Planning, Local Government and Housing.

Most of the key Ministries are represented in the boards of the NRFA and the RDA. However, the Ministry of Local Government, which is a key player in ensuring rural roads are properly managed is conspicuously not represented in the NRFA while the CEO of RDA is represented as an Ex-officio member. The RDA Board is government-dominated with only three members representing road user organizations. A Committee of Chairpersons of the three Road Sector Agencies namely NRFA, RDA and Road Traffic Safety Authority (RTSA) has been formed as an internal arrangement to ensure interagency cooperation, sharing of information, strategic direction and quick decision making. The Committee is composed of the three Board Chairpersons of the Road Sector Agencies. Directors/CEOs and senior managers are in attendance during the Committee meetings held every month. The Ministry of Local Government and Housing (MLGH) is not represented on this committee. The day to day operations of the RDA are directed by the CEO and the Chairman of the Board is also involved in such activities. The day-to-day operations of the NRFA are directed by a Management Team, headed by the Director/Chief Executive Officer, who is assisted by four Departmental Heads: Director Fund Management, Director Planning, Monitoring and Evaluation, Director Corporate Services and Director Internal Audit.

5.3.4 Policy Framework and Legislation

Key policy framework documents of relevance to this study are:

Zambia Transport Policy 2002

The first key Sector Policy document was approved in 2002 by the Ministry of Communications and became Government's approved Transport Policy paper. It was the basis for the establishment of the three public sector agencies (the RDA, RTSA and NRFA), the key institutions in the road sector. The Government was left with the limited the role of policy formulation and oversight, while regulatory, operational and

management functions were made the responsibility of the established agencies in the sector. The key statements relevant to roads are:

- *provide adequate, financially and economically sustainable road transport infrastructure able to facilitate domestic, regional and international trade;*
- *preserve investments already made in roads through maintenance;*
- *increase gradually resources to the road fund to enable it to become self-financing in the maintenance and rehabilitation of the road network; and*
- *institute the direct channelling of all road user charges to the Road Fun.*

Subsequent to the production of this Transport Policy paper, the National Road Sector Framework 2012 document was prepared with an overall strategic focus on:

- ensuring that the existing road infrastructure is kept in maintainable condition at all times; and
- rehabilitating and upgrading existing roads as well as the construction of new ones.

To implement the policy the following road programmes were launched in addition to the maintenance strategy that was prepared in 2014:

- Upgrade, rehabilitate, maintain and construct roads and bridges to international standards;
- Harmonise policies for the road sector Road and Bridge infrastructure development;
- Link Zambia 8000 (Construction of approximately 8,000 km of roads in Phase I (2,914 km) Phase II (3,447 km) and Phase III (1,622 km);
- PAVE Zambia 2000 (Construction of approximately 2,000 km of main and urban roads in all the provinces;
- L400 (Construction of approximately 400 km of urban and ring roads in Lusaka district;
- Construction and rehabilitation of all-weather roads in strategic tourist sites;
- Construction and rehabilitation of roads in Kafue National Park; and
- Road infrastructure development (total length 251 km).

These road programmes were highly ambitious. Due to overemphasis on new construction and upgrading works at the expense of carrying out timely routine and periodic maintenance, the bulk of the CRN was left unattended to. The worst affected network has been the PFR[7] network which has not seen any significant improvement in condition and passability.

The Road Maintenance Strategy document has identified the following reasons that led to poor performance of the programmes:

- Inadequate maintenance funding due to low budgetary allocations;
- Delayed procurement process due to requirement for the review of contract documentation by the office of the Attorney General;
- Inadequate RDA capacity due to low staffing levels in regions, inadequate tools such as maintenance manuals and maintenance equipment to effectively carry out maintenance on force account, and inadequate monitoring of routine and periodic maintenance activities;
- Poor quality of consultancy services offered by consultants especially in supervision services and defective designs which have resulted in cost overruns, delayed maintenance due to time extensions and inadequate monitoring of contractors; and

[7] Primary Feeder Road

- Inadequate contractor capacity, with many contractors lacking technical capacity to carry out some maintenance works, which resulted in delayed project implementation, cost overruns and general poor quality of work.

The Transport Policy 2018

This new policy includes a ten-year National Transport Policy Implementation Plan from 2018 to 2028. The objectives for the Road Transport and Infrastructure component of the implementation plan are:

- to harmonise all pieces of legislation governing the road sector to minimize overlap of mandates and adherence to core mandates;
- to promote development of transport services that meet the global safety standards; and
- to promote sustainable mobility of both goods and passengers to achieve economic and social needs.

The details of the activities to be undertaken during the ten-year plan horizon are as shown in Table 3.

Table 3: National Transport Policy Implementation Plan

Measures	Activities	Output Indicator	Annual Targets										Responsible
			Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
Harmonize the Public Roads Act No. 12 of 2002 and the Local Government Act Cap 281.	Engage key stakeholders through RMI/TMI to harmonise the pieces of legislation	Laws harmonised		*	*								MHID (Lead) MLGH (Lead) MTC RDA MOJ RTSA
	Undertake road infrastructure improvements management	Percentage of roads re-engineered	5%	15%	25%	35%	45%	55%	65%	75%	85%	100%	MHID-lead MTC RDA RTSA NRFA
Facilitate provision of cost effective and reliable transport services	Improving the condition of feeder roads and rural road connectivity	Feeder roads improved	250	500	750	1000	750	500	500	500	500	500	MHID RDA NRFA
	Rehabilitation and Maintenance of road infrastructure	Number of Kilometres Rehabilitated and Maintained		500	500	500	500	500	500	500	500	500	MHID– Lead MTC MLGH RDA NRFA

Source: MOT

The activities and targets contained in the policy implementation plan as shown in Table 3 are not consistent with Road Maintenance Implementation plan prepared by RDA. In addition, the intervention referred to as “improvement” is vague as it does not specify what is actually being anticipated to be achieved on the ground. Combining rehabilitation and maintenance into one activity results in maintenance being marginalised when it comes to implementation. There is a need to harmonise the plans being developed in the road sector by different institutions.

Road Maintenance Strategy 2015 -2024

This is a new road management strategy that has been launched to give road maintenance due priority. Through this Road Maintenance Strategy, Routine Maintenance activities on the Core Road Network (CRN) will be given the first priority in the Road Sector Annual Work Plan (RSAWP), followed by periodic maintenance and then finally rehabilitation and upgrading works. The reason for this prioritization is to ensure preservation of the existing road asset which is in a maintainable condition. All roads in good and

fair condition will be placed under routine maintenance. The timely application of the maintenance activities will be guided by a Road Asset Management System (RAM). The RAM will draw input from annual road condition surveys. However, the work plan that has been developed by MOT is not consistent with the road maintenance implementation plan that has been prepared by RDA for the next 7 years. This is due to lack of effective coordination between the road sector organisations. The RDA is under the Ministry of Works.

5.3.5 Procedures for collecting and depositing revenues assigned to NRFA

Revenues accruing to the NRFA are governed by the following principal acts of legislation:

- Road Traffic Act, No. 11 of 2002;
- Public Roads Act, No. 12 of 2002;
- National Road Fund Act, No. 13 of 2002;
- National Road Fund (Amendment) Act, No. 5 of 2006;
- Public Roads (Amendment) Act, No. 10 of 2006; and
- Tolls Act, No. 14 of 2011.

Three government institutions are currently responsible for the collection of road user charges as shown in Table 4.

Table 4: Road User Collection Arrangements

RUC Instrument	Collecting Agency
Customs and Excise Department collects fuel excise payments upon entry into Zambia, a component of which comprises the fuel levy for petrol (gasoline) and for diesel (gasoil).	Zambia Revenue Authority (ZRA)
Transit "toll" fee – international (foreign registered and Zambian returning commercial goods vehicles).	Road Transport and Safety Agency (RTSA)
National transit fees or "tolls" at inland weighbridge stations payable by commercial goods vehicles that are domestically registered in Zambia. (Zambian inland commercial goods vehicles).	Road Development Agency (RDA)
Road Traffic Collections – vehicle licensing and registration fees, public service vehicle licence and identity fees, motor vehicle examination fees, driver licensing and testing fees.	Road Transport and Safety Agency (RTSA)
Commercial vehicle overloading penalties at weighbridge stations and abnormal load permit fees together with hazardous load penalty payments where such loads exceed the legal dimensions.	Road Development Agency (RDA)

Road user charge collections are deposited into commercial banks and thereafter they are transferred to the Bank of Zambia Government's general revenue account – "CONTROL 99". Transfer from the bank account to NRFA is done after authorisation for such transfers by the Secretary to the Treasury. Funds are then allocated to the road agencies and allocated according to the execution of approved Annual Work Plans (AWP) submitted by the road agencies on the basis of approved payment certificates or as allocations for force account works.

The fuel levy in Zambia is imposed under the Customs and Excise Act (Chapter 322 of the Laws of Zambia, Section 76 and the Second Schedule). The specified rates, which became effective on 1 January 2014 are:

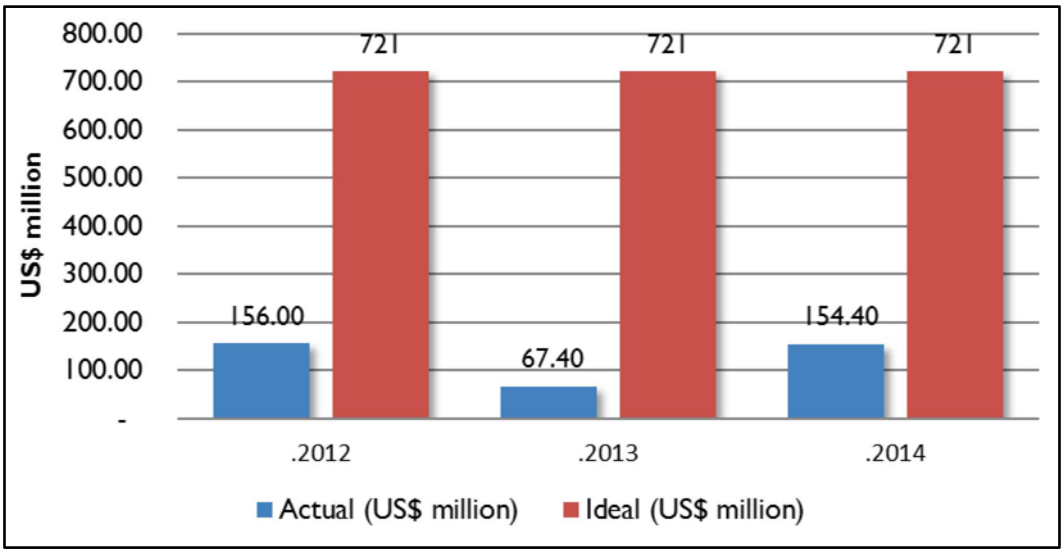
- Petroleum spirit (motor spirit) (petrol): ZMW 1.97 per litre excise duty of which ZMW 0.87 per litre comprises the Fuel Levy
- Automotive gasoils (diesel): ZMW 0.62 per litre excise duty of which ZMW 0.62 per litre comprises the Fuel Levy.

There are reports indicating that not all the monies that have been collected are made available for road activities through the NRFA. However, assurances were given during meetings with officials in the relevant agencies that all money due to the road fund is made available to the NRFA. The law that established the NRFA only mentions the sources of revenue for the fund, but actual imposition of levies is done in other legislations as indicated above.

5.3.6 Road Maintenance Budgets

According to the 2015 RDA Maintenance Strategy, a minimum of US$721 million was required to be allocated on an annual basis between 2012 and 2016 to bring the CRN to a maintainable condition. Figure 9 shows that in 2012, for example, only 22 per cent of the maintenance budget requirements were met while as little as 9 per cent and 21 percent were met for the years 2013 and 2014 respectively. As a result of these financing gaps, in 2012 only 8,787 km of the targeted 18,342 km of maintenance was achieved.

Figure 9: Actual Versus Ideal Maintenance Budget Allocation



According to the RDA Annual Report for 2015, the agency certified works to a total value of K7,465 million during the period against the annual budget of K4,965 million. This represented an implementation rate of 150 percent[8]. Upgrading works made up the largest component of the value of certified works at K3,206 million (43 percent) followed by Rehabilitation-Paved roads at K1,894 million (25 percent). A breakdown of the total amounts certified compared with the AWP are summarised in Table 5.

[8] It is noted that works certified were not necessarily paid for due to inadequate funds and overcommitment of national resources.

Table 5: Implementation of the RDA AWP

S/N	Intervention Type	Amount Certified 2015	% of Total Amount Certified	AWP 2015
1	Upgrading to Bituminous Standard	3,205,827,681	42.9%	1,389,224,450
2	Rehabilitation-Paved	1,894,288,373	25.4%	1,407,598,028
3	Periodic Maintenance-Paved	1,273,706,437	17.1%	515,909,470
4	Bridges	279,185,578	3.7%	475,600,000
5	Consultancy	272,336,660	3.6%	95,750,000
6	Routine Maintenance	167,092,128	2.2%	130,000,000
7	Feasibility Study & Designs	150,966,204	2.0%	192,600,000
8	Force Account Works	57,606,227	0.8%	41,500,000
9	Toll Programme	35,792,385	0.5%	163,900,000
10	Rehabilitation-Unpaved	31,170,489	0.4%	71,500,000
11	Axle Load Control	27,936,685	0.4%	116,200,000
12	Periodic Maintenance-Unpaved	18,070,265	0.2%	121,140,530
13	Project Monitoring	10,999,400	0.1%	12,500,000
14	Capital Expenditure	17,592,469	0.2%	129,729,000
15	Pave Zambia	9,727,659	0.1%	90,000,000
16	Procurement	8,599,157	0.1%	5,300,000
17	Capacity Building	4,670,426	0.1%	7,000,000
Total		**7,465,568,223**	**100.0%**	**4,965,451,478**

Source: RDA Annual Report 2015

Table 5 indicates that the road sector is facing a huge financial crisis. There are many contracts that cannot be paid for from the annual budget. It is estimated that the accumulated debt is more than K70 billion as at the end of 2017. In such a situation, it would take several annual budgets to pay for works in the committed contracts. The debts to contractors and consultants are being serviced bit by bit and yet continue to grow because contracts remain active although performing slowly or not all. This scenario makes it impossible to anticipate the completion dates of ongoing projects or programme their maintenance.

RDA has prepared a Road Maintenance Strategy with the following objectives to be achieved by 2024:

1. 100 per cent of the paved TMD is in good condition;
2. greater than 80 per cent of unpaved TMD is in good condition;
3. greater than 90% of the paved Urban Roads are in good condition;
4. greater than 80% of unpaved Urban Roads are in good condition;
5. greater than 80 per cent of Primary Feeder Roads are in good condition;
6. the Road User Charges are dedicated to road maintenance by 2018;
7. application of the OPRC[9] system for road maintenance is implemented by 2016; and
8. 15,000 new job opportunities are created annually through the RMS by 2020.

To operationalize the strategy, RDA has developed a Maintenance Implementation Plan covering the period 2018-2024 using the HDM-IV for TMD roads and multicriteria analysis covering (i) the number of beneficiaries; (ii) agricultural production along the road; (iii) social benefits from improved connectivity; (iv) connectivity to the main network (Trunk, District and Main Roads); and (v) Investment efficiency for the

[9] Output and Performance Based Road Maintenance Contract.

rest of the network. The plan shows that to bring the roads to the condition specified in the RMS objectives will require a total of USD 10.45 billion over seven years, of which approximately USD1.55 billion is intended to come from loans.

Table 6: RDA Road Maintenance Implementation Plan.

Network	Surfacing	Type of Maintenance	Length (Km)	(USD '000)
TMD	**Paved**	Routine	54,974	1,376,863
		Periodic	1,646	1,316,464
		Rehabilitation	877	852,699
	Unpaved	Routine	17,871	446,773
		Periodic	2,126	212,580
		Rehabilitation	5231	659,353
	Sub-Total			**4,864,730**
Urban	**Paved**	Routine	19,471	486,787
		Periodic	713	570,434
		Rehabilitation	531	831,075
	Unpaved	Routine	4,854	121,362
		Periodic	2,621	2,096,823
		Rehabilitation	2,288	182,173
	Sub-Total			**4,288,653**
PFR	OPRC	Maintenance	27,040.00	175,760
	OPRC	Rehabilitation	6,940.00	971,600
	Passability		3,780.00	151,181
	Sub-Total			**1,298,541**
Grand Total (USD '000)				**10,451,924**

Source: RDA

Table 6 indicates that USD 6,628,084,000 (equivalent to ZK 65,961,106,000) will be required over the seven-year period for routine and periodic maintenance, or ZK 9,423,015,142 annually. The NRFA strategic plan 2017-2021 indicates that it is planned to increase the road fund revenue by 56% in 2019 and by 80% in 2021. According to NRFA 2016 Annual Report, the Local Resources of Tolling Revenue, Fuel Levy and Other RUCs, together with the External Resources from Cooperating Partners, are dedicated towards the routine and periodic maintenance of the road network and that GRZ Project Direct Allocations provide funding for the rehabilitation, upgrading and new construction of roads. However, a close scrutiny of the financial statements for the year 2016 indicates that out of ZK 1.9bn that was collected as road user charges only ZK 862 million was allocated for road maintenance. According to Table 7, in 2016 NRFA managed to collect about ZK 1.9 billion, which is far less than ZK 9.4 billion required for routine and periodic maintenance only as envisaged by RDA in its Maintenance Implementation Plan. With the accumulation of debts from previous years amounting to more than ZK 70 billion, there is a great likelihood that the MIP will not be implemented as expected due to the current commitments in the road sector and the growing debt.

Table 7: NRFA Collections 2015/2016

Sources of funds (ZMK)	Year ended 31 Dec 2016	Year ended 31 Dec 2015
Balances brought forward	72,488,167	37,213,654
Exchange gains	-	16,914,881
Fuel Levy and other Road User Charges	1,934,130,163	421,881,699
GRZ – Direct Funding	63,191,380	3,914,001,770
Other income	96,804,038	-
Weighbridge fines and fees	1,667,870	21,199,410
Total	**2,168,281,618**	**4,411,211,414**

Source: NRFA Annual Report 2016

5.3.7 Annual Roads Work Programme

On an annual basis the road agencies are required by NRFA to submit an unconstrained list of roads that would require funding.

National Roads

The RDA prepares its AWP based on "engineering judgement" as the Highway Maintenance System (HMS) is not used for the purposes of developing plans and required interventions. The HMS is only used to store road data. There is no effective road asset management system in place. The last comprehensive road condition data were collected in 2015 and RDA is planning to conduct a survey in 2018. The NRFA does not have a set calendar for submission and approval of project funding proposals, nor set dates for acquittals and other reporting. In addition, no guidelines are issued by NRFA for the preparation of proposals or the required format.

District Roads

The Ministry of Local Government and Housing (MLGH) in Zambia has a Department of Housing and Infrastructure Development that is responsible for roads. Below the Director there is an Assistant Director responsible for infrastructure who is assisted by two Principal Engineers one responsible for roads, markets and bus stands and another for solid waste. The Principal Engineer for roads has two Senior Engineers reporting to him, one responsible for urban roads and another for rural/feeder roads.

On an annual basis MLGH invites proposals for funding from the local authorities (LA). Each LA has a technical department headed by an engineer who is responsible for preparing the AWP using best engineering judgement as there is no road maintenance management system available that can be used by the technical staff to prepare the budgets. Road condition and inventory surveys are seldom undertaken. Resources are never sufficient to cover the needs of all 114 LAs. They are expected to prioritise the works they have requested and the MLGH cuts the LA submissions to fit within the budget. In so doing some LAs tend to get more than others and some do not get any funding. Sometimes the MLGH will ask the LAs to justify their submissions based on some form of criteria such as population data and economic activity linked to the candidate roads. There is no policy on the split between road rehabilitation and road maintenance works and most interventions seem to be developmental in nature. The MLGH has difficulty in assessing proposals from the LAs because the MLGH does not hold baseline data on the condition of the rural roads network. (The MLGH is planning to conduct a condition survey of the rural road network under a Word Bank project). In addition, there are only three technical staff in the department to scrutinise the LA proposals. Once MLGH has approved the plans with budgetary allocations based on existing unit rates, it carries out procurement of works on behalf of the LAs while onsite supervision is done by LAs. The works are certified by the LAs which send the payment certificates to the MLGH for onward transmission to NRFA for payment. After scrutinising the certificate, the NRFA arranges payment directly to the contractor. In case of force account works, the money is sent directly to the LA for implementation. Periodically the Engineers from the Ministry visit the LAs to monitor how works are implemented. LAs do not have resources to provide counterpart funding for their roads.

Finalising the AWP

The NRFA convenes an annual stakeholders' meeting to discuss the AWP before it is approved. Experience indicates that no changes are expected after plans have been submitted to the NRFA.

The AWP for 2016 is summarised in Table 8.

Table 8: AWP for 2016

	Periodic Maintenance km	Rehabilitation km	Routine Maintenance km	Upgrading km	Grand Total km
■ MLGH	63	20	441	-	524
■ RDA	1,295	1,238	20,365	2,658	25,556
■ Total	1,358	1,258	20,806	2,658	26,080

Source: RDA

Table 8 shows that the road network under the LAs is highly neglected. The number of kilometres planned to receive interventions in the LAs is only about 5 kilometres per district. Only 3% of the network of 19,930 kilometres is being attended to. This explains why some districts do not receive any funding at all during a year. Reports indicate that decisions on the financing of roads in Zambia are still influenced mainly by political priorities and deviation from approved plans is a common phenomenon. The Zambia National Service is allocated about 3 percent of the road fund for carrying our road works, and about 3 percent is allocated to the RTSA for road safety activities.

Table 9 shows that maintenance and especially routine maintenance is underfunded at the expense of capital works. This contradicts information published by NRFA indicating that road fund revenues are used only for routine and periodic maintenance. There is a need to restrict road fund revenues that can be used for capital works as well as increasing the budget for maintenance of the local road network.

Table 9: Allocation of Road Fund Revenue

RSAWP FOR 2016 ROAD FUND SOURCES OF FUND			
Nr.	**Project Type**	**Amount**	**%**
1	Periodic	640,950.00	29.44
2	Routine	133,000.00	6.11
3	Rehabilitation	447,871.12	20.57
4	Upgrading	90,000.00	4.13
5	Others	865,550.00	39.75
	Total	**2,177,371.12**	**100**

Source: RDA

5.3.8 Reporting

An assessment of the road works implementation report from Chongwe Municipal Council indicates that the reporting system is weak with insufficient details to assess performance. The report covers names of roads and kilometres planned to be maintained per ward, kilometres attended to, type of intervention and total amount spent for all the wards. The assessment indicated that the list of roads implemented does not correspond to the list of roads that was planned to be maintained. The cost for maintaining each road was also not included. The report does not mention whether the amount received was the same as the amount budgeted but judging from the huge discrepancy between the planned kilometres and actual implemented one can conclude that the performance was very poor. Only 82 kilometres were implemented out of 419 kilometres planned, which is about 20 per cent. The main challenge noted is the frequent breakdown of the grader[10].

A comparison was made with the reporting format of LAs in Tanzania, which includes more relevant information such as the planned interventions per road with corresponding financial estimates, status of implementation including both physical and financial achievement per road , road condition, funds received, implementation of policy issues etc.

5.3.9 Outreach Programme

The NRFA has a Public Relations Unit that mainly focuses on raising awareness on the implementation of various programmes being undertaken by the agency such as the National Road Tolling, the revised toll tariff structure, Local User Discounts, and Frequent User Discounts as provided for in the Statutory Instrument Number 85 of 2016. The unit has produced a nine-series studio-based TV programme on Road Tolling which commenced airing on ZNBC TV, stream TV stations and private and community radio stations across the country. The programme issues news releases and interviews, appearances on scheduled radio and TV programmes such as Good Morning Zambia, Let the People Talk, and Sky Forum among others. All

[10] ReCAP is supporting a research project in Chongwe District to introduce tractor-based technology for road maintenance thus reducing the reliance on heavy equipment.

this is done to assure the public that the revenues from NRFA are producing value for money. In addition, meetings with stakeholders and Members of Parliament are convened for awareness creation and to win support for the activities undertaken.

5.3.10 Financial Accounting, Control and Monitoring

The NRFA has a Directorate of Fund Management which is responsible for the tracking of funds from collection points, ring fencing the Road Fund, control of its usage, and later disbursing it to the intended contracted works and services. Revenue accounting is done by the collecting agents and the system seems to be working well. The main problem lies on the expenditure side.

NRFA provides direct funding to RDA and MLGH for in-house works under the force account approach. These are supposed to be mainly minor works of emergency nature and are executed through the Regional Managers and Local Road Authorities. The approach requires an agency to procure equipment, materials and employ its own staff (Engineers, Supervisors, skilled and general workers) to execute the works. The funds are disbursed to respective RDA Regional Accounts and LAs after approval by the Head Office of RDA or MLGH. In order to control expenditure and to ensure accountability, NRFA disburses 50% or less on the certified amount and the rest is paid once the initial amount is retired.

NRFA has a Directorate of Programming, Monitoring and Evaluation (PME) which is responsible for monitoring road works that are funded by NRFA to ascertain whether they achieve value for money. Monitoring is done through scrutinising the AWP, processing payment certificates and field inspections. Experience indicates that during implementation there is deviation from the approved programmes re-scoping projects to fit into the work programme. The review of interim payment certificates has revealed that claims often include mathematical errors, double submission of the same IPCs, over certification, unsubstantiated and overstated quantities. The NRFA has been rejecting such fraudulent claims resulting in substantial savings of the road fund. For example, in 2016 the NRFA processed a total of 4,700 IPCs and recorded a total of K 7,205,369.60 as savings. This has enabled the NRFA to save approximately K 67.73 million between 2011 and 2016 through the IPC Certification process.

Field inspections are done in-house and through external auditors. The activity involves random physical checks to monitor and verify quantities, quality, safety and general progress on the selected programmes, projects and related activities and this is done jointly with the implementing agencies or/and other related stakeholders. Inspections include mainly visual observations, but measurements and in some cases tests are conducted. Inspections allow the NRFA to pick out projects that may need further investigations through technical audits. RDA and MLGH have internal monitoring mechanisms but monitoring by the MLGH is inadequate as there are only three technical staff and no proper systems and equipment available for the job.

It is evident that force account is being implemented even for very large projects. The NRFA Annual Reports indicate that over a four-year period from 2012 to 2016 a total of 120 force account projects were undertaken with a total amount of K 288.94 million claimed. NRFA certified K 280.35 million to be a genuine claim leaving K 8.58 million as funds withheld or savings made over the 4-year period.

5.4 Effectiveness, Efficiency and Economy of Implementing Agencies

5.4.1 Assessment Criteria

A number of criteria can be used to assess effectiveness, efficiency and economy of the implementing agency in the execution of maintenance works so as to avoid possible mismanagement of resources.

The definition of each of the assessment criteria is stated below:

a) Efficiency refers to “determining whether things were done right” which can be evaluated by:

- Examining the utilization of the funds received for maintenance and evaluating the factors that contributed to sub-optimal financial and/or physical performance;

- Comparing the unit costs with the median and average unit costs for the various maintenance activities; and
- Investigating different methods to carry out maintenance (for example, force account units, maintenance contracts and Performance Based Contracts (PBC)).

b) Quality means "if the work has been completed to acceptable standards" and can be evaluated by the relevant tests or procedures.

c) Effectiveness can be defined as "doing the right things" which can be evaluated by:

- Criteria used for fund allocation;
- Criteria used to select a maintenance activity;
- Adequate prioritization; and
- Whether contractors are awarded work according to their classification.

5.4.2 Utilization of funds

According to the RDA Annual Report of 2015, the road sector AWP budget was K5,462.17 million but RDA received K6,829.60 million from both external and local resources. The overall expenditure was 98 percent of receipts. The surplus receipts were carryovers of unpaid IPC's from 2014, part of which were paid in 2015. In total K2,203.2 million remained unpaid from the year 2015 into 2016. The RDA certified a total of K7,465 million in 2015 against the annual budget of K4,965 million. This represented an implementation rate of 150 percent.

Regarding physical performance, in the case of periodic maintenance, the annual target was to maintain 919 km and the RDA achieved 659 km for the paved road network. For routine maintenance, 17,912 km was achieved against a target of 20,365 km. This represents 72 and 88 percent performance respectively. Under rehabilitation and upgrading works, 450 km and 260 km were achieved against the set targets of 1,574 km and 1,242 km respectively. This represents 29 percent achievement on rehabilitation works and 20 percent under upgrading works. The reasons given for poor physical performance is fiscal constraints the RDA faced during the year under review. The reason given does not seem to explain the real cause of the problem because the financial expenditure and the amount of certified for works during the year does not correspond with physical output of the works undertaken.

5.4.3 Quality procedures

The Monitoring and Evaluation Unit of the RDA carries out monitoring and evaluation of projects by assessing the quality, cost, schedule and scope of works. In 2015 ten consultant's projects were assessed. Out of these, seven had a Performance Rating above 60 percent which translates into acceptable satisfactory performance while three consultant's projects had a Performance Rating of between 53 percent and 58 percent which translates into slightly poor performance. Regarding contractors, ten contractor's projects had a Performance Rating above 60 percent which translates into acceptable satisfactory performance against four which had a Performance Rating between 52 percent and 59 percent which translates into slightly poor performance. External audits carried out by the NRFA were done on a sample basis.

5.4.4 Planning and Prioritization

The Highway Management System (HMS) is a computer-based system developed by RDA which stores road network data. It is supposed to be used for developing the annual maintenance programme for the road network and to prioritize the maintenance activities based on the budget available, whereas HDM-4 is generally supposed to be used for multi-year planning purposes. The HMS is not continuously updated with network data. For paved roads, a condition survey is supposed to be conducted annually and at least 50% of the condition data should be updated in the HMS annually. Condition surveys on the unpaved roads are supposed to be conducted twice a year- once in the dry season and once in the wet season via a visual inspection but this was last done in 2015. Traffic count is also supposed to be undertaken across the

country and at least 25-30% of the road traffic data is updated in the HMS annually but there is no evidence that this is done.

In terms of the effectiveness of the works selected for implementation, the maintenance activities are not selected by a treatment matrix which is a function of the roughness, cracking, ravelling and traffic levels. It is done by engineers using "good engineering judgement". The prioritization plan is determined by multi-criteria analysis including connectivity, population, social services and tourism.

Optimal timing of maintenance is imperative and postponement of maintenance actions may result in higher funding levels required. Thus, it is vital that the road network data in the HMS is current such that the correct maintenance activities and frequencies are selected. The lack of accurate assessments of these measures is likely to result in improper allocation of funds.

5.4.5 Unit Costs

The unit costs in Zambia are regarded as being higher than elsewhere in the region due to delayed payments for work done. Unit costs are given in Table 10.

Table 10: Unit Costs of Maintenance Activities (US dollars)

Maintenance Standard (Asphalt Mix)			
Description of work items	**Unit Cost**		
	Economic	**Financial**	**Unit**
Reconstruction Asphalt Mix	85.00	100.00	per m^2
Edge Repairs	42.60	50.00	per m^2
Pothole Patching	34.00	40.00	per m^2
Crack Sealing	17.00	20.00	per m^2

Maintenance Standard (Surface Treatment)			
Description of work items	**Unit Cost per Km**		
	Economic	**Financial**	**Unit**
Cape Seal with shape construction	5.95	7.00	per m^2
Single Surface dressing with Shape Correction	12.75	15.00	per m^2
Edge Repairs	42.60	50.00	per m^2
Pothole Patching	34.00	40.00	per m^2
Crack Sealing	17.00	20.00	per m^2

Improvement Standard (Unsealed to Sealed)			
New pavement type	**Unit Cost per Km**		
	Economic	**Economic**	
Surface Treatment on Stabilized Base	500,000	520,000	per Km

Source: RDA

Experience from other countries in the SADC region indicates that for contracted works, the larger the quantity of works, the smaller the unit cost. Where possible, sections of road should be combined resulting in larger contract sizes to ensure that savings from economies of scale can be realised resulting in increased value for money for the NRFA. There are various models to execute maintenance works ranging from in-house (or force account units) to outsourcing (or contract-based maintenance) to performance-based maintenance which all impact on efficiency. Force account units are often perceived as less expensive but there are hidden costs such as employee benefits, government housing, etc. that may make them more expensive. Force account units also tend to be less efficient than contractors, as force account units are not profit driven (i.e. the salaries of the employees of force account units are guaranteed). The SADC Protocol on Transport, Communications and Meteorology in the Southern African Development Community (SADC) Region states that force account work should be done away with over time. Experience from Namibia indicates that the road user is burdened with a 20%-30% cost premium due to inefficiency of force account operations. This translates to higher charges to be recovered from road users.

Advantages of force account units include:

1. Force account units enable government roads authorities to remain knowledgeable with regards to road maintenance and construction especially in the areas of construction and maintenance techniques, works execution progress, unit cost rates, complexity of work, etc.;
2. Force account work attracts young engineers and technicians for employment at the government roads authorities (Engineers need hands on experience of construction and maintenance work, which they can acquire as resident engineers at force account units);
3. In cases of emergencies, like flash floods, or other events interrupting traffic flow on roads, force account units can quickly be mobilized to resolve the crisis;
4. With a force account unit at its disposal, a roads authority can experiment with new construction procedures and do research on various road construction and maintenance issues;
5. Force account units are versatile and can be redeployed to other more important projects virtually overnight;
6. Force account units compel roads authorities to do construction and maintenance work on a continuous basis (road authorities have to keep their staff and equipment occupied and recover the costs of the force account units);
7. Staff at force account units enjoy good job security;
8. Force account provides benchmark for contractor performance/costs; and
9. Force account offers flexibility to target specific socio-economic groups.

Disadvantages of force account include:

1. Force account units are not profit driven like private contractors and hence force account units are mostly not as effective and efficient as private contractors;
2. The staff at force account units are government employed and have government job security so there are limitations for staff dismissals for unacceptable behaviour;
3. Overhead costs at force account units are very high because staff are provided with government housing, transport, medical aid, pensions etc,;
4. Force account may suffer from slow, bureaucratic procedures where good performance is discouraged, low efficiency and poor management/use of available resources and poor cost-awareness, and it cannot function if there is an erratic supply of funds; and
5. Political interference may be applied to force account operations where it is easy to divert funds and resources.

Zambia should consider involving the private sector more in the implementation of the road maintenance works as envisaged in the SADC Protocol. Advantages of using the private sector include:

- RDA and LAs will be released from direct organisational responsibilities;
- Plant acquisition and management is transferred to contractors;
- Human resource sourcing and management is delegated to the private sector;
- There is more flexibility to hire/fire and motivate personnel;
- Competition in the bidding process brings efficiency, high utilisation of assets, and lower costs;
- Improved accountability is possible;
- There is minimal political interference once contracts have been awarded;
- Economic empowerment can be achieved through the participating of SMMEs (Small, Medium and Micro Enterprises) in road maintenance; and

- The private sector offers greater possibility of introducing innovation to reduce costs, for example through the use of Performance Based Contracts.

In order to benefit from the advantages of using the private sector Zambia has to ensure:

- There is adequate funding and stable flow of funds to support an effective and competitive market;
- Improved procurement law and transparent tendering processes;
- Government policy is in place to use the private sector with preference given to local contractors for locally funded projects;
- There are competent and resourced contractors available (otherwise a capacity building programme for local contractors has to be put in place including financial/credit schemes); and
- RDA and LAs must have staff capable of managing and supervising the contracts.

5.4.6 The Auditor General Report for the Period 2012 to 2015.

The objectives of the audit carried out by the Auditor general were, amongst others, to ascertain whether procurement procedures and expenditures were followed in the award and execution of contracts.

The following were observed:

1. ***Failure to Pay Contractors on Time***: There were delays in settling of interim payment certificates resulting in incurring of interest and standing time charges. In addition, in some cases, commencement orders were issued prior to the settlement of advance payments.

2. ***Late Engagement of Supervising Consultants***: There were delays in the engagement of supervising consultants for periods ranging from one to twelve months. Thus, projects were implemented without adequate supervision.

3. ***Lack of Detailed Engineering Drawings***: Projects commenced without detailed road engineering designs resulting in understatement of bills of quantities which consequently led to increases in contract sums once the drawings were in place. This further led to delayed completion of projects.

4. ***Change of Key Personnel without RDA Approval***: It was observed that contractors changed key personnel without approval from RDA.

5. ***Single Sourcing (Direct Bidding):*** Although, RDA obtained authority to single source from the Zambia Public Procurement Authority (ZPPA), most projects did not meet the criteria for single sourcing.

6. ***Over-procurement of Projects***: It was observed that RDA procured works at the unconstrained budget level as opposed to the budget approved by Parliament.

7. ***Variations:*** There were variations on contracts ranging from 50 percent to 400 percent, which were considered excessive.

8. **Workmanship:** There was non-adherence to Project Specifications. It was observed that specifications were not adhered to resulting in poor quality works.

From the above analyses and the Auditor General report it can be concluded that projects have been mismanaged. Much needs to be done in terms of efficiency, economy and effectiveness to improve the situation. Regarding quality control, the number of audits undertaken internally is too small to judge the performance of consultants and contractors. There is a need to increase the sample size to get a true picture of the situation and improve the internal quality control function. In 2016 the NRFA inspected a total of 113 projects against the targeted 180 projects per year which is about 63% performance. The NRFA Annual report indicates that in 2016 a total of 691 works contracts funded by NRFA were running in that year. Thus, the total number of contracts that were audited by NRFA forms only 16% of the total number. Since NRFA is responsible for making payments it is important for NRFA ensure that the works that have been certified have produced value for money.

5.5 Options for Expanding Road Fund Revenue

In order to respond to the expected demand of the road users, and to allow the road network to play its full role in the economic and social development of the Zambia, the entire core road network should be completely rehabilitated and put in good and fair condition by 2024 . However, given the huge indebtedness of the road sector and the massive commitment to non–performing contracts, it is not advisable to further commit to full construction or rehabilitation contracts. Furthermore, in Zambia poverty continues to remain more of a rural phenomenon than an urban one. According to the Sixth National Development Plan the majority of Zambia's population (65 percent) lives in rural areas where poverty is estimated to be 78 percent. Extreme poverty, which reflects a household's inability to meet its nutritional requirements, was estimated at 58 percent for rural areas and 13 percent for urban areas. The plan also notes that rural areas lack critical infrastructure for raising productivity and the people are not linked to domestic and foreign markets. Many rural areas are difficult to access, particularly during the rainy season when vital farming inputs should be delivered. Agricultural productivity in Zambia is low and inadequate to generate sufficient incomes for rural households. Poverty is exacerbated by maintaining only the national road network and leaving the rural road network unattended to.

The need for a revised charging system arises from the fact that the current funding levels from the NRFA are highly inadequate compared to the maintenance and development needs of the country. Proposed adjustment to funding instruments are discussed below, including mechanisms and mandates regarding the proposed adjustments.

Road Reserve Charges (RRC)

NRFA should consider introducing RRC as it is done in Tanzania in the form of billboard fees, utilities within the road reserve such as water, electricity, telephone, parking optical fibre and rent from petrol stations and other businesses using the road reserve. The Road Authority in Tanzania collects about USD 4 million per annum. RDA should prepare and issue specifications and charges for various categories of advertisements within the road reserve.

Natural gas, solar, carbon taxes and electric vehicles

The Custom and Excise law already makes provision for the collection of a fuel levy imposed on diesel and petrol sales. It would be relatively simple to widen the application of the Act to include a levy on other energy sources purchased for the propulsion of vehicles.

Toll roads

Tolling is the best method of collecting money from road users which can be used for the maintenance and development of that particular road, provided that there are adequate traffic volumes passing through the toll system to recover the collection cost, infrastructure costs, and operational costs. The current toll fees being collected in Zambia are not dedicated to the particular road section where they are being collected and hence they defeat the purpose of collecting them as they are put in the general account to be used to finance other road works including at the expense of the roads where the toll was collected. It is being recommended that two systems for tolling be introduced and be allowed run in parallel whereby to economic roads with adequate traffic be required to pay more than other roads and the amount collected be ploughed back to the same road.

Weight distance charges

Weight distance charges is also another good way to recover the cost of damage that heavy vehicles cause to the road. The success of implementation is highly dependent on the technology or methodology adopted to track the distance of vehicles. Depending on the technology or methodology adopted to track the distance, there may be a lag until sufficient revenue can be generated. The experience of tracking transit goods can be easily applied as the same device has the capability of recording the distance travelled. It is recommended to start with local and foreign transit vehicles and later on with other local trucks. In Tanzania all public service vehicles (buses) are fitted with tracking devices for controlling speed. This method can be used for levy collection.

Review of Fuel Levy

It is being proposed by NRFA that the component of the excise duty on fuel allocated to government be reduced and the component allocated to the fuel levy increased so as to generate more revenue for the Road Fund at least for three years.

Table 11 shows the fuel levy in countries in east and southern Africa converted to USD for comparison purposes. South Africa and Uganda have the highest fuel levies from the countries examined. Based on the percentage of taxes on fuel, there is some scope to increase the fuel levy in Zambia.

Table 11: Fuel levies in East and Southern Region

Country	Fuel levy national currency		Fuel levy (USD cents)		Exchange rates
	Petrol	Diesel	Petrol	Diesel	-
Tanzania	313	313	13.89	13.89	2253.97
Botswana	12	7	1.12	0.65	10.76
Namibia	114	114	7.60	7.60	15.00
South Africa	315	315	21.00	21.00	15.00
Lesotho	30	40	2.00	2.67	15.00
Swaziland	35	35	2.33	2.33	15.00
Zimbabwe	-	-	6.00	2.00	-
Kenya	18	18	17.37	17.37	103.65
Uganda	950	630	25.72	17.05	3694.33

Information received from Zambia is that the fuel levy is between 7% and 15% of the fuel price. The reason for this range is not yet clear. The petrol price in Zambia is about USD 1.375 per litre. If the levy is 15% the amount is about 20 US cents, which would be in the higher group of countries in the region, but if it is only 7% this would be equivalent to only 10 US cents per litre and should be reviewed upwards.

5.6 Summary of Findings

The Road Preservation Pyramid (Figure 7) shows the main pillars of road asset management the GEM project is addressing. The overall outcome of the asset management is to achieve sustainable development. The assessment of the financing of roads in Zambia has touched on each of the six building blocks of the pyramid.

This assignment has revealed the following:

- The framework for measuring road agency performance is still in the traditional form. It is important that the report framework include the concepts and indicators being developed by the GEM project (Refer also to GEM Quarterly Report No. 5 February-April 2018).
- A Road Condition Survey and Inventory has not been undertaken by the RDA since 2015 and never undertaken in the LAs. This has a negative impact on measures being taken to improve road condition as decisions where to make interventions and the amount of money required are not based on data. Simple tools developed under GEM can assist in alleviating the problem including determination of maintenance requirements.
- Good roads are a catalyst towards economic development. Poor infrastructure has been identified to be a hindrance towards social economic development of rural dwellers. It is recommended that all rural roads be included in the annual work plan. Concerted efforts should be applied to address bottlenecks. Indicators of economic and social impact can assist in measuring the extent to which this policy has been achieved.
- It is evident that good practice in asset management is not followed and a quick assessment has indicated that unit costs and physical performance of road works have been unsatisfactory. Once

an asset management system has been put in place, the road agencies will be able to improve their performance.

5.7 Recommendations for Policy, Strategies and Legislative Reviews

Based on the review of the funding of the road sector in Zambia, the following policy measures are recommended:

1. The policy documents developed by the Ministry of Transport should be synchronised with the road maintenance strategy targets of the RDA (Ministry of Works).
2. Maintenance of roads must become the highest priority. Timely application of maintenance on the road network will prevent the necessity to carrying out expensive rehabilitation works.
3. On rural feeder roads an appropriate strategy to support the National Development Plan is to suspend new construction and rehabilitation and concentrate on ensuring passability of the roads through maintenance and spot improvements. Spot improvements include constructing low–cost crossing structures (bridges, culverts, drifts etc.), restoring breached road sections and spot gravelling the identified low–lying and damaged road sections. The RDA and MLGH should concentrate on removing bottlenecks obstructing access in the roads in poor condition. This means that the whole network will have to be included in the plan rather than concentrating only on the CRN. This action will:
    - Save money for maintenance and ensure accessibility for the rural dwellers in order to uplift rural investment and development and enhance human and social development consistent with the poverty alleviating strategy.
    - Improve cash-flow to road agencies for road maintenance activities; and
    - Improve the efficiency and capacity of the NRFA to manage the Road Fund.
4. There is a need for concerted effort to bring down construction and maintenance costs in the market to sustainable levels by addressing the factors leading to high unit costs, such as late payments to contractors and the use of inappropriate technologies (for example heavy equipment for routine maintenance). These measures would assist in saving money that can be used for road maintenance.
5. It is recommended that only a few teams of force account brigades be retained in strategic locations to handle emergencies and not to carry out road maintenance and construction. These brigades could be used to carry out spot improvements on vulnerable sections when there are no emergencies.
6. There is a need to review the current accreditation system for contractors to ensure that contracts are only awarded to firms with the required capacity, and the National Construction Council should develop a capacity building programme for local contractors in specific maintenance interventions such as surface dressings.
7. The NRFA Act be reviewed to include the following:
    - Clarify the term “Agency” and “Board” to distinguish between the Agency as a corporate body and the Board which is the oversight body within the institution.
    - Clause 17. of the Act directs funds to be spent in (a) in the construction, maintenance and care of public roads; and (b) in road transport, traffic and safety management. It is recommended that for clarity the following additions be included: The Fund may be applied for:
        - routine and periodic maintenance of public roads;
        - road safety activities including erection of sign posts;
        - operational expenses of the Road Authority;

    - administrative expenses of the Fund;
    - research in road works; and
    - any such activities relevant to the maintenance of public roads as may be determined by the Board.

- Allocations from the Fund to the designated agencies should be based on a formula derived from among other factors, on the conditions of the public roads, maintenance requirements, the length of the road network and the relevant volume of traffic or derived from an approved maintenance management tool.
- It is recommended that at most 10% of the total road fund revenue be allocated to cater for capital works and strategic expenditures. Five percent should be allocated to cover for emergencies and the remainder be dedicated for road maintenance.
- Funds allocated for road maintenance should be tightly restricted to road maintenance works only and not used for any substantial works to improve the road standards. Capital projects and programmes should be financed from the Government Treasury and other donors (Bi-Lateral Donors and Multi-Lateral Development Banks);
- Ensure all roads in good and fair condition are immediately placed under Routine Maintenance;
- The expenditure budget should be prioritised in the following order: firstly routine maintenance then periodic maintenance and spot improvement, and thereafter, subject to the availability of remaining funds, to rehabilitation.
- Road agencies should be required to maintain and use an appropriate decision support system to prioritize the maintenance activities taking into consideration, traffic and condition of the network among other factors including socio-economic conditions. The quality of the data in the NMS will assist in the allocation of funds for the LAs as many of the inputs in the NMS form part of the allocation criteria for the distribution of funds to the LAs.
- Performance agreements should be put in place between the NRFA and the roads agencies with punitive measures for misappropriation of funds or deviating from the AWP.
- A clause should be introduced which limits the disbursement of monies from the road fund to goods and services that form part of the approved Annual Road Work Plan, except in the case of emergencies as approved by the Board.
- Include a clause allowing the Board after consultation with the Minister, to prepare by-laws to be published in the Government Gazette to impose penalties, including suspension of funding allocations to a road agency which fails to comply with the NRFA Act or regulations made under it or take such supplementary, remedial or alternative measures to ensure the performance of a road agency which persistently fails to discharge its functions under the Act.
- Include a clause to recognise the supremacy of the NRFA Act over other written laws relating to road agencies, public roads, road traffic or road safety. If any there is any provision in those acts which are inconsistent with any provision of the NRFA Act, the provisions of that law shall be invalid to the extent of the inconsistency.
- It is recommended to clarify areas where the Minister can make regulations such as those relating to financial procedures, monitoring and evaluation of the operations of the Fund, investment of surplus funds, collection of revenue, the procedure for determination of levels of road tariffs, procedures for developing road maintenance budgets, procedures for the allocation and transfer of funds to designated agencies and the control of those funds, the

structure and functions of the secretariat, details of the Annual Road Maintenance Programme, penalties for contravening the regulations, etc.[11]

8. It is recommended that RDA put its paved road network under performance-based maintenance contract. Experience from elsewhere indicates that PBCs have the potential to reduce to cost of maintenance provided that they are managed and executed properly. They are issued over a longer period (typically 5 years or more), reducing delays due to procurement associated with the traditional contracts which are revised annually. Performance based contracts guarantee pre-determined service levels for the contract duration, beneficial to both the road authority and road users
9. The RDA Act should be reviewed to include more representatives from the private sector and include a representative of MLGH.
10. Based on the huge discrepancy between the budget and certified works physical and financial performance, it is evident that contractors are not being paid timely and it is recommended that this needs to be looked into as a matter of urgency.
11. It is recommended that backlog maintenance in terms of spot improvement be included as an item that can be funded in the Act in order to allow spot interventions on roads that are in poor condition due to lack of maintenance.
12. NCC should not be allocated funds from NRFA as licenses for registration of companies and projects are sufficient to generate the revenue required to fulfil their mandate. In Tanzania, the Contractors Registration Board does not obtain any subvention from the government and are able to carry out their mandate without any difficulty.
13. It is recommended that the relevant Acts be amended to include the clause requiring that all senior staff of the roads agencies must be to be recruited on a competitive basis.
14. It is proposed that implementing agencies be required by law to prepare multi-year programming for maintenance activities in order to avoid a complete stop-start approach at the beginning and end of each financial year.
15. To control over-commitments, over-expenditures and diversion from the approved plans it is recommended that NRFA procures an integrated financial management system such as Epicor that has been used successfully in East Africa whereby all procurement requisitions and payments originate from the system. The computerized financial management systems (IFMIS) can significantly improve governance by providing real-time information that managers can use to administer road works programmes effectively, formulate budgets and manage resources. The system is characterized by extensive financial controls: not only would this help NRFA to gain effective control over their finances but would enhance transparency and accountability, reducing political discretion and acting as a deterrent to corruption and fraud. With this system no payments and requisitions can be allowed to pass through if they have not been approved by the NRFA. In this system all road works and administrative activities are given respective votes with budget ceilings. The system functions in such a way that one cannot “overdraw” from budget funds. Quarterly commitment forecasts are backed by monthly cash forecasts. Payment vouchers would originate from the implementing agencies, but payment can be done by NRFA.

    To compliment this system, it is recommended that cash budget be introduced in Zambia. Cash budgeting is a system that imposes strictness on current and capital expenditures whereby current expenditures are not allowed to be used for capital expenditures and vice versa. It brings spending into line with resources by limiting expenditures to revenue and therefore prevention of payment arrears. Funds are released based on Annual Procurement Plans and Annual Cash Plan. In many countries it has been used to restore fiscal discipline and macroeconomic stability. In This case,

[11] Clause 22 of NRFA Act allows The Minister by statutory instrument to make regulations for the better carrying out of the purposes of the Act.

NRFA will allow RA (vote holders) to spend monies from their votes only to the amount it releases every quarter.

16. Reporting format should be overhauled to provide as much detail as possible to allow NRFA measure performance. The format being used in Tanzania can be used as an example of good practice.
17. It is recommended to review the institutional arrangements for rural roads and consider the establishment of the Rural Roads Agency as is the case with Kenya and Tanzania.
18. It is recommended that a new allocation formula for the road fund be developed based on objective and transparent criteria amongst road agencies.
19. New sources of revenue should be considered including a revision of the current RUC system.

5.8 Guidelines for Accessing Funds

Currently there is no Guideline used by LAs to access funds and implement road works activities. Such a Guideline would help technical staff to plan and implement maintenance activities smoothly and efficiently. It would assist all LAs to have a common understanding on maintenance and monitoring techniques. The Guideline would provide requirements for the preparation of the Budget and Approval Process Overview for commitment of expenditure before the start of a financial year. It should emphasise the following:

Preparation of Road Maintenance Programmes.

Each LA is required to prepare a Road Maintenance Programmes which shall be reviewed by the NRFA Board in order to determine—

(a) the affordability of the programme; and

(b) the appropriateness of the amounts allocated in the programme for each class of roads.

Each LA is required prepare the following plans in such form and containing such details as may be prescribed by the Board in the guideline. :

- Annually, and at least three months before the start of each financial year: Prepare an Annual Road Maintenance Programme;
- Every three years: Prepare a three-year Road Maintenance Plan; and
- Every five years: Prepare a five-year Road Maintenance Plan.

The Guideline should provide for a committee in each LA comprising key stakeholders to scrutinise the plans before they are submitted to NRFA. The committee should have such powers and perform such functions as are conferred on it by regulations in the Act and elaborated in the Guideline.

Guideline Format

The Guideline may consist of the following Format:

Chapter 1: Introduction

The introduction covers background, purpose and important definitions of road Interventions to include such things as routine maintenance, bridge maintenance, spot improvement, emergency works, periodic maintenance, rehabilitation, development, upgrading and backlog maintenance.

Chapter 2: Targets and Policy Directives

This chapter explains targets and policy directives. The targets are set annually and policy directives are set for planning, implementation, monitoring and evaluation. Performance and quality targets are set to be followed by LAs. Maintenance standards will also be referred in this section.

Chapter 3: Planning

This chapter describes the planning processes which include budget preparation and annual, medium and long-term plans. It also specifies the requirement of Annual Road Inventory and Condition Survey which

become the basic data for planning. Innovative approaches to road maintenance are also included. The chapter will also provide guidelines for prioritizing works and the importance of preserving the roads asset.

Chapter 4: Procurement

This chapter describes three phases in the process of procurement as detailed in the procurement law including packaging of works, preparation of tender documents and advertisement, and evaluation and contract award.

Chapter 5: Implementation

The roles of a LA engineer as project manager and requirements of handing over and preparation of final project accounts are specified in this chapter.

Chapter 6: Monitoring and Evaluation

The chapter provides engineers in the LA with guideline criteria for M&E of road works projects in the LA. To make the M&E exercise efficient and effective, standard forms will have to be prepared. This section will also include a description of how to use a value for money monitoring instrument.

In preparation of the submission to the NRFA the Technical Staff will take into consideration policy, targets and technical specifications and other requirements that will be included in the Guideline.

6 PhD Progress Report - Establishing the true value of low volume rural roads in low income countries

6.1 Important Details

Institution	University of Birmingham
Program	PhD
Title	Establishing the true value of low volume rural roads in low income countries incorporating social benefits
Supervisors	Dr. Michael Burrow, Dr. Gurmel Ghataora
Student	Kakiiza Kagaba Robert
Location	Uganda / United Kingdom
Type of study	Split site study
Duration	Mandatory 3 years, Maximum 4 years (9/11/2016 – 9/11/2020)

6.2 Introduction

This research seeks to address the gap in prioritizing maintenance or improvements to rural roads using value as an indicator or reference measure for prioritizing sections of the network and as a suitable means of motivating a strong case arguing for funds for rural maintenance where social benefits are significant.

The literature review shows that research has attempted to link the improved performance in road asset management to improved economic and social benefits for local communities in rural areas (GEM, 2017). Different methods have been adopted over the years to valuate social and economic benefits mainly in other sectors other than roads. There is a need however to develop methodologies which can be used to monetize the social benefit of rural roads so that it can be included in cost-benefit analyses along with the calculated economic benefits.

In addition to social and economic benefits, rural roads can be valued in terms of the physical assets which they contain (e.g. carriageway, drainage, utilities etc). Consequently, it is possible to conceive a valuation of the benefits (and cost) of a rural road to consists of the monetized social and economic benefit together with the physical value of the assets of the road. Such an approach would provide a means by which rural road assets managers could argue for funds and enable the maintenance of rural roads to be prioritized in a transparent and equitable manner.

Accordingly, this PhD research is based on an investigation of the true value of rural road asset in low income countries and its eventual use in arguing for funds for maintenance and upgrading of rural roads as well as in prioritization of funding where maintenance budgets are insufficient. The true value of rural road asset combines both the structural (physical) value of the road and monetized social economic value of the road asset.

This PhD study is based on a split site type of study program. This entails carrying out the research from Uganda, supplemented by fortnightly supervision meetings by Skype and up to six months over three years at the University of Birmingham.

6.3 Aims

The aim of this study is to develop a theoretical model that can establish the true value of low volume rural roads in low income countries incorporating social economic benefits.

6.4 Objectives

To meet the above aims, the research has a number of objectives as follows:

i. Determine the components of true costs and benefits of low volume rural roads via a review of the literature and from stakeholder consultation

ii. Explore, means of valuing the true costs and benefits of roads in term of the physical, economic and social benefits and costs from road investment.

iii. Develop a framework for valuation which monetizes costs and benefits

iv. Demonstrate the use of the model using case studies from Sierra Leone, Uganda and Zambia

6.5 Progress Report

The following activities have been completed:

1. Project planning;
2. Literature review using systematic review;
3. Methodology has been drafted;
4. Preliminary (baseline) data collection for Kamuli district completed and data analysed;
5. Repeat surveys were concluded; and
6. 3 months and 9 month progress assessments made.

The following activities have started and are ongoing:

1. Analysis of repeat surveys;
2. Continuous review of the questionnaire to capture more data;
3. Collection of more data to enhance the PhD requirements;
4. Modelling the valuation criteria;
5. More analysis of data to be collected;
6. Proposed study visit to Sierra Leone and Zambia;
7. Two planned conferences or workshops;
8. Thesis writing; and
9. More visits and consultations at University of Birmingham.

6.6 Other related activities

1. Coordinating GEM activities alongside Kamuli District and UNRA teams in Uganda;
2. Supporting GEM in project implementation in Kamuli district and the proposed neighbouring districts in data collection, analysis and community sensitisation and training; and
3. Durban conference paper preparation and presentation.

6.7 Conclusion

This quarter has been very productive following a fruitful visit to Birmingham, completion of the mandatory 9 months review report and assessment and eventually the repeat surveys for Kamuli District. New ideas of literature review using systematic review process were discussed and agreed, reporting formats agreed and a number of lectures attended at the University during my recent visit.

There is light at the end of the tunnel that an acceptable procedure of valuation of social benefits will be reached. Current trend analysis indicate correlation between the road condition and social impacts on communities using the road. Analysis has been made in areas of health, education, agriculture, trade, transport, housing and recreation.

Equally challenges have been met mainly in finding relevant data on valuation of social benefits relating to rural roads, modelling valuation parameters and equally important conceptualizing the valuation process. Time seems to be the worst factor as it tends to move faster than expected, though it is standard. There will be need to allocate more time to these studies.

The author would like to acknowledge the support provided by the course supervisors during visits to Birmingham and out of station activities, and knowledge obtained from GEM team members through many interactions, field visits, workshops and emails.

The author would also like to thank ReCAP for financial support and sharing of GEM data for the PhD research. The financial support has facilitated attendance at conferences and visits to the University of Birmingham and receipt of a regular stipend.

7 PhD Research Progress Report - A probabilistic tool to calculate short and medium-term rural road network condition as a function of maintenance expenditure.

7.1 Important Details

Institution	University of Birmingham
Program	PhD
Title	A probabilistic tool to calculate short and medium-term rural road network condition as a function of maintenance expenditure.
Supervisors	Dr. Michael Burrow, Dr. Gurmel Ghataora
Student	Peter Kome
Location	Sierra Leone / United Kingdom
Type of study	Split site study
Duration	Mandatory 3 years, Maximum 4 years (6/3/2017 – 6/3/2021)

7.2 Aim and Objectives

7.2.1 The Aim

The aim of the research it to develop a computer-based tool to predict the condition of rural road assets (pavement and drainage assets) under different maintenance budget scenarios and to facilitate risk based maintenance.

7.2.2 The Objectives

The research has a number of objectives (described in the August – October progress report). These objectives are given below together with comments on the progress towards achieving them to date.

i. To explore the literature on asset management systems with a view to identifying an appropriate approach for rural asset management.

Progress to date: Substantially complete. With additional work done so far, a probabilistic model, with deterioration based on Markov Chains continues to be the most appropriate (see Section 2 in November 2017 – January 2018 report).

ii. To identify the major components of a rural road which require maintenance (by cost).

Progress to date: Completed. For purpose of the GEM project, the following components of rural roads had already been identified as cited in my November 2017 – January 2018 report:

a) Carriageway (Materials and Construction type);

b) Drainage; and

c) Culverts (bridges are being left out of our study).

iii. To understand how the major components, deteriorate over time.

Progress to date: Completed. The progress made with this objective is described in section II A.

iv. To explore the literature to identify suitable deterioration models for each of the components identified in objective ii.

Progress to date: Substantially completed. From the literature, several deterioration models were reviewed. However, the preferred model identified for this work is the Markov Chain deterioration model (see Section I A).

v. By means of exploring the literature and consulting with asset managers of rural networks in SSA, develop a concise and structured framework for predicting the total future maintenance requirements over a given planning horizon, for a rural road network.

Progress to date: Complete. The approach identified is described in the draft paper (see sections 2).

vi. Test the developed framework with data collected from three rural road agencies

Progress to date: Ongoing. Currently working on resizing the present 5,000m long road segments into 200m segments for better analysis of the Tonkolili road network deterioration.

As the research progresses objective v) above will be expanded to include the concept of risk-based maintenance.

7.3 SARF/PIARC Conference Durban October 2018

A paper has been submitted to the conference as follows:

A Conference on the Theme: FA1 – Road needs and financing mechanisms: A Stochastic Model for Rural Road Maintenance

A paper authors: Kome, P.S., Ghataora, G.S., Burrow, M.P.N of School of Engineering, University of Birmingham, UK

Abstract - Rural road maintenance in Sub-Saharan Africa is underfunded as the benefits are less tangible than investment in building new roads or funding strategic or national road development. As a result, investment in rural road maintenance is often inefficient, not transparent and motivated by non-needs driven factors. This is having a significant effect on the socio-economic development of rural communities. To ameliorate this, there is a need to present the benefits of rural road maintenance in a concise, transparent and straightforward manner that is meaningful to politicians and senior decision makers.

The research describes work that was carried out to develop a probabilistic tool which is capable of determining the effects of maintenance on road asset condition over time at the network level under budget constraints. The tool consists of Markov based rural road asset deterioration and maintenance effects models. These have been determined as a function of climate and traffic for a variety of assets and geo-environments in the region. The robustness and viability of the tool is demonstrated via data collected from three Sub-Saharan countries.

7.4 Other Activities

Within the period under review support has been provided to the GEM Sierra Leone team to undertake preparatory training of all newly elected local government officials on the progress the GAT experts had in terms of:

1) Training the new local council authorities using the lecture notes and slides of the GAT on:

   a. Understanding and continuing to use the existing Self-Assessment Questionnaire.

   b. Understanding the asset management pyramid and the importance of each building blocks.

   c. Appreciating the past achievements under the GEM project and committing to continue.

   d. Getting the SLRA Feeder Roads Department with the approval of the authority's management to act as surrogate local council administration to guarantee uptake of the knowledge gained from the GEM project.

2) Repeat of the socio-economic surveys across all ten market centres.

3) Repeat of the road asset condition survey including drainage structures on the 250Km GEM rural road network, using 200m road segments instead of the previous 5,000m segments.

Other activities included writing of a ReCAP sponsored Blog for SLoCaT concerning additional money and commitment needed to develop and maintain rural road networks and transport services and assistance

with the collection of video footage for the same. Contributions were made to a Twitter campaign and development of a video.

7.5 Planned Activities

The following activities are planned in the next three months:

- Continue with literature review.
- Continue to work on the draft conference paper while waiting for feedback from the conference organisers, especially in the areas of the quality of the road conditions data, the data analysis using the model, and the discussion (which needs detailed review after a re-run of the model).
- Progress with the ongoing continuous adjustment and development of the deterioration models (focusing and those which allow for drainage futures).
- Visit to UoB for two months from October 2018 to November 2018.

7.6 Acknowledgements

The proposed work described in this report forms part of the PhD research programme which is part of the GEM project under RECAP (Project No. 10636A GEN2018A). The work is carried out under the supervision of the University of Birmingham under the co-supervisorship of Dr. Michael. P. Burrow and Dr. Gurmel Ghataora. Valuable data is being obtained through the support a team of GEM colleagues and partners supervised by the professional GEM Advisory team leads (GAT). The financial support of DFID through ReCAP as main sponsor is also gratefully acknowledged.

8 Current Project Status and the Way Forward

8.1 Current Status of the Project

The current status of the GEM project is summarised as follows:

- The participating roads agencies have increased confidence in the implementation of the procedures introduced under GEM including the RAM self-assessment questionnaire, collection of road inventory and road condition monitoring data;
- On the whole, all agency staff that the project has been in contact with have grown in stature and self-confidence and are visibly making a difference in their areas of influence. This will, in the medium term to long term, result in the development of new champions who will promote sustainable road asset management practices in the road sectors of participating countries;
- There is an increase in awareness of the importance of adopting a holistic approach to road asset management, including effective national and local level policies for rural roads and political support or the sector;
- The participating roads agencies have increased awareness of the importance of consulting with local communities and road user groups - support is being provided through the GEM project to develop the tools needed to achieve this;
- Appropriate indicators have been developed for assessing the impact of rural road conditions on the local economy and the welfare of communities and data is being collected routinely in the project areas;
- Preliminary analysis of the social and economic data is contributing to the general understanding of the dynamics of rural transport and the role of rural roads;
- Progress with the physical implementation of road maintenance works and capacity development in managing road maintenance operations has been affected by inadequate funding for rural road maintenance in the participating countries - the GEM project is developing guidelines of good practice that can be applied at the national level to overcome this constraint;
- The GEM project has provided a platform for two PhD degree study programmes at the University of Birmingham;
- The GEM project has provided material for two technical papers submitted to the SARF/IRF/PIARC Regional Conference for Africa to be held in Durban in October 2018; and
- There is increasing interest within the participating countries to extend the GEM approach to other district roads agencies. The GEM approach can be adapted to any rural roads agencies and, with sufficient time and resources, the project can readily be expanded to additional new countries.

8.2 The Way Forward

The following tasks are expected to be carried out in the next reporting period:

- Follow-up visits to Tanzania to assist them to become fully established as a GEM participating country;
- Communications activities in Chongwe municipality in Zambia to raise awareness of the importance of reliable rural access;
- The Project Implementation Team (PIT) meeting in Zambia in November 2018, when each participating road agency will present the status of their current performance in rural road asset management;
- Preparation of the first draft of the GEM “Guideline for Rural Road Asset Management”, which is a key output of the project;
- Possible expansion of the GEM project to three districts bordering Kamuli District in Uganda; and

- Possible expansion of the GEM project to all 31 districts of Sierra Leone.

The PIT meeting will be a stand-alone event (not part of another conference). It will take place in Zambia from 19th to 23rd November and will include a site visit to Chongwe Municipality where the tractor-based maintenance pilot project is expected to be in operation. The meeting will discuss all aspects of road asset management including the financing challenges and optimising the use of available resources. A mini-workshop will be held on the organisation of road maintenance operations.

CSIR is currently finalising a methodology for assessing climate vulnerability of rural roads. The GEM project team is planning to discuss with CSIR whether a basic level of assessment for local roads agencies which can be carried out as part of their road asset management. It is unlikely that this aspect could be incorporated in the 2018 round of data collection, but it could be incorporated in the process in 2019 if the GEM project is extended.

The ReCAP Project Management Unit (PMU) is considering whether the GEM project could be extended until the end of the current phase of ReCAP in mid-2020. The main concern of the PMU is that the project may not be able to achieve all of its intended objectives as a result of maintenance funding not being allocated to the GEM road networks in the participating countries.

The risks that have been identified to the successful achievement of the project objectives are summarised in Table 12 along with suggested mitigation measures.

Table 12: Project Risks and Mitigation Measures

Risk	Mitigation Measures
Inadequate funding allocations for road maintenance prevents participating agencies from implementing maintenance works on GEM project networks.	• Extend the GEM project to ensure agencies continue to improve in other areas of road asset management and more districts take up the GEM approach, hence more voices will eventually result in the appeals for more funding being heard (there is a strong demand to extend the GEM project to other districts in Uganda, Zambia and Sierra Leone). • Increased lobbying at higher levels for more funding for maintenance through External Communications. • Prepare best practice guidelines for funding of rural road maintenance. • Extend GEM project network to cover all roads in the district that receive maintenance.
Weak capacity in the participating countries prevents the roads agencies from achieving their Action Plans and performance targets.	• Additional training in road asset management for agency staff. • Increase the profile of the peer review process between the participating countries. • Involve additional districts in each country to create an internal peer review process. • Extend the duration of the project to provide more time for capacity development.
High staff turnover in district roads agencies.	Prepare a Road Asset Management Guideline clearly describing the performance assessment procedures and the indices developed under GEM for use by new staff (this is already a planned project output).
Inadequate funding of Communications activities at the district level.	Identify and implement low cost communications activities based on the GEM experience in Zambia.

In summary, notwithstanding the successes attained on the project so far, they can best be described as “a road partially travelled”. In looking to the future, it is expected that the increased financing of rural road maintenance will improve in the participating countries in 2019 following increased engagement on financing issues in the participating countries. This will provide an opportunity to focus more on other building blocks of the Road Preservation Pyramid (RPP) such as the Management and Operation building blocks, which consider the use of the funding by the roads agencies. However, The GEM project is currently due to close in April 2019. Should this be the case, then it is likely that such opportunities to consolidate on past successes will not materialise. For this important reason, it is recommended that project should be extended for another year to April 2020) to allow for a fourth round of data collection (and analysis), training of more road agency personnel, including those in new participating districts, and to consolidate the gains that have been made under the current phase of funding for the project. It would also be possible during the extension period, to explore mechanisms for expanding the GEM to other countries based on the experience with the extension to Tanzania.

Annex 1 C Lema Sierra Leone Visit Programme and People Met

Programme of Visit

Itinerary	Date	Issues Discussed
Arrival in Freetown	4/6/18	
Introductory meeting with Deputy DG and other staff of SLRA in Freetown. Meeting with SL Road Maintenance Fund Administration (RMFA) Travel to Tonkolili District	5/6/18	• Purpose of the visit and overview of progress in the implementation of GEM socio-economic component in Tonkolili District. • Monitoring and Evaluation of rural roads maintenance investment in Sierra Leone
Meeting with the new Chairperson and other staff of TDC. Working session with the GEM project team for socio-economic study (TDC & SLRA).	6/6/18	• Introduction of the GEM project and purpose of the visit, progress in the implementation of the socio-economic component. • Review of repeat survey data and discussion of preliminary analysis results.
Field visit to Manasi Trading Centre on Makoni – Manasi road. De-briefing session with the TDC/SLRA team Travel back to Freetown	7/6/18	• Establish physical progress on maintenance and perception of local communities on impacts. • Establish the next steps & plan for interventions
Departure	8/6/18	

List of People Met

Name	Designation/Organisation
Dr. Sahr Gbembo	Deputy Director General, SLRA
Mr. Daniel Wisman	Director of Development, SLRA
Mr. Hassan A. Turay	Director of Administration, SLRA
Mr. Vandy French	Director of Operations, SLRA
Mr. Yayah Conteh	Director of Mechanical Services Unit, SLRA
Peter S. Kome	Director of Feeder Roads, SLRA
Tamba Amara	Snr. Engineer, SLRA
Lucy T. Essa	Snr. Environmental Officer, SLRA
Patrick J. Lavalie	Environmental Engineer, SLRA
Samuel J. Macauley	Feeder Roads Engineer, SLRA
Mohamed Lahai	District Engineer – Tonkolili, SLRA
Sallieu Komeh	Works Engineer, TDC
Abul Aziz Sesay	Assistant Engineer, TDC
Yabom Sesay	Chairperson, TDC
Gbamuru Sillah	Ag. Chief Administrator, TDC
Richmond Sesay	Director of Planning, RMFA
Rugiatu Koroma	Head of Monitoring & Evaluation, RMFA
Mohamed Timbo	Civil Engineer, RMFA
Yassin Bangura	Trainee Civil Engineer, RMFA
Clifford Williams	Finance Manager, RMFA
Terrence Williams	Head of Public Relations, RMFA

Annex 2 Visit to Uganda - Programme and People Met

Programme of Visit

Day	Activity	Participants
Mon 23 July 2018	Travel to Kampala	GEM Team
Tue 24 July	Working meetings/interactions with UNRA in Kampala: • Objectives of Visit • Review of Monitoring Report • Discussions on Funding of Projects • Discussions on Future GEM Project needs • Updating of GEM Work Plan	UNRA Staff, GEM Team
Wed 25 July	**a.m.** Travel to Jinja **p.m.** Working meetings/interactions with Jinja Station staff: • Objectives of visit • Road Condition Monitoring • Use of in-House Equipment • Socio-economic data impact analysis • Discussions on Future GEM Project Needs • Site Visit	UNRA Staff, GEM Team Jinja Station Staff, GEM Team
Thurs 26 July	Working meetings/interactions with Kamuli staff: • Objectives of visit • Requests for Funding from Road Fund • Road Condition Monitoring • Use of in-House Equipment • Socio-economic data impact analysis • Discussions on Future GEM Project Needs • Updating of GEM Work Plan • Site Visit Travel to Kampala	Kamuli Staff, GEM Team
Fri 27 July	**a.m.** Wrap-up meeting at UNRA. **p.m.** Meeting with URF: • URF/Councils Mandates • Funding History - Kamuli • URF Planning Processes • Funding Requests – Format & Calendar • Monitoring and Reporting • Possible Links with GEM Project	GEM Team, UNRA GEM Team, URF Staff and TA
Sat 28 July	GEM Team Departs	GEM Team

List of People Met

Name	Designation/Organisation
Dr. M.H. Rubarenzya	Head, Research & Development Dept. UNRA
Dr. Emmerentian Mbambazi	Research Fellow, Research & Development Dept. UNRA
Dr. Leah Musenero	Research Fellow, Research & Development Dept. UNRA
Asio Bernadette	Client Care, UNRA
Angella Muganga	Client Care, UNRA
Owauhanga Bullua	Client Care, UNRA
Janet Awor	Client Care, UNRA
Maureen Okeny	Client Care, UNRA
Ogwal Francis	Intern, UNRA
Natohom Caroline	Intern, UNRA
Diana Akengo	Intern, UNRA
Isaac Menya	Manager Network Planning, UNRA
Doreen Kafuza	Network Technician, UNRA
Muzahle Richie	Road Maintenance Engineer, UNRA Jinja
Eng Robert Kakiiza	UoB PhD Student
Eng. Dinah Nakombe	Station Manager, Jinja Station UNRA
Denga Cosmos	Road Maintenance Technician UNRA Jinja Station
Edobo Collins	Road Maintenance Technician UNRA Jinja Station
Solomon Mpanga	University student intern at Jinja Station
Eng G. Mulondo	District Engineer, Kamuli District Council (KDC)
Eng D. Mufumba	Assistant District Engineer
Robert Isabirye	Head of Department, Natural Resource Office, KDC
Eng Andrew Kagoda	Manager Monitoring and Evaluation
Eng Justine Ongom Odongo	Programme Officer National Roads
Jeff Falconer	Team Leader TA to URF
Stephen Vincent	TA to URF

Annex 3 Visit to Zambia by Africa Road Financing Expert

List of People Met

Name	Designation/Organisation
Eng. Presley Chilonda	Principal Engineer, Roads Development Agency, RDA
Mwata Sekeseke	National Coordinator, Improved Rural Connectivity Project
Shilambwe Mwaanga	Assistant Director, Macroeconomics, Ministry of Finance
Benjamin Shawa	Economist, Economic Forecasting and Modelling, Ministry of Finance
Nkumbu Siame	Director, MLGH
Eng Dickson Ndhlovu	Director, Planning and Design, RDA
Morgan Chiselebwe	Director Finance, NCC
Eng. Yohane Tembo	Director, Programming, Monitoring &Evaluation, NRFA
Chunky Kanchele	Head Statistics and Research, RTSA