



**AfCAP**  
Africa Community Access Partnership



# Economic Growth through Effective Road Asset Management

Final Formulation Phase Report



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Cover Image: The Road Preservation Pyramid (Pinard et al, 2016)

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## ReCAP Completion Report Template

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## **Abstract**

The Africa Community Access Programme (AFCAP) is funding a research and capacity building project on asset management for rural roads. The purpose of the project is to achieve economic and social benefits for local communities in rural areas as a result of improved performance in road asset management.

The project will provide technical assistance to achieve improvements in asset management performance on a selected network of rural roads in the participating regions. The performance will be measured annually against a new framework for rural road asset management that is being developed as part of the study. Measurements will also be taken of the road network condition and the impact of the road condition on the rural economy. These data will be discussed at annual stakeholder meetings in the project areas and regionally. They will be used as part of an influencing strategy to achieve home-grown and sustainable improvements to the management of rural roads.

The Final Design Report marks the culmination of the Formulation Phase of the project. During the Formulation Phase the geographical research areas and research project partners have been identified, and the detailed methodology for the project has been finalised. The methodology includes a system for monitoring and evaluation of the project.

The draft Design Report was presented at a stakeholder workshop held in Mombasa, Kenya on 15<sup>th</sup> March 2016. Comments received during the workshop have been incorporated into the final design.

Sierra Leone, Zambia and Uganda are recommended for participation in the project. The Western Cape of South Africa will also participate as benchmark for best practice in rural road asset management. A second option is proposed which would include Ethiopia as a fifth country. This would reduce project risks and broaden its impact. The second option includes participation of all 11 AFCAP member countries in the annual meetings of the project technical steering group (the Project Implementation Team). A third option would include Sierra Leone, Zambia, Uganda and the Western Cape, with all AFCAP member countries attending the PIT.

## **Key Words**

Rural Roads, Maintenance, Asset Management, Capacity Development

## **Acronyms, Units and Currencies**

\$	United States Dollars
AFCAP	Africa Community Access Partnership
AM	Asset Management
ARMFA	African Road Maintenance Fund Association
ASCAP	Asia Community Access Partnership
BADEA	Arab Bank for Economic Development in Africa.
CDS	Civil Design Solutions
DFID	Department for Further International Development
DM	District Municipality
GDP	Gross Domestic Product
GPS	Global positioning system
IAMM	Infrastructure Asset Management Manual
ILO	International Labour Organization
IQL	Information Quality Level
LVR	Low Volume Road
PMU	Project Management Unit
PO-RALG	President’s Office – Regional and Local Government
RAI	Rural Access Index
ReCAP	Research for Community Access Partnership
RI	Roughton International
SDG	Strategic Development Goal
UK	United Kingdom (of Great Britain and Northern Ireland)
UKAid	United Kingdom Aid (Department for International Development, UK)
UoB	University of Birmingham

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## **Executive Summary**

The Africa Community Access Programme (AFCAP) is funding a research and capacity building project on asset management for rural roads. The purpose of the project is to achieve economic and social benefits for local communities in rural areas as a result of improved performance in road asset management. As the contracted managers of this DFID funded project, Cardno Emerging Markets has signed a contract with Roughton International Limited (RIL) to provide technical input and project management services for the project.

Three countries from sub-Sahara Africa will participate in the project and a fourth country, with a high level of proficiency in rural asset management will provide a benchmark for best practice. If the project is successful it is expected that there will be subsequent phases which will enable the participation of additional countries.

It is evident from literature review, discussions with stakeholders and feedback from key informants that there are very few examples of sustainable rural road asset management currently operational in sub-Sahara Africa. Rural road maintenance in sub-Sahara Africa tends to be characterised by a poor maintenance culture, inadequate human resources and funding, reliance on inappropriate technologies, poor quality control, mismanagement and corruption. Where examples of good practice exist they tend to be on donor-funded programmes with high levels of technical assistance, but these initiatives tend to flounder when the donor support is withdrawn.

As a result of the low existing capacity in rural roads agencies a highly innovative approach is required to achieve meaningful results. It is necessary to build a maintenance culture in the participating countries. This will be achieved through an evidence-based approach to changing the mind set of policy makers and targeted technical assistance at the implementation level. The performance of the participating roads agencies will be measured against a new framework for evaluating road agency performance in rural road asset management that is being developed as part of the study. The output of this evaluation will be used as a basis for discussing with participating countries what can or should change to improve the ability of the roads agency to perform in a more effective and efficient manner. The findings of the evaluations will be discussed with road sector stakeholders in the project areas and in regional meetings of the participating countries as part of an influencing strategy to improve performance in road asset management and,

The project approach is highly innovative. It will create incentives for road managers to improve their performance by having to answer to road users and their peers. Simple indicators of the importance of roads will be used to influence government decision makers to direct more resources to rural road maintenance.

ultimately, to achieve home-grown and sustainable improvements to the management of rural roads.

A baseline of the performance monitoring data will be collected in the four project areas at the start of the implementation phase. The same data will be collected after one and two years in order to measure any changes in road asset management performance. The participating roads agencies will be responsible for the collection of the data and self-assessment of their performance. Technical assistance will be provided to agency staff to develop and implement a Capacity Development Plan. The technical assistance will include staff training and mentoring and preparation of technical guidelines as required.

This Design Report marks the end of the Formulation Phase. It follows the submission of the Mobilisation Report in December 2015 and the Inception Report in January 2016. The project will proceed to the Implementation Phase upon acceptance by the AFCAP PMU of the recommendations of this report.

This report includes proposals for the selection of geographical research areas where the project will be implemented. The country selection process identified Sierra Leone, Zambia and Uganda as being best placed to participate and most likely to fulfil the project objectives. The Western Cape of South Africa will also participate as benchmark for best practice in rural road asset management. A second option has been proposed which would include Ethiopia as a fifth country. This would reduce the project risks and broaden its impact. The option to include Ethiopia also includes participation of all AFCAP member countries in the annual meetings of the project technical steering group (the Project Implementation Team - PIT). A third option would include Sierra Leone, Zambia, Uganda and the Western Cape, with all AFCAP member countries attending the PIT.

The framework for assessing performance in road asset management and the tools for monitoring road condition and social and economic impacts will remain in draft form until they have been field tested over at least two iterations in the project areas. The development of these tools is part of the research project.

According to the Terms of Reference the overall duration of the project is 27 months, of which 5 months comprise the Formulation Phase and 22 months the Implementation and Dissemination Phases. However, it is expected that more time will be required to achieve meaningful results given the current immaturity in asset management in the participating countries. Therefore, it is recommended that the implementation and dissemination period of the project should be extended to 29 months, thus allowing two years for implementation with sufficient time for effective dissemination of the project findings and lessons learned.



## **1 Introduction**

### **1.1 Background to the Project**

Cardno Emerging Markets is managing a programme of Research for Community Access (ReCAP) on behalf of the Department for International Development (DFID). The programme includes research and capacity building activities in Africa (Africa Community Access Programme – AFCAP) and Asia (Asia Community Access Programme – ASCAP). Cardno has signed a contract with Roughton International Limited (RIL) of UK to provide consultancy services for the delivery of a regional research project on improved management of rural roads.

The project is known as ‘Economic Growth through Effective Road Asset Management – GEM’ and will initially be implemented in sub-Saharan Africa as part of AFCAP. The consultancy contract is for a five-month period covering the formulation and detailed design of the project. If the Formulation Phase is successful, the project will proceed to implementation.

### **1.2 Purpose of this Report**

This report includes details of the proposed research methodology for implementation of the project. The research methodology must be approved by the AFCAP PMU before the project can proceed to implementation. The draft Design Report follows the Inception Report, which was submitted in January 2016. The Inception Report included a summary of the findings of the review of existing rural roads asset management practice, and initial proposals for the monitoring tools to be used to measure and monitor performance in road asset management in the project areas. The draft proposals contained in the Inception Report were discussed by the study team at a two-day meeting in Dar es Salaam in February 2016. They also reflect feedback from the project stakeholder workshop held in Mombasa in March 2016. A summary of the Dar es Salaam discussions is included in Annex C. The Mombasa Workshop Report is in Annex E.

### **1.3 Country Selection**

The review of existing road asset management practice in African countries is included as Annex B to this report, with a summary of the findings in Chapter 2. The review provided no compelling reasons to select one country above another to participate in the project. All countries that were considered were at an early stage of adopting professional asset management practice, aside from South Africa. This confirmed the recommendation that all AFCAP participating countries should be given an opportunity to participate through an open invitation for proposals.

At the end of February 2016 the AFCAP PMU sent letters of invitation to all AFCAP participating countries<sup>1</sup> requesting their proposals for participation. The letter of invitation is included in Annex D. A summary of the evaluation of proposals is included in Chapter 8 of this report.

Meanwhile it has been agreed with the ReCAP PMU that the Western Cape Province of South Africa should participate in the project as an example of good practice in road asset management. An exchange of letters has been completed between the ReCAP PMU and the Western Cape government confirming their participation.

#### **1.4 Outline of Methodology for Project Implementation**

The methodology for implementation of the project, as described in this report, includes the following:

- Project Purpose, Objectives and Approach
- Rural road asset management performance monitoring tools:
  - Framework for self-assessment of performance
  - Road network condition measurement
  - Indicators of social and economic impacts of rural roads.
- Technical assistance to participating roads agencies
- Project Implementation Team
- Work Plan for the Implementation Phase
- Inputs by the Project Team
- Monitoring and Evaluation
- Dissemination of research findings.

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<sup>1</sup> Invitation letters were sent to DR Congo, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Sierra Leone, South Sudan, Tanzania, Uganda and Zambia.

## **2 Project Purpose, Objectives and Approach**

### **2.1 Purpose**

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.

### **2.2 Objectives**

The objectives of the project are as follows:

1. 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.
2. Develop a framework for measuring performance in road asset management appropriate to sub-national rural road networks and apply it in selected project areas.
3. Develop simple and appropriate tools for monitoring road condition and apply them in the project areas.
4. Develop simple indicators of economic and social impact of rural roads and monitor them in the project areas.
5. Achieve incremental (and measurable) improvements to asset management performance in the project areas over a three-year period.

### **2.3 Approach**

The approach to the project is intended to foster self-reliance in road agencies in the project areas and 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 destinies. 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 will be provided through demand-led technical assistance funded by UK Aid through AFCAP.

It is intended that the project will establish close links with the Africa Road Maintenance Fund Association (ARMFA)<sup>2</sup>. If the project is successful there is a possibility that AFMRA will take responsibility for the wider roll out of the project approaches across the Africa region.

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<sup>2</sup> Collaboration between the project and ARMFA was agreed in principle at a meeting with the current President of ARMFA in Addis Ababa on 26th February 2016.

## **2.4 Project Phases**

The project is being implemented in phases. The current consultancy contract covers the 5-month Formulation Phase. During this phase the project team has developed a detailed methodology for implementation of the project. If the recommendations of the Formulation Phase are accepted by the AFCAP PMU it will be followed by the Implementation Phase. This will include periodic monitoring of asset management performance in the participating project areas, sharing of the outcome of the monitoring between the project areas and technical assistance to improve current practices. Dissemination of the research findings will take place in parallel with the implementation and at the end of the project.

Project Objective 1 (Desk Study) has been achieved during the Formulation Phase. Objectives 2 to 4 have been partially achieved during the Formulation Phase, with the performance monitoring tools further refined during the implementation phase. Performance targets for the fifth objective will be established during the initial phase of the implementation period as part of the road agencies Capacity Development Plans. The approach to monitoring road agency performance are described in detail in Chapters 4, 5 and 6.

### **3 Review of Existing Rural Roads Asset Management in Africa**

#### **3.1 Countries Reviewed**

The review of existing rural road asset management practice is included in Annex B. It focused on the following countries:

- Ethiopia
- Malawi
- Mozambique
- Tanzania
- Uganda
- Zambia
- Zimbabwe
- Western Cape Province of South Africa.

Visits were made to Zambia, Tanzania and the Western Cape during the Formulation Phase in order to obtain first-hand information. A visit was planned to Nigeria to review the outcome and sustainability of the Ekiti State Rural Access Programme, but it was not possible to obtain a travel visa from the Nigeria Embassy in Harare in the time available. The Ekiti State project adopted an innovative approach to rural access improvements and long term maintenance. The project was funded by UK Aid and ended in 2006.

#### **3.2 Summary of Findings**

The summary of country programmes for rural road maintenance provides a picture of the current situation prevailing in sub-Saharan Africa. Supplementary information obtained from Ghana and Sierra Leone presents similar trends. The conclusions are as follows:

- There are very few examples of sustainable rural road asset management practice currently operational in sub-Saharan Africa. Current approaches tend to be focussed on preparing and implementing an annual work programme rather than on any longer term strategic plan.
- Governments still tend to pay more attention to construction of roads than maintenance. Many countries have not yet developed a culture for maintenance.
- Funding for maintenance has improved in recent years with the establishment of road funds, but priority tends to be given to maintenance of the national trunk road networks. There is still a general lack of political will to provide funding for road maintenance.
- The improvement of funding is not always reflected in improved maintenance due to inefficiencies in the organisations responsible for organising maintenance, failure to utilise available resources in the most effective way, and lack of accountability.

- Political interference is common and invariably undermines the efficiency and effectiveness of sector organisations. Corruption is a significant factor affecting performance in the sector.
- Governments are grappling with their policies on decentralisation of road maintenance. Most countries are now following a policy of decentralisation of service delivery in key sectors, but the most effective rural roads maintenance programmes have been those that are managed centrally and implemented at local level. The lack of clear policy on decentralisation results in unclear roles and responsibilities for sector institutions.
- Contracting out of road maintenance has not led to capacity development in the private sector. The small size of contracts is not attractive to bigger contractors and small firms cannot invest in staff development. In some countries, the use of force account for undertaking maintenance works has proved to be more efficient than outsourcing such works.
- Where examples of good practice exist they tend to be on donor-funded programmes with high levels of technical assistance, but these initiatives tend to flounder when the donor support is withdrawn.
- The Western Cape in South Africa offers a good example of a well-managed road network. The overall commitment to provide value to road users is based on a sound, well-planned and systematic approach to asset management sets the tone and presents clear guidelines for the expected outputs. The approach follows a well-planned and systematic approach to asset management that examines the technical and administrative requirements for the implementation of works. The road management team in the Western Cape uses sound engineering methods that yield good results. The system provides a good bench mark for improving maintenance regimes in other countries within and beyond Sub Saharan Africa.

The purpose of the desk study was to identify “what works” and “what doesn’t work” for rural road network management in Africa. The conclusion is that there is no “one size fits all” in terms of what may work, or what may not work. For example, road maintenance organised through force account has been successful in some countries whilst in other countries the contracting of maintenance to the private sector has been more successful. Some countries have decentralised responsibility for rural road maintenance whilst others operate through centralised institutional arrangements. What is clear is that donor initiatives for rural road maintenance do not work in the long term and local solutions have the greatest chance of success.

The desk study has also shown that approaches to road asset management that focus on one or two elements of the road preservation system are unlikely to be successful. Experience in Africa shows that it is necessary to consider asset management in a wider, holistic, and

hierarchically-related manner in order to find the gaps which need to be addressed. For example, it is not sufficient to prescribe or install a particular pavement management system within a rural roads agency and expect this to result in significantly improved maintenance of the road network. The evidence suggests that, with very few exceptions, such systems flounder once the funding and or champion disappears. The installation of such systems has been unsuccessful because the wider issues including institutional arrangements, political involvement, financial management etc. have not been addressed.

## **4 Framework for Self-Assessment of Asset Management Performance**

### **4.1 Background and Approach**

The framework will be used by rural road agencies to assess their own performance in the management of their road assets. It will assist road agencies to identify areas of their approach which require improvement, and provide a means of benchmarking the organisation with respect to other RAs and to monitor changes in performance over time.

Considerable work in the region has been undertaken in the last 30 years to better understand the reasons for the relatively poor performance of the road sector (see for example Brooks et al., 1989; Heggie and Vickers, 1998; Pinard, 2012). These studies have shown that the development and performance of road agencies are reliant on inter-dependent external factors, internal institutional arrangements and the technical capacity of the organisation. Utilizing these concepts related studies by Pinard et al. (2012, 2016), for example, have also developed frameworks for assessing road sector performance.

The approach taken in this project has therefore built on the existing body of work and used international best practice as advocated within asset management specifications to further refine a framework. These specifications are primarily those provided the Institute of Asset Management (IAMM, 2011) and the Publically Available Specification PAS 55 (BSI,2004).

From these sources it is evident that a road asset management specification needs to consider:

- External and institutional factors
- The policy of the road agency (which in turn should consider government policy), customer needs through defined levels of service for road assets
- The resources (physical and human), processes and tools required (and available) to monitor and meet these levels of service
- Mechanisms for planning for the future and dealing with unexpected impacts on the road infrastructure.

Accordingly, a self-assessment framework has been developed which seeks to assess the performance of a rural road agency in six key areas, or building blocks, which are considered necessary for effective asset management (Pinard, 2016). These are:

- External<sup>3</sup>
- Institutional
- Financing

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<sup>3</sup> This encompasses “political” issues.



- Management
- Technical
- Operational.

## **4.2 Questions for Road Agency Self -Assessments**

The proposed framework assesses the performance of a road agency via a set of questions associated with each of the above 6 building blocks to determine the maturity (on a scale of 0 - 4) of an agency with respect to that building block. The questions have been designed to be pertinent to a rural road agency, simple to understand and easy to answer. For each of the building blocks a set of questions has been developed. Each question requires a “yes” or “no” answer and has been developed, on its own, to establish the level of maturity of an agency with respect to one aspect of a building block. For example, a set of four questions are associated with engaging stakeholders under the “political” building block. A “yes” answer to only the first of the four questions suggests that the agency is “poor” at engaging. However, a “yes” answer to the first and second question suggests that the agency is “satisfactory” with respect to engagement, and so on. Methods will be developed to combine the scores achieved for all building blocks separately to gain an understanding of all overall agency performance. The approach will be further refined before field testing in the initial phase of the project implementation. Further refinements are expected following the field testing.

The draft questions are listed below.

### **1. External issues**

Requirements include:

- Engagement with stakeholders by means of informed consultations and a culture of open communications and knowledge sharing in order to:
  - understand their needs and expectations by helping to identify local requirements, alternatives and solutions to problems
  - lobby political support for adequate AM plans and related maintenance funding
  - influence the development of the agency’s AM strategies
  - communicate the agency’s programmes and targets
  - assess how the agency’s performance is rated by stakeholders.

Questions

Q 1.1

- a) Has the agency developed guidelines for community consultation?

- b) Does the agency conduct consultations with members of the public (road users, local inhabitants and local businesses) at least annually?
- c) Does the agency use a range of techniques to communicate with stakeholders e.g. surveys, media releases, newsletters, telephone hotlines, social media?.
- d) Does the agency communicate its maintenance and development works programmes with stakeholders who will be affected (i.e. road users, local inhabitants and local businesses)?

Q 1.2

- a) Does the agency interact at council level with the Roads Committee responsible for road related issues?
- b) Does the agency table road budgets at council meetings for approval before implementing works, and periodic acquittal reports on usage of funds?
- c) Does the agency discuss its strategic plans at council meetings to map out plans for short, medium and long term programmes?
- d) Does the roads agency coordinate district programmes at provincial and national level through established council structures?

**2. Institutional issues**

Requirements include:

- The existence of an AM policy and strategy that is supported by senior leadership
- Need to recruit and retain capable staff by offering competitive salaries
- An appropriate organisational structure with an adequate complement of appropriately trained staff with the necessary core competencies
- The extent to which staff involved in the process understand and support it and are willing to contribute and improve it
- KPIs that can be used to measure the quality of the service the agency provides
- Means (funding) for outsourcing of all strategic, non-core activities (e.g. instrumented surveys such as roughness and deflection measurements).

Questions

Q 2.1

- a) Does the agency have an informal AM policy and associated strategy?
- b) Does the agency have a formal AM policy which aligns with its major asset management activities?
- c) Does the agency's AM policy align with its corporate vision and mission?
- d) Does the agency's AM policy take into account stakeholder needs and expectations?

Q 2.2

- a) Have the basic levels of service been defined?
- b) Are the differing requirements of stakeholders understood?
- c) Are stakeholders consulted when determining the levels of service?
- d) Is the level of service consultation strategy developed and implemented?

Q 2.3

- a) Is the contribution of the road network to the road agency's objectives defined?
- b) Are the levels of service linked to measures of asset performance?
- c) Is the cost to fulfil the level of service requirements known?
- d) Are the levels of service integral to decision making and business planning?

Q 2.4

- a) Do members of staff understand necessary emergency responses?
- b) Does the agency have an emergency response plan?
- c) Is the emergency response plan regularly updated?
- d) Does the agency test, analyse and improve emergency response plans at least every 3 years?

Q 2.5

- a) Does the agency's organisational structure identify roles, responsibilities and competencies of key staff, aligned with its AM policy, strategies, objectives and plans?
- b) Are the roles, responsibilities and organisational commitment for AM documented and communicated to all relevant people?
- c) Does the agency have an adequate complement of appropriately qualified staff with designated responsibilities to undertake its AM mandate?
- d) Is the agency able to outsource its non-core activities (e.g. instrumented surveys such as roughness and deflections)?

Q 2.6

- a) Does the agency offer training opportunities for staff?
- b) Does AM specific training occur for primary staff?
- c) Has the agency implemented an on-going training programme to address required AM competencies?
- d) Is there a formal AM capacity building programme which is routinely monitored?

Q 2.7

- a) Are RA salaries much lower (+/-50%) than comparable private sector jobs?
- b) Are RA salaries lower (+/-20%) than comparable private sector jobs?
- c) Are RA salaries roughly the same as comparable private sector jobs?

d) Are RA salaries greater than comparable private sector jobs?

### **3. Financial issues**

Requirements include:

- A stable, adequate and sustainable source(s) of funding for maintenance
- Annual asset valuation of road infrastructure assets
- Costing framework for determining unit costs of works
- Budgeting and programming processes
- Prioritised maintenance investment plan
- Risk strategy to address potential consequences of inadequate funding (e.g. emergency response)
- Financial accounting and auditing of expenditure.

Questions

Q 3.1

- a) Does the agency depend only on the consolidated fund for funding of road maintenance?
- b) Is the funding received from the consolidated fund related to road performance?
- c) Does the agency get a fixed share of its maintenance funding requirement from a Road Fund?
- d) Does the agency get a variable share of its maintenance funding requirement from the Road Fund that is related to road performance?

Q 3.2

- a) Is the percentage of the budgeted funding obtained < 30 % of that required?
- b) Is the percentage of the budgeted funding obtained 30%- 59% of that required
- c) Is the percentage of the budgeted funding obtained 60% - 89% of that required?
- d) Is the percentage of the budgeted funding obtained 90% - 100%of that required?

Q 3.3

- a) Does the agency carry out asset valuation?
- b) Is the value of the agency's road asset decreasing?
- c) Is the value of the agency's road asset stable?
- d) Is the value of the agency's road asset increasing?

Q 3.4

- a) Is the percentage of the maintenance funding obtained < 0.5% of the asset value of the road network?
- b) Is the percentage of the maintenance funding obtained between 0.5% - 1% of the asset value of the road network?
- c) Is the percentage of the maintenance funding obtained between 1%- 1.5% of the asset value of the road network?
- d) Is the percentage of the maintenance funding obtained > 1.5% of the asset value of the road network?

Q 3.5

- a) Does the agency carry out annual and multi-annual financial forecasting?
- b) Are the financial forecasts based on current Asset Management Plan (AMP) outputs?
- c) Are the financial forecasts based on current comprehensive AMPs with reasoned supporting assumptions?
- d) Are the financial forecasts based on current comprehensive advanced AMPs with detailed supporting assumptions and high confidence in accuracy?

Q 3.6

- a) Does the agency operate an accounting system?
- b) Are the annual accounts finalised within the first quarter of the following year?
- c) Are the accounts audited annually?
- d) Are the accounts published annually?

**4. Management Issues**

Requirements include:

- Use of appropriate AM system that contains:
  - Network definition (road and bridge inventory information)
  - Network condition (roads and bridges)
  - Network usage (traffic)
  - Financial/cost information on works activities
  - Storage, update, analysis and reporting of data collected.
- Appropriate levels of service and intervention standards that determine gaps in network performance
- Prioritised annual, medium (3- 5yrs) and long term (> 5 yrs) maintenance and development plans and related investment plans
- A risk management strategy (for unfunded works)
- Annual reporting on the overall management of the road asset (AM plan)

- Demand forecasting.

## Questions

### Q 4.1

- a) Does the roads agency have an AM system(s) in place which can store current and historical asset inventory, condition and asset utilization data (e.g. traffic)?
- b) Does the AM system enable treatment cost and historical maintenance information to be stored and accessed?
- c) Does the AM system allow for the comparison of the current condition of assets with intervention levels to determine maintenance requirements?
- d) Can the AM system facilitate the prioritisation of road sections requiring maintenance?

### Q 4.2

- a) Has the road agency developed intervention levels for all its principal asset types which require periodic maintenance (carriageway, shoulders, bridges, culverts)?
- b) Are the intervention levels directly associated with defined levels of service?
- c) Have the intervention levels been determined using an economic analysis
- d) Have the intervention levels been determined using socio-economic-political (i.e. multi-criteria) analysis?

### Q 4.3

- a) Does the agency produce annual maintenance and development plans?
- b) Does the agency produce annual prioritised maintenance and development plans?
- c) Does the agency provide prioritised medium term (3-5 year) maintenance plans?
- d) Does the agency provide prioritised long term (> 5 year) maintenance plans?

### Q 4.4

- a) Does the agency have an asset management (AM) plan that contains basic information on assets service levels, planned works and financial forecasts and future improvements?
- b) Is maintenance and development planned and prioritised according to asset condition?
- c) Is maintenance and development prioritised using a cost benefit approach?
- d) Is maintenance and development expenditure prioritised using techniques which consider economic and social benefit?

### Q 4.5

- a) Does the agency keep a record of maintenance / unfunded works backlog?

- b) Does the agency have a strategy to reduce maintenance backlog based on a percentage of the available development budget?
- c) Does the agency prioritise the reduction of maintenance backlog using an economic analysis?
- d) Does the agency prioritise the reduction of maintenance backlog using risk management techniques?

Q 4.6

- a) Does the agency carry out basic demand (traffic) forecasting?
- b) Are the forecasts of traffic demand based on traffic counts carried out in the last 5 years using robust economic indicators (e.g. GDP)?
- c) Is traffic demand forecast based on mathematical analysis of historical trends and primary economic factors?
- d) Are risk analysis methods used to forecast demand?

Q 4.7

- a) Does the agency schedule capital projects using staff judgement, taking into consideration government policy and political drivers?
- b) Are projects identified using input from operational staff, estimates of service lives, traffic demand modelling and accident analysis?
- c) Are major capital projects for the next 10 years identified and prioritised taking into account socio-political-economic requirements?
- d) Does the agency use advanced formalised socio- economic-political decision making techniques to identify major capital expenditure?

## **5. Technical Issues**

Requirements include:

- Existence of a road referencing system
- Existence of a classified road inventory
- Standard procedures for developing a road inventory, data collection and performance monitoring
- Use of asset register to store all road asset information.

Questions

Q 5.1

- a) Does the agency have a road referencing system based on routes and nodes between centres of population?

- b) Is the road referencing system based on road sections (< 1 km) with homogeneous characteristics?
- c) Is the road referencing system based on sub-sections (homogenous sections of 200 m lengths)?
- d) Is the road referencing system GIS based?

Q 5.2

- a) Does the agency have an item inventory recording basic road surface types (earth, gravel or sealed)?
- b) Does the agency undertake an inventory of all principal assets (carriageway, shoulders, bridges, culverts, side drains)?
- c) Does the inventory include the service lives of all principal assets?
- d) Does the agency have deterioration models for all principal assets?

Q 5.3

- a) Is the road inventory based on broad assumptions or incomplete data?
- b) Is there a system of systematic and documented data collection for all principal assets (carriageway, shoulders, bridges, culverts, side drains) on a road by road basis?
- c) Is there an established system of systematic and documented data collection for all principal assets (carriageway, shoulders, bridges, culverts, side drains) on a section basis?
- d) Is there an established system of systematic and documented data collection for all principal assets on a sub-section basis?

Q 5.4

- a) Does the agency carry out annual visual condition assessment surveys for all principal assets (carriageways, shoulders, bridges, culverts, side drains)?
- b) Are the visual condition assessments carried out in accordance with well documented, standardised procedures?
- c) Does the agency measure gravel roads: gravel loss and corrugation annually, and for sealed roads: roughness and cracking annually and deflection at least every 5 yrs?
- d) Are the results of the condition assessment and other road recorded in a computerised AM system?

Q 5.5

- a) Does the agency estimate asset utilization (traffic) on its network?
- b) Does the agency measure asset utilization (traffic) annually on its major roads?
- c) Does the agency project asset utilization across its network from annual measures of utilization of a sampled number of roads?



d) Does the agency assess bottlenecks on its network?

## **6. Operational Issues (execution of works)**

Requirements include:

- Appropriate type of contract
- Outsourcing of strategic, non-core activities
- Maintenance scheduling of works
- Emergency Response Plan
- Auditing of maintenance works.

Questions

Q 6.1

- a) Are service delivery roles within the agency clearly allocated?
- b) Does the agency have provision for outsourcing of non-core activities?
- c) Are competitive tendering practices used?
- d) Are service delivery mechanisms reviewed annually to identify risks, benefits and costs of various outsourcing options?

Q 6.2

- a) Does the agency plan day to day maintenance?
- b) Are the needs of stakeholders considered when scheduling day to day maintenance?
- c) Is the planning of day to day maintenance optimised in terms of the availability and use of resources?
- d) Is day to day planning of maintenance optimised by considering the availability of resources and impacts on road users?

Q 6.3

- a) Does the RA undertake technical audits of designs?
- b) Does the RA regularly undertake technical audits of maintenance, construction and rehabilitation works?
- c) Does the RA provide guidelines for undertaking the road audits?
- d) Does the RA require service suppliers to be ISO 9000 certified?

## **5 Road Network Asset Valuation and Condition Monitoring**

### **5.1 Approach to GEM Road Monitoring and Asset Valuation**

From the desk-study review it was concluded that examples of sustainable rural road asset management currently operational in Sub-Saharan Africa are almost non-existent. An innovative approach focussed on building a maintenance culture is therefore necessary to yield any meaningful results. Hence the road agencies (RAs) will be primed to own the entire process from the outset, with the goal of realising economic growth through improvements in road asset management practices. They will be at the forefront of the activity of asset valuation and road condition monitoring.

The following sections describe a toolkit for asset valuation and condition monitoring that is a part of a broader asset management process. Technical assistance will be provided under the project to help the participating roads agencies (RAs) to tackle the process in a gradual step by step manner that takes into account the political will to change as well as financial and human resource constraints. It is expected that the procedures for road asset valuation and condition monitoring will be refined and improved as a result of field testing and with more knowledge of the project areas.

It is noted that monitoring of the road network condition will incorporate bridges (and other drainage structures) and earthworks, as well as the roads.

### **5.2 Road Condition Monitoring**

#### *5.2.1 Background*

Under AFCAP Phase 1 a project was undertaken in Mozambique aimed at utilising GPS technology to determine physical and functional condition of low volume gravel and earth roads [Herman, et al, 2009]. The project was instituted with the objective of developing a practical, affordable, reliable and objective method of monitoring condition and level-of-service of unpaved road networks in Mozambique using speed data collected using simple GPS technology. Simple recreational GPS receivers were used to collect speed data under a testing regime that examined the following variables: sampling method (time or distance), sampling frequency, driving regime (fast, normal, slow), road class, reported road condition and GPS receiver type. Indices were developed that report on the 'speed deficiency' characteristics at road segment, link and network levels and these were proposed as a proxy for road condition.

The GPS method was subsequently employed in Tanzania on an AFCAP project which was aimed at supporting the design, construction and monitoring of district road improvements [AFCAP/TAN/008, 2010]. Road condition assessments were undertaken which included an analysis of the gradient, height and the possible travelling speed of a vehicle along the road. Several regimes of driving up and down each of the roads and recording the trip data using a

GPS were carried out after which the data was analysed and assessed in a simple fashion using Microsoft Excel. Graphs and profiles were produced using the GPS data and the road divided into homogenous sections. The method was found easy to apply with minor problems at commencement as evaluators were learning how to use the GPS equipment.

It must be noted that there are several manuals and procedures for road condition measurement which have been developed by countries such as South Africa, Australia and New Zealand. All of these offer experience that is useful for this project. However, as a benchmark, it is recommended that South Africa's TMH 12 document be adopted for use as a road condition monitoring tool. The document provides tried and tested guidelines for visual assessment of the condition and performance of unsealed roads for use in gravel road management systems, maintenance programming and the monitoring of experiments. TMH 12 provides guidance on undertaking visual assessments of the condition of unsealed roads for:

- Input for gravel road management systems
- Project level assessments for specific roads
- Ad hoc assessments of road condition after significant events (e.g. severe rainfall)
- Training of assessors to rate unsealed roads in a consistent and repeatable manner
- Assessing the condition of specific roads during experiments.

It is noted that there is no intention to dictate the use of TMH 12 in the project areas. The RAs will rather be encouraged to improve on the use of any existing methods, as described below. It is noted that TMH 12 is already in use in the Western Cape.

### *5.2.2 Objective and Approach*

The main objective in undertaking road condition surveys is to identify structural and functional defects on the project roads in a simple, sustainable and affordable manner. The data so generated must be of an appropriate quality and reflect, as far as possible, the actual situation on the ground.

The road condition surveys under the GEM project will be undertaken by the RAs themselves at intervals that will yield data to feed the RAs maintenance management system as well as assist in determining the effectiveness of the asset management systems.

Most RAs are known to be implementing some form of road condition survey using procedures that may have been fully tried and tested. Many of these systems have been introduced by experts employed as technical assistants on programmes funded by international development partners. The RAs will be encouraged to review their existing systems and improve them where necessary rather than introducing new methods.

A review of existing methods will be undertaken as a first step following initial interactions with the participating RA's. The objective of the review will be to assess the effectiveness and appropriateness of the existing system and identify any constraints to its use. Guidance will be given to the RAs to overcome these constraints to ensure that meaningful condition measurements can be taken on a regular basis without substantial external support.

Given that each project RA is likely to be using a different method to measure the condition of their roads, it will be necessary to devise a method to convert the various data into an accepted common standard for the purposes of comparing performance between the participating RAs. However, it is noted that changes in performance by a particular RA over time will be more important to measure than absolute comparisons between RAs.

### *5.2.3 Description of Typical Unpaved Roads Defects*

Candidate RAs under the GEM project are likely to be largely responsible for provision and maintenance of unsealed gravel and earth roads. The agencies may be responsible for the maintenance of paved roads, but these are likely to be a small part of their networks. Condition monitoring of gravel and earth roads requires a different approach compared to surfaced roads.

It is expected that condition monitoring of unpaved roads in the project areas will typically measure the various aspects described below.

#### **Poor Cross-fall and Profile**

An unsurfaced road must be built so that water drains quickly off the roadway. If it is not, water stays in ponds or puddles, soaks into the roadbed, and softens it. Building a crown into the road—making the centre of the road higher than the shoulder—enhances drainage. Normally, a gravel road will normally have +/- 5-6% crossfall from its centre line to the shoulder break point [Walter et al, 2002]. Poor cross-fall shape accelerates the formation and progression of structural and functional problems.

#### **Erosion and Scour**

Erosion or scour occurs when water flows on the road surface and surfacing material is washed away and usually deposited in drains or culverts. The loss of materials can result in the formation of run-off channels causing unsafe driving conditions. Erosion can be prevented by increasing the shear strength of the wearing course material or with an effective drainage system [CSRA, 2009].

#### **Drainage**

Roadside drains and culverts must be able to handle surface water flow. Without adequate side drains, water will pond on the roadway and soften the gravel wearing course. The side drain must be wide and deep enough to accommodate all the surface water. The drain must slope so water flows and does not form local ponds. The bottom of the side drain must be

below the formation level. A sufficient number of turn-outs is important. Side drains and culverts must be maintained to prevent erosion or the build-up of debris. [Walter et al, 2002].

### **Gravel Loss**

Gravel loss is experienced on roads with unbound wearing courses. The rate of gravel loss can be reduced by selecting materials with appropriate plastic properties, well-graded gravels and using high degree of compaction (Van Zyl, 2007).

### **Passability**

A road becomes impassable when there are severe structural and functional problems. Impassability is predominantly experienced in wet weather and vehicles fail to progress due to slipperiness and/or formation of deep ruts. Wash away of low lying crossing points due to heavy rains also results in impassability. The problem is more severe on earth roads than gravel roads.

### **Potholes**

Potholes on gravel roads are a result of low strength of the base course usually due to ingress of water. Development of potholes is rapid especially where there is combination of traffic, poor drainage and water ponding. Potholes are mostly observed at the bottom of vertical curves, on level road sections and near bridges and culverts [CSRA, 2009].

### **Rutting**

Rutting is usually caused by ravelling of low-cohesive materials or deformation of cohesive wearing course materials under traffic. Ruts normally occur parallel to the direction of travel due to the weight of vehicles and the action of the vehicle tyres on the road surface. The ruts may turn into gullies due to water flowing along the wheel tracks.

### **Stoniness**

Stoniness is the presence of oversize material in the wearing course, present either as embedded or as loose material on the surface. Stoniness is usually a result of poor material type or selection of the same.

### **Dustiness**

Dust is material released from the road surface as a result of tractive forces from wheels of moving vehicles. Dust results in safety and health problems, negative effect on crops in agricultural areas, general discomfort and damage to vehicles [CSRA, 2009]

### **Corrugations**

Corrugations are parallel crests that form at right angles to the direction of travel. The wavelengths of the crests depend on the prevalent type of vehicle and speed of travel and the material type and properties (particularly grading). Corrugations result in uncomfortable rides on gravel roads and poor vehicle control.

It is recommended that the condition of paved roads be monitored for the following defects [TMH22, 2013]:

**Roughness**

Road roughness, or roughness, is the term used to describe the relative degree of comfort or discomfort experienced by a road user when using the road (i.e. riding quality). Roughness is an important parameter to monitor since it directly relates to the experience of road users in respect of the pavement and also reflects pavement condition and road safety

**Cracking**

Cracking can be an indication of surfacing or structural distress and can take various forms such longitudinal, transverse, block and parabolic in shape.

**Skid Resistance**

Skid resistance is a measure of the ability of a road surface to prevent a vehicle's tyres from sliding whilst the vehicle performs typical manoeuvres such as turning or braking. Since skid resistance plays a role in determining how a vehicle will respond to sudden braking or turning at speed, it is related to road safety and accident frequency.

**Deflection**

Deflection measurements are used to monitor the structural condition of pavements. It is aimed at assessing the structural integrity of pavements and their ability to carry traffic loading, given the environment in which these pavements operate

**Rutting**

Rutting is the longitudinal permanent deformation that occurs in the wheel paths of flexible pavements. Rut depth relates to the riding experience and safety of the road user and provides information on the structural condition and deterioration of pavement structures.

*5.2.4 Selection of Defects for Monitoring*

Poor performance of unpaved and paved roads is usually as a result of the structural or functional problems summarised above. Structural problems (impassability, potholes and rutting) arise when the pavement loses its capability to support traffic loads under prevailing environmental conditions. Functional defects (poor cross-fall, section stoniness, dustiness, ravelling and gravel loss, erosion and scour) are usually a result of poor material selection and construction methods and inadequate maintenance [CSRA, 2009].

Surface conditions on gravel roads and earth roads constantly change in response to variable environmental and operational conditions. On the one hand, heavy rains and sudden increases in heavy traffic can result in dramatic changes in surface conditions in very short spaces of time. On the other, simple maintenance activities such as blading or tyre dragging can change the condition from very poor to good following as much as one pass of a grader or tractor respectively.

The GEM project is focussed on monitoring the road conditions and demonstrating changes in road asset value over a period of time, ranging from 12 months and longer. Over periods shorter than 12 months the unpaved road conditions may vary significantly as a result of weather conditions or maintenance activities. Hence, the monitoring of the road conditions for the purposes to quantifying improvements in asset management has to be based on major long term deterioration factors associated with each road type. The major criteria proposed for monitoring asset value on the earth and gravel roads are therefore expected to include:

- Camber
- Usable Cross Section
- Drainage
- Gravel thickness.

In addition to the above, it is intended to collect travel speed and location data using simple GPS receivers as developed under the previous AFCAP research in Mozambique and Tanzania. By using mobile phones for this exercise it will also be possible to estimate the roughness of each road link. There are several available applications for mobile phones that convert vertical acceleration measured by movement sensors in the phone into roughness measurements expressed as the International Roughness Index (IRI). This method has been found to be provide a good correlation with roughness measured by conventional means (see, for example, case studies given on RoadBump website at <http://www.grimmersoftware.com/>). The mobile phone method was recently used by Roughton International for the measurement of roughness on a 234km section of the M1 highway in Malawi. The use of this method on the project will provide more evidence of its value and limitations. It is noted that the GPS survey of the network will also enable a more accurate mapping of the roads where this is not already available.

It must be noted that the RAs will be expected to continuously monitor aspects of road condition in a responsive manner and at shorter intervals than the above, as input into their maintenance management systems. This may include:

- Surface defects – rutting, corrugations, potholes, stoniness, dust
- Roughness
- Passability.

Linkages will also be sought with the soon to be launched ReCAP project titled “The use of appropriate high-tech solutions for road network and conditions analysis, with a focus on satellite imagery”. The project will investigate the potential uses of appropriate high-tech solutions to improve RA’s knowledge of the location and condition of their rural road networks. Through this collaboration it will be possible to compare road condition measurements taken by conventional means within the project areas with measurements taken using the remote sensing approach.

### **5.3 Road Condition Rating for Asset Valuation Purposes**

Not all road defects are relevant to monitoring of trends in road network asset value. Only the following defects will be assessed to judge the condition of a road or road section for purposes of road asset valuation: camber/road cross section, drainage, and gravel thickness. Table 1 gives guidance in rating these key road characteristics, with assessment carried out through a Windshield Visual Condition Survey as adapted from [Walter, D. et al]..

Condition survey forms in current use by the RAs will be reviewed for suitability to capture the condition ratings over sections one kilometre in length. Simple averages of sections ratings will be adopted to define the condition index at link level. The end result of the condition rating will be defining the condition of each link on the five level scale from Very Poor through Poor, Fair, Good to Very Good.



**Table 1: Summary of Condition Rating**

Condition Rating	Description	Observations	Remarks
5	Very Good	<ul style="list-style-type: none"> <li>No distress.</li> <li>Excellent surface condition and ride.</li> </ul>	<ul style="list-style-type: none"> <li>New construction or total Re-construction.</li> <li>Excellent drainage.</li> <li>Little or no maintenance needed.</li> </ul>
4	Good	<ul style="list-style-type: none"> <li>Dust under dry conditions.</li> <li>Moderate loose aggregate.</li> </ul>	<ul style="list-style-type: none"> <li>Recently regraded.</li> <li>Good camber and drainage throughout.</li> <li>Adequate gravel for traffic.</li> <li>Routine grading may be needed.</li> </ul>
3	Fair	<ul style="list-style-type: none"> <li>Good camber (75-150mm).</li> <li>Adequate drains on more than 50% of roadway.</li> <li>Gravel layer mostly adequate</li> <li>But additional work may be needed in some locations to correct corrugations</li> </ul>	<ul style="list-style-type: none"> <li>Shows traffic effects.</li> <li>Re-grading (reworking) necessary.</li> <li>Side drain improvement and culvert maintenance required.</li> <li>Some areas may need additional gravel.</li> </ul>
2	Poor	<ul style="list-style-type: none"> <li>Little or no roadway camber (less than 75mm).</li> <li>Adequate side drains on less than 50% of roadway. Portions of the side drains may be filled, overgrown and/or show erosion.</li> <li>Some areas (25%) with little or no gravel.</li> </ul>	<ul style="list-style-type: none"> <li>Travel at slow speeds (less than 30km/r is required).</li> <li>Needs additional new gravel.</li> <li>Major side drain construction and culvert maintenance also required.</li> </ul>
1	Very Poor	<ul style="list-style-type: none"> <li>No roadway camber or road is bowl shaped with extensive ponding.</li> <li>Little if any side drains.</li> <li>Filled or damaged culverts.</li> </ul>	<ul style="list-style-type: none"> <li>Travel is difficult and road may be closed at times.</li> <li>Needs complete rebuilding and/or new culverts.</li> </ul>

## 5.4 Road Condition Monitoring Process

### 5.4.1 Identification of Network

The participating RA is responsible for selection of the network to be monitored. A network of up to about 400kms will be selected and is expected to consist mainly of gravel and earth roads. If the RA networks include paved roads these will be included in the project.

### 5.4.2 Network Referencing

It is expected that the study network will be linear referenced and the following attributes will be noted:

- Road or route name
- Route number

- Road class
- Node names and details
- Lengths of sections
- Chainages
- Coordinates.

#### *5.4.3 Inventory Data*

If not already in place the RAs will need to establish network inventories that capture the following:

- Road or route name
- Route number
- Road class
- Node names and details
- Lengths of sections
- Chainages
- Coordinates of all the above, etc.
- Pavement type
- Surface type
- Construction history
- Routine maintenance history
- Periodic maintenance history
- Carriageway type and width
- Bridges types and locations
- Culverts types and locations
- Annual budgets and expenditure history.

#### *5.4.4 Road Condition Monitoring Fieldwork*

##### **Windshield Condition Surveys**

Windshield surveys will be undertaken on an annual basis to capture the condition of each kilometre of road using the condition rating indicated before. The ratings will then be aggregated at link level. It is expected that up to 100 kilometres can be surveyed per day using a team of two persons.

##### **GPS Surveys/Roughness Measurements**

The GPS and roughness surveys will be undertaken simultaneously with the windshield survey. The survey will log position and travel speed of the survey vehicle on a continuous basis and the resulting information will be interrogated to yield road network performance indicators including roughness (as described above).

## **5.5 Road Asset Valuation**

### *5.5.1 Background*

There has been no research carried out to date under AFCAP on road asset valuation. The subject has been addressed in the Africa context as part of wider topics such as commercialisation of road management [Pinard M., 2012] and studies into the setting up and functioning of road agencies and road funds. It was concluded in part that most road agencies in sub-Saharan Africa had established some typical components of road asset management system with varying levels of sophistication, and mainly for national roads. However, difficulties were found in operating the systems in a reliable, sustainable manner. Rural roads remained unattended to vis a vis application of good asset management practices.

There have been many well established road management systems and road maintenance management systems for pavements, bridges, traffic congestion, safety, etc. that precede the current trending asset management systems. Most, if not all, of these systems are based upon the principles of life cycle management of the asset [Cowe Falls 2001]. These systems were designed to answer three fundamental questions: “What assets do we have; where are they; and, what condition are they in?” The supplementary questions being asked are “How many dollars do we need to maintain or improve the current condition?” and “What will the condition be as a result of a given funding level? Asset management requires accounting of the investment made in the asset and as such adds a fourth fundamental question – “What is the value of our asset?” [Cowe Falls et al, 2004].

### *5.5.2 Selection of Asset Valuation Method*

As part of the framework of asset management, asset valuation is used to calculate the current and future value of the asset portfolio. The methodology used must be based upon reliable values that can be predicted with some degree of accuracy. If a parameter within the method cannot be predicted into the future with comfortable levels of certainty, as a result of a large statistical variance, the accuracy of future predicted values will be too inaccurate to be of use. Table 2 includes a comparison of most commonly referenced asset valuation methods and basic definitions adapted from [Cowe Falls et al, 2004].

Cowe et al (2004) tellingly concluded as follows: “Agencies that are in the process of developing asset values should also recognize that despite the variability in the method, what really is important is the change over time of the asset being valued. As asset valuation has the potential to become a performance measure or indicators, it is important that agencies be able to report how well they are retaining asset value as a result of proper management. One approach would be to report the Replacement Cost and the Written Down Replacement Cost (WDRC). The former indicates the cost to replace the asset and the latter provides an indication of how well the asset is being managed. WDRC also incorporates engineering performance models and recognizes good management rather than consumption as in the

case of straight line depreciation. Regardless of which valuation method is used, the important point is to select a valuation method that can be easily sustained and managed, is not data and/or analytically burdensome and that proper asset management should result in retention of asset value. What matters most is the change in the asset over time and proper management will preserve asset value.”

**Table 2: Comparison of Asset Valuation Methods**

Asset Valuation Method	Features	Advantages	Disadvantages
Book Value (BV) Historical Cost (HC)	<ul style="list-style-type: none"> <li>Commonly used for financial accounting purposes.</li> <li>Uses historical records of procurement (first cost plus any subsequent costs), depreciated to present worth.</li> <li>Provides direct comparisons in time series progressions.</li> </ul>	<ul style="list-style-type: none"> <li>Data generally available.</li> <li>Relatively simple.</li> </ul>	<ul style="list-style-type: none"> <li>Does not account for changes in prices. Neglects usage.</li> <li>Neglects technology and service standard changes.</li> <li>Most models include a 'horizon' beyond which inflation and discount costs negate any retained value.</li> <li>Results can be misleading for older assets such as bridges, land.</li> <li>Value is related to age of asset.</li> </ul>
Replacement Cost (RC)	<ul style="list-style-type: none"> <li>Commonly used by public agencies for various public infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Quite straightforward to calculate.</li> <li>Can be communicated and understood easily.</li> </ul>	<ul style="list-style-type: none"> <li>Can be misrepresentative (eg. Relatively new asset in good condition would be worth the same as an old, deteriorated asset).????</li> </ul>
Written Down Replacement Cost (WDRC)	<ul style="list-style-type: none"> <li>Commonly used for management accounting purposes.</li> <li>Uses current market prices to rebuild/replace.</li> <li>Current condition used to establish write down value.</li> </ul>	<ul style="list-style-type: none"> <li>Reflects current prices &amp; technology.</li> <li>Requires good performance modelling.</li> <li>Easily understandable to technical staff.</li> <li>Enables comparison of assets.</li> <li>Provides for future budgeting.</li> </ul>	<ul style="list-style-type: none"> <li>Conjectural on replacement costs (subject to external market forces).</li> <li>Requires good performance modelling.</li> <li>Question of how to handle an upgraded /improved replacement.</li> </ul>
Net Salvage Value (NSV)	<ul style="list-style-type: none"> <li>Represents value of materials including disposal costs</li> </ul>	<ul style="list-style-type: none"> <li>Uses generally available data.</li> </ul>	<ul style="list-style-type: none"> <li>Difficult to predict future construction prices.</li> <li>Subject to market forces, in particular, supply and demand if parallel service exists.</li> </ul>

Adapted from Cowe Falls et al, 2004

### *5.5.3 Asset Valuation Process*

To determine the value of the road asset the following steps will be undertaken:

- Gathering, collation and review of existing relevant information
- Establishment of an asset register with hierarchy clearly defined
- Determining Expected Useful Life for each asset
- Condition Assessment for each asset
- Determining Remaining Useful Life
- Setting unit rates for calculation of replacement cost
- Calculation of Current Replacement Cost
- Calculation of Current Asset Value.

### *5.5.4 Information and Data Collection*

Before undertaking the road asset valuation process, existing available information must be collected, collated and assessed for its relevance to the asset management process. Any shortfalls will be identified and noted from the onset. Potential sources of information and data that may be held by RAs, central government ministries, statutory bodies such as Road Funds will include:

- Statutes, regulations and by-laws
- Strategic plans
- Road maintenance plans
- Asset registers
- Annual reports
- Proceedings of authority meetings
- Project plans
- Project completion reports
- Manuals and guidelines.

### *5.5.5 Establishment of an Asset Register*

The following steps will need to be undertaken to establish a road network asset register:

- Define the asset hierarchy
- Design an asset register format, starting off with a simple spreadsheet
- Establish Estimated Useful Life for each asset as well as unit costs for replacement
- Determine existing asset data sources
- Plan data collection to supplement existing data
- Collect data and capture in database
- Validate data
- Carry out periodic updating and re-evaluations.

Table 3 includes an example of a road infrastructure asset hierarchy. Each RA will be expected to define its own hierarchy.

**Table 3: Example of Road Asset Register Hierarchy**

Infrastructure	Asset Group	Asset
Roads and Bridges	Paved Roads	Right of Way
		Formation
		Pavement Layers
		Surfacing
		Bridges
		Major culverts
		Minor Culverts
		Information Signs
		Regulatory Signs
		Fences
		Bus Shelters
		Kerbs and Channels
		Guardrails
		Guardrails
	Gravel Roads	Right of Way
		Formation
		Gravel Wearing Course
		Bridges
		Major culverts
		Minor Culverts
		Information Signs
		Regulatory Signs
		Fences
		Bus Shelters
		Kerbs and Channels
		Guardrails
	Guardrails	
	Earth Roads	Right of Way
		Formation
		Bridges
		Culverts
		Road signs
		Right of Way

### 5.5.6 Expected Useful Lives of Assets

Each asset in the asset register must be assigned an Expected Useful Life. This will be a function of the following: standard of design and construction, utilisation rates, the operating environment and maintenance regime. Table 4 includes recommended useful lives for road

assets to be used on this project. These recommendations will be reviewed by each RA for suitability to their circumstances.

**Table 4: Expected Useful Life of Road Assets**

<b>Asset</b>	<b>Expected Useful Life (EUL) in Years</b>
Right of Way – Earth Roads	30
Right of Way – Gravel Roads	50
Right of Way Paved Roads	50
Formation	25
Gravel Wearing Course	7
Pavement Layers	15
Surface Dressing	7
Asphalt Surfacing	15
Bridges	50
Major culverts	25
Minor Culverts	15
Information Signs	3
Regulatory Signs	3
Bus Shelters	7
Kerbs and Channels	3
Guardrails	5

**5.5.7 Asset Valuation Method**

Assigning a monetary value to the assets will demonstrate the cost of depreciation and replacement and the RA can ensure that adequate funding is set aside to maintain the networks in a usable state in the long term.

As with common practice, it is proposed to adopt the Depreciated Replacement Cost (DRC) approach as the most appropriate asset valuation method, as follows:

$$\text{Depreciated Replacement Cost (DRC)} = \frac{\text{RUL} \times \text{CRC}}{\text{EUL}}$$

where:

- RUL – Remaining Useful Life
- CRC – Current Replacement Cost
- EUL – Expected Useful Life

RUL is established following visual condition assessment of the asset and taking into account the knowledge of the maintenance regime to date.



EUL is the anticipated life of the asset from acquisition or new construction until failure assuming normal expected operating environment and maintenance regime.

CRC is an estimate of replacement of the asset with a modern equivalent of similar nature, based on current unit rates.

### 5.5.8 Determination of RUL – Remaining Useful Life

As defined above RUL is usually determined from the visual condition assessment of the asset whilst taking into account the maintenance regime that the asset has been subjected to. The condition of the road network in this case will be used as proxy to determine the RUL according to a scale that is customised to the road type that is gravel, earth or dirt road.

The generic condition rating shown in Table 5 will be adopted for the assets, with the RUL for each asset being determined after detailed consideration of all factors.

**Table 5: Generic Condition Rating**

Rating	Description	Detailed Description	RUL as % of EUL
5	Very Good	Sound structure, well maintained. Only normal maintenance required.	71-100
4	Good	Serves needs but minor deterioration (< 5%). Minor maintenance required.	46-70
3	Fair	Marginal, clearly evident deterioration (10-20%). Significant maintenance required.	26-45
2	Poor	Significant deterioration of structure and/or appearance. Significant impairment of functionality (20-40%). Significant renewal/upgrade required.	11-25
1	Very Poor	Unsound, failed needs reconstruction/ replacement (> 50% needs replacement).	0-10

*Adapted from MIG Manual, RSA*

### 5.5.9 Establishing Unit Rates

To calculate the Current Replacement Cost, unit rates must be established for each asset that take into account all cost factors: overheads, design, construction, supervision, etc. These rates can be built up from basic costs of inputs or can be obtained from historical costs, if available and reliable. Rates may also be obtained from the local construction industry organisations.

Whilst the ideal situation will call for a detailed calculation of the CRC for each asset on a road section, it may be prudent to establish generic rates per kilometre at network level at the beginning and this can be improved upon as the RAs develop more mature asset management systems.

An example of unit rates is shown in Table 6 for typical road design standards used in sub-Saharan Africa. The unit costs will vary where different design standards are applied.

**Table 6: Typical Unit Rates**

<b>Road Type</b>	<b>Current Replacement Unit Rate (\$/km)</b>
Earth	10,000
Gravel	25,000
Surfaced – Chip & Seal	200,000
Asphalt	300,000

*5.5.10 Example of Calculation of Asset Value*

Table 7 includes the results of simple asset valuation for a road network using the process described in the preceding sections, and partly adapted from Schliessler, A et al.

The participating RAs will be assisted in developing own appropriate valuations that suit their specific environments.

It is expected that the methodology for valuation of road assets will be refined as the project progresses and this proposed method is implemented in the project areas. The development of an appropriate method of asset valuation is part of the research project.

**Table 7: Example of Road Network Asset Valuation**

BASIC INFORMATION ON ROAD SECTIONS						CURRENT REPLACEMENT COST						THRESHOLD LEVEL OF SERVICE				CURRENT CONDITION OF SECTIONS				ANALYSIS			
Section ID No.	Section Identification		Length (km)			Type of Pavement Material	Traffic Volume (AADT)	Expected Useful Life - EUL (Yrs)	CRC Cost/Km (\$)	CRC Cost of Section (\$)	Fixed Asset % of CRC Cost	Variable CRC Cost (\$)	Min. Threshold Condition - Rating	Cost/Km at Threshold Condition as % of CRC Rate	Variable Cost/Km at Threshold Condition (\$)	Replacement Cost at Threshold Condition (\$)	Current Condition Rating	Estimated RUL as % of EUL	Variable Cost/Km at Current Condition (\$)	Current Asset Value at Current Condition (\$)	Present Value as % of Max Value New	Present Value as % of Min Threshold Value	Sections with Condition Less than Permissible (Kms)
	From	To	Paved	Gravel	Earth																		
1	Boane	Bela Vista	2.00			SD	155	15	400 000.00	800 000.00	55%	360 000.00	GOOD	50%	90 000.00	620 000.00	VERY GOOD	90%	162 000.00	764 000.00	96%	123%	-
2	Salamanga	Ponta Douro		23.00		Calcrete	50	15	35 000.00	805 000.00	65%	281 750.00	GOOD	60%	7 350.00	692 300.00	VERY POOR	10%	1 225.00	28 175.00	4%	4%	23.00
3	Moamba	Sabie			11.00	Sand	5	3	14 000.00	154 000.00	85%	23 100.00	FAIR	70%	1 470.00	147 070.00	POOR	25%	525.00	5 775.00	4%	4%	11.00
4	Sabie	Cnr 405			10.00	Sand	3	3	10 000.00	100 000.00	85%	15 000.00	FAIR	55%	825.00	93 250.00	POOR	20%	300.00	3 000.00	3%	3%	10.00
5	Catembe	Bela Vista		15.00		Calcrete	25	7	25 000.00	375 000.00	65%	131 250.00	GOOD	62%	5 425.00	325 125.00	VERY GOOD	75%	6 562.50	98 437.50	26%	30%	15.00
6	Cnr R403	Mungazine	5.00			Asphalt	350	15	750 000.00	3 750 000.00	50%	1 875 000.00	GOOD	55%	206 250.00	2 906 250.00	FAIR	40%	150 000.00	750 000.00	20%	26%	5.00
7	Magude	Mahele		23.00		Calcrete	50	7	35 000.00	805 000.00	65%	281 750.00	GOOD	58%	7 105.00	686 665.00	VERY GOOD	85%	10 412.50	239 487.50	30%	35%	23.00
8	N200	Catuane			6.00	Sand	5	3	14 000.00	84 000.00	85%	12 600.00	FAIR	70%	1 470.00	80 220.00	POOR	25%	525.00	3 150.00	4%	4%	6.00
9	Cnr R401	Pessene			10.00	Sand	10	3	10 000.00	100 000.00	85%	15 000.00	FAIR	65%	975.00	94 750.00	VERY GOOD	80%	1 200.00	12 000.00	12%	13%	10.00
10	Cnr N1	J. Machel		15.00		Calcrete	25	7	25 000.00	375 000.00	65%	131 250.00	GOOD	56%	4 900.00	317 250.00	VERY GOOD	85%	7 437.50	111 562.50	30%	35%	15.00
11	Magude	Motaze			5.00	Sand	15	3	10 000.00	50 000.00	85%	7 500.00	FAIR	48%	720.00	46 100.00	VERY GOOD	75%	1 125.00	5 625.00	11%	12%	5.00
12	Maragra	Calandra			22.00	Sand	20	3	10 000.00	220 000.00	85%	33 000.00	FAIR	50%	750.00	203 500.00	FAIR	45%	675.00	14 850.00	7%	7%	22.00
13	Cnr R413	Machubo			17.00	Sand	5	3	10 000.00	170 000.00	85%	25 500.00	FAIR	45%	675.00	155 975.00	POOR	75%	1 125.00	19 125.00	11%	12%	17.00
14	Mapula	Fr RSA			44.00	Sand	7	3	10 000.00	440 000.00	85%	66 000.00	FAIR	45%	675.00	403 700.00	GOOD	60%	900.00	39 600.00	9%	10%	44.00
15	Panjane	Macaene		15.00		Calcrete	25	7	25 000.00	375 000.00	65%	131 250.00	GOOD	60%	5 250.00	322 500.00	POOR	75%	6 562.50	98 437.50	26%	31%	15.00
16	Sabie	Macaene		44.00		Calcrete	25	7	25 000.00	1 100 000.00	65%	385 000.00	GOOD	47%	4 112.50	895 950.00	FAIR	40%	3 500.00	154 000.00	14%	17%	44.00
17	Macaene	Maguene	3.00			Asphalt	350	15	600 000.00	1 800 000.00	50%	900 000.00	GOOD	55%	165 000.00	1 395 000.00	GOOD	60%	180 000.00	540 000.00	30%	39%	3.00
	Mapula	Mangonzo																					

Length - Paved	10.00
Gravel	135.00
Earth	125.00

Max. Possible Value of Network	11 503 000.00
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Min. Permissible Asset Value of Network	9 385 605.00
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Current Asset Value of Network	2 887 225.00
Asset Value Deficiency %	-6 498 380.00 -69%

Length of Network less than Permissible	268.00
%	99%

## **5.6 Reporting**

The following reports are expected to be generated from the Condition Monitoring and Asset Valuation processes:

- Asset knowledge reports – extent of network, type of roads, bridge structures, etc.
- Current Network Asset Value
- Percent of Network in condition worse than threshold – by type
- Trends in Asset Value over the last three years
- Trends in condition of road network by type over the last three years
- Projected trends in asset value and condition following planned improvements in asset management and funding
- Expenditure split – capital, rehabilitation, periodic, maintenance, agency costs
- Road network mapping in various forms.

## 6 Indicators of Social and Economic Impacts of Rural Roads

### 6.1 Introduction

Poor access is a major constraint to economic growth in Sub-Saharan Africa (SSA). According to the Rural Access Index (RAI) global tables published by the World Bank (2007, last updated 2010), about 34%<sup>4</sup> of rural population in Africa live within 2 kilometres of an all-season road. Decision making for investment in rural areas (in agriculture and other economic activities) will largely depend on whether the area is accessible or not. Poor quality rural roads will influence production costs upwards by constraining availability of inputs, as well as limiting supply of transport due to increased vehicle operating costs and consequently transportation costs. This will result in lowering of revenues and profits for locally produced goods thus perpetuating economic decline and poverty. On the other hand efficient and reliable rural transport infrastructure (rural roads, tracks, footpaths) and services has a positive impact on economic and social wellbeing of communities. Good and accessible rural roads will improve condition for economic growth and poverty reduction through consequential lower transport costs, enabling mobility of people and goods, as well as improving access to social and economic opportunities, e.g. employment, markets, etc. A study on Uganda by Fan et al. of the IFPRI<sup>5</sup> estimated that spending US\$10,000 (2013 prices) on rural roads would lift 261 people out of poverty. Also, improving existing accessible roads can lead to up to 50% reduction in transport tariffs. Likewise, improved rural roads were estimated to lead to a 27% increase in agricultural output in Ethiopia<sup>6</sup>.

Considering that a significant proportion of rural population in SSA is engaged in agriculture, effective maintenance of rural roads would play a major role in facilitating bulk transportation of farmers produce by truck in order to gain from the economies of scale. From the AFCAP funded study on 'Overcoming the First Mile'<sup>7</sup>, the analysis of modal differences in transport costs revealed that in Kenya back-loading costs 16 times as much per km as movement by truck. In Tanzania head/back-loading costs 23 times as much per km as movement by truck. The study concluded that there are huge opportunities to raise farmers' incomes by a substantial amount if commodities can be loaded on to a truck close to the harvest location and take the produce directly to market, if farmers work together to achieve load consolidation.

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<sup>4</sup> <http://data.worldbank.org/data-catalog/rural-access-index>

<sup>5</sup> Fan, S., Zhang, X., Rao, N. (2004a) Public expenditure, growth, and poverty reduction in rural Uganda. DSGD Discussion Paper No. 4. Washington, DC: IFPRI. [The investment basis for the number lifted out of poverty was converted at prevailing exchange rates at the time of the study by Hine et al. (2015) Table 5.3 to US \$10,000 at 2013 prices].

<sup>6</sup> Hine J, Abedin M, Stevens RJ, Airey T, Anderson T (2015) *Does the extension of the rural road network have a positive impact on poverty reduction and resilience for the rural areas served? If so how, and if not why not? A systematic review*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education, University College London.

<sup>7</sup> The AFCAP funded study on OVERCOMING THE FIRST MILE –LESSONS FROM FARMERS IN KENYA & TANZANIA (John Hine, Peter Njenga, Shedrac Wililo) – 2014/2015

The level of accessibility and mobility in/and to an area will also influence social and welfare status of a community. For example, poor access to education or health services will curtail opportunities for local communities, and especially women to gain education and skills that are necessary for socioeconomic advancement.

Despite quite obvious social and economic benefits of rural roads, these are considered by development agencies and stakeholders to be difficult to justify for investment. The existing methods of economic valuation are mainly quantitative and not adequate to capture other than purely economic benefits of roads. HDM4 for example is not practical for appraisal of lower volume rural roads carrying less than 50 vehicles per day that are typical in rural SSA. Thus the tendency is to ignore social benefits as difficult to quantify, which may lead to wrong investment priorities in rural roads. Robust socioeconomic valuation at the appraisal stage of projects would lead to sound baseline data and information on which to peg subsequent monitoring and impact studies. Baseline studies for rural roads investments are rarely done in SSA. As a result of such inherent weaknesses there is a knowledge gap on the impacts and benefits of rural roads and rural transport investments. In his analysis of methodological weaknesses of existing SSA impact studies Anthony Airey (2014)<sup>8</sup> asserts that, *“This weakness begins before the project starts when they fail to undertake baseline data collection in both suitable control and treatment areas. It continues in the analysis of data, which assumes the autonomous nature of road impacts, overlooking the importance of road access in the investment and planning decisions made by other sectors...”* In view of the existing knowledge gap there is need for a search of more evidence to substantiate the economic and social impacts of rural roads improvement, which is important for planning and policy decisions.

## 6.2 Purpose and Objective

**Purpose:** To achieve economic and social benefits for local communities in rural areas as a result of improved performance in road asset management.

**Specific objective:** Develop simple indicators of economic and social impact of rural roads and monitor them in the project areas.

## 6.3 Scope

During the formulation phase of the study it is intended to define an approach for measurement of economic and social impacts of rural roads improvement at project level. The process involves identification of appropriate performance and impact indicators, and the method of collecting the required data to gauge the performance of rural roads network condition on the rural economy and social welfare. Sound baseline data and information will be required to serve as a basis for continuous

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<sup>8</sup> Anthony Airey (2014), Good Policies and Practices in Rural Transport in Africa: Monitoring and Evaluation, SSATP Working Paper No. 99.

performance monitoring by participating countries and subsequent impact monitoring during and post-project period.

By definition impact evaluation is a post project activity used to assess whether the investment has achieved its development goal (Airey, 2014). Impact evaluations normally come as a final stage of the M&E process that in our case would draw on the results monitoring of the rural roads projects in the project areas. Due to the limited scope of this project in terms of time and available resources it will not be possible to make a rigorous socioeconomic assessment of the impact of rural roads as this can be expensive, time consuming and requires long-term data collection. For example, the measurement of income indicators as a result of road condition improvement will be outside the scope of this study. Since the project is related to all-season access the impact of reliable access on communities will be measured where possible. However, these impacts will be less evident than on projects that include a large component of new road construction.

The focus of the project will be on result-based impact assessment directly related to road network condition (i.e. direct traffic and transport benefits) for the lifetime of the project. In this respect there will be two types of monitoring: i) routine monitoring and measurement of results by the road agency (e.g. traffic counts, level of service) and ii) stand-alone time-bound research projects on social and economic impacts by transport professionals, students, etc. An example of the second category could be the maximum roughness of a road that allows viable public transport services to operate, or the cost to farmers of rough roads which result in damage to their produce.

The intention of the study is to provide a good indication of how to monitor and measure systematically and consistently the possible outcomes of maintaining good rural roads conditions. This will serve as an influencing evidence-based strategy to improve rural road agency performance as well as to influence political leaders to give greater priority and importance for rural road network management for long term sustainable change.

#### **6.4 Study Approach**

The proposed design has been drafted in the absence of specific knowledge about the countries that will be selected to participate in the project. Therefore, the detailed design of the social and economic monitoring framework with specific indicators can only be finalised once the project and country contexts are known. That said, in determining performance and impact indicators in this report the following key assumptions have been made:

- The prioritisation of maintenance and any road improvements will fit within the development framework of the district, province or agency (whichever applies). The final indicators (objectively verifiable) to work with will be matched with such objectives in order to give clarity on what impact or results are expected. In this regard the final outcomes of the study will be in line with information needs of the participating countries and as such will be more likely to be used in addressing current policy and practical issues for rural roads investment.

- Specific roads to be selected will be in a maintainable condition and not requiring rehabilitation or reconstruction. However, where necessary re-gravelling may be recommended (using own resources) to improve the asset value and ensure the road is in a maintainable condition.
- The monitoring process will be undertaken in close collaboration with, and be led by the participating road agencies in order to tap into the available and potential in-country capacities and resources for impacts monitoring and evaluation, and to set the stage for continuous M&E. Hence the assumption is that there will be basic minimum required capacities (e.g. statistical skills) and a system for results / impact monitoring of rural roads in the project areas. In that respect the project will contribute to capacity building for M&E (project-based systems) of rural roads investments in participating countries.

## **6.5 Key elements of the study**

### **1. General framework for evaluating social and economic impacts of rural roads in this study:**

Alignment with investment policies, strategies and development objectives for rural roads and related transport in the project areas, taking into account existing monitoring systems. This will enable results to contribute to future development planning and investment decisions for rural roads.

### **2. Definition of performance and impact indicators for social and economic impacts of rural roads:**

Generally, a range of indicators can be associated with social and economic impacts of rural road condition. These include output indicators (e.g. length of rural road maintained) and outcome indicators (e.g. road condition, level of service) that are directly related to road network performance. Others are transport related indicators (e.g. vehicle operating cost, transport costs, etc.), economic impact indicators (e.g. agricultural transport costs, off/in-farm employment, etc.), social impact indicators e.g. access to education, access to health facilities, and availability of emergency transport.

For the purpose of this study the following menu of indicators is proposed in order of preference. It is not expected that the participating roads agencies will be able to collect all of the indicators due to capacity constraints. During the initial visits to the participating project areas an assessment will be made of local capacity and an appropriate set of indicators will be agreed.

The first set of indicators in Table 8 are directly related to road network performance and effect on transport services - to be monitored during project duration. The second set of indicators in Table 9 are intended to measure social and economic impacts of rural roads improvement in project zones as mainly post-project activity. These will be considered under stand-alone time-bound research projects to assess impacts in project areas and communities that will be directly served by improved roads. Thus a potential researcher may wish to pick one or more related indicators to work with in the analysis of certain aspects/areas of impacts of rural roads. As such



these indicators are optional depending on interest and resource availability. Primary indicators in Table 8 will be streamlined as appropriate in collaboration with participating road agencies when the project areas have been selected. The indicators must be consistent with the ReCAP log frame indicators and any systems adopted by ReCAP management to provide a measure of return on research investment (both in financial and social terms).

**Table 8: Indicators for performance monitoring and result-based impact assessment (project duration)**

	Output Indicators	Outcome Indicators	Impact Indicators
<b>Transport Infrastructure</b>	<ul style="list-style-type: none"> <li>- length of rural road maintained (to acceptable levels) as a proportion of the project network</li> </ul>	<ul style="list-style-type: none"> <li>- road condition (roughness index)</li> <li>- level of service (e.g. elimination of road closures / reduction in travel days lost)</li> <li>- direct employment creation in road maintenance (gender disaggregated worker-days per kilometre of road maintained)<sup>9</sup></li> </ul>	
<b>Transport Services</b>		<ul style="list-style-type: none"> <li>- traffic levels (traffic counts)</li> <li>- traffic composition (cars, light/heavy trucks, buses, IMTs, motorcycles, bicycles, commercial/non-commercial)</li> <li>- vehicle operating costs</li> <li>- Road safety (accident incidents/rates)</li> </ul>	<ul style="list-style-type: none"> <li>- availability of public transport and usage, frequency</li> <li>- access to transport services (average time to reach public transport)</li> <li>- fares on public transport</li> <li>- availability of freight transport</li> <li>- freight transport cost savings</li> <li>- change in transport modes (passengers and freight)</li> <li>- travel times savings</li> </ul>

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<sup>9</sup> This indicator implies a policy of employment creation through the road maintenance works in the project area.

**Table 9: Indicators for socioeconomic impact monitoring (during and post-project) – stand-alone research projects**

	Impact Indicators
<b>Transport Services</b>	<ul style="list-style-type: none"> <li>- percentage of users satisfied with the condition of improved road (Road User Satisfaction Surveys) and continuous road maintenance</li> <li>- percentage of the population in the project zone having access to transport services on the project roads<sup>10</sup></li> <li>- maximum roughness of a road that allows viable public transport services.</li> </ul>
<b>Agricultural Economy</b>	<ul style="list-style-type: none"> <li>- agricultural output / unit of cultivated land</li> <li>- transformation of agricultural output (from low to higher value crops)</li> <li>- farm-gate prices</li> <li>- agricultural transport means and availability of trucking services</li> <li>- agricultural transport costs (per ton-km)</li> <li>- access to market (transport time)</li> <li>- post-harvest losses / unit of cultivated land</li> <li>- extent of damage of goods being transported on the road<sup>11</sup></li> <li>- use of extension services</li> <li>- on-farm employment (gender disaggregated).</li> </ul>
<b>Dominant economic activities</b>	<ul style="list-style-type: none"> <li>- non-farm employment (gender disaggregated)</li> <li>- increase in the number of shops/kiosks, etc.</li> </ul>
<b>Social services (Education &amp; Health)</b>	<p>(gender disaggregated)</p> <ul style="list-style-type: none"> <li>- access to schools /education centres (time to reach the facility)</li> <li>- school enrolment rates and school attendance rates (students &amp; teachers)</li> <li>- teacher capacity</li> <li>- access to health facilities (time to reach the facility)</li> <li>- rate of visits to healthcare services</li> <li>- health care staff capacity</li> <li>- availability of emergency transport.</li> </ul>

**3. Definition of data requirements for each indicator and the method of data collection:** This task will be carried out in collaboration with participating road agencies when the indicators (consistent with log-frame provisions) have been agreed. The study will rely on both primary and secondary data sources in participating countries. Tools for primary data collection will include traffic surveys, road user satisfaction surveys, questionnaires (district /provincial or agency level), focus group discussions (villagers, farmers, transporters, etc.), interviews, etc. Appropriate timing for primary data collection will be determined by experienced rural roads professionals in the participating countries. Secondary data sources will include rural roads sector survey reports and

<sup>10</sup> This indicator could be associated with the only one Sustainable Development Goals (SDG) target related to transport out of the 17 SDGs and 169 associated targets. Under Goal 11. ‘Make cities and human settlements inclusive, safe, resilient and sustainable’ there is target no. 11.2 that states ‘By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport,...’. “Transforming our world: the 2030 Agenda for Sustainable Development, UN October 2015”.

<sup>11</sup> Particular reference could be made to Prof. Wynand Steyn’s Caltrans project study in California that evaluated economic effect of road condition for tomato industry by determining the extent of damages and associated costs in relation to road roughness. <http://www.sarf.org.za/uploads/cms/documents/WynandJvdMSteyn.pdf>

others from the district, province, road agency or ministry, development partners involved in roads and rural development sectors. Other sources may include Central Statistical Agency, e.g. data from population census, national survey on standards of living of households (may include a database on the access of the population to basic social services), welfare monitoring surveys, demographic and health surveys.

The study will give weight to baseline data collection relying on both primary and secondary data sources to establish reliable baseline situation as a basis for assessing subsequent results and impacts of rural roads condition improvement. The timing of the baseline survey will enable the sequencing of timing and pattern for the follow-up surveys. The search and analysis of results and impacts will be conducted in the project areas with the local communities and other parties (e.g. transporters) that are likely to be influenced directly by the projects. The road's zone of influence for data collection purposes will be clearly defined. It is possible to demarcate (by GPS or other means) a catchment area as a zone of influence, e.g. 2 ~ 5km from the road. Other multiplier effects or impacts beyond the demarcated zone of influence will not be considered since the project would need to be followed long enough to allow robust measurement of such impacts, a commitment that cannot be guaranteed within the scope of this study.

**4. Definition of appropriate analysis framework for social and economic impacts of rural roads:**

The study will use a combination of simple quantitative and qualitative approach that can be understood and handled by the local counterparts in participating countries as the method of analysis of results and socioeconomic impacts of rural road improvements. It will endeavour to align the framework with existing requirements (if any) for rural roads sector monitoring and impact evaluations along with the budget constraints. The study will address mainly the short-term and intermediate impacts (results /outcomes) during the project period, as it can be difficult to determine the nature of long-term impacts of rural roads improvement, some of which are likely to evolve with time. In measuring the primary indicators for this study (listed in section 2. i) above) a single difference reflexive comparison (before and after) will be used to monitor outcomes and impacts in project areas for comparison with baseline situation. It should be noted however that this type of narrow comparison is unable to separate the road impact from the general economic and other changes that would have happened without the roads project (van de Walle, 2009<sup>12</sup>). Methods of measuring the impact indicators for stand-alone time-bound research projects under section 2 ii) can be more sophisticated and will be determined by the researchers depending on the scope of work to be undertaken, available expertise and resources.

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<sup>12</sup> van de Walle, Dominique(2009) 'Impact evaluation of rural road projects', Journal of Development Effectiveness, 1:1,15 – 36

## **7 Technical Assistance to Participating Roads Agencies**

### **7.1 Objective and Approach**

The project team will provide technical assistance to each of the participating roads agencies (excluding the Western Cape). The purpose of the technical assistance is to assist the roads agencies to identify strengths and weaknesses in their current road asset management practices and to find solutions and improved methods of operation. The basis for this assessment will be the framework for evaluation of RA performance described above. All solutions must be appropriate to the environment within which the road agency works. It is not the intention of the project to dictate an appropriate solution for each participating agency, but rather to assist each agency to develop their own solutions. These solutions will be based on international and regional best practice but will reflect the unique opportunities and challenges faced by each agency. Asset management will cover the roads and bridges in the project area as well as slope stability, materials sources, environmental management, climate resilience etc.

It is expected that improvements to road asset management practice that are put in place by the roads agencies through the technical assistance will result in improved performance as measured using the project monitoring tools.

### **7.2 Methodology**

The technical assistance component will be led by the Road Maintenance Expert. He will be supported by the Team Leader and the other experts on the team, including the Short Term Experts and post graduate students from the University of Birmingham.

The Road Maintenance Expert will visit each project area at the start of the implementation phase. He will:

- Assess and understand the current institutional set-up, road maintenance operations, management systems, network condition, staffing levels and capacity, funding sources and amounts, technical standards, forms of contract, choice of technology etc.
- Visit a sample of roads and inspect recent and ongoing maintenance works.
- Conduct a workshop in each project area to ensure maximum participation in this data collection process and invite participants to contribute practical suggestions for improving the status quo.
- Assist the roads agency to identify an appropriate road network for inclusion in the study.
- Support the other team members responsible for the performance self-assessments, road condition measurements etc. (The self-assessments will be conducted simultaneously with the initial visit or soon after).

Based on the findings of the initial visit and the performance self-assessments, the Road Maintenance Expert will prepare a draft Capacity Development Plan (CDP) for each participating roads agency

(excluding the Western Cape). The CDPs will be prepared in close collaboration with other experts on the study team, in particular the Road Asset Management Expert and the Institutional and Financing Expert. The CDPs must be closely aligned to the Framework for Assessment of Asset Management Performance and support its objectives. The CDPs will be simple, practical and achievable, and appropriate to the existing capacity levels in the agencies.

The CDPs will typically include the following:

- Summary of the existing arrangements for management of the target road network.
- Summary of existing agency capacity (human resources, offices, vehicles, IT etc.).
- Gap analysis of existing capacity against minimum requirements for effective management of the agency's road network.
- Actions required to close any identified capacity gaps including preparation of technical guidelines, training courses etc.
- Strategic plan for implementation of the identified actions including clearly defined and time-bound targets for performance improvements.
- Resources available to the agency to support the implementation of the strategic plan (in-house resources, local government, central government, private sector, AFCAP, other development partners, etc.).

The draft CDPs will be shared with the road agencies who will be required to agree and endorse every aspect of the plan. The agencies will present their CDPs at the first regional meeting of the Project Implementation Team. This may lead to further recommendations and modifications.

Each CDP will include a programme of subsequent visits by the Road Maintenance Expert and other expert advisers, trainers etc. under the project. It is expected that the Road Maintenance Expert will visit each project area for about one week every four months during the Implementation Period. These follow-up visits will assist the agencies to assess their progress in the implementation of their strategic plans and to incorporate any required modifications. It is expected that the Road Maintenance Expert will deliver training courses during these visits as required and will provide mentorship to agency staff.

## **8 Country Selection**

### **8.1 Letter of Invitation**

Letters were sent by the AFCAP PMU to all AFCAP participating countries inviting the submission of proposals for participation in the project. The letters were sent to the AFCAP Coordinators in each country. Submissions were received from South Sudan, Sierra Leone, Zambia, Uganda, DRC, Ethiopia and Malawi. Ghana indicated that they would not be able to participate due to inadequate resources. Mozambique, Tanzania and Kenya failed to submit proposals.

### **8.2 Requirements for Country Proposals**

The country submissions were required to include the following specific details:

1. Name of the state/province/district/region which is proposed to be included in the project and the capital city/town.
2. Length of the proposed study road network by paved, gravel and earth standard.
3. Population of the project area.
4. Reasons for proposing this project area.
5. Total number of staff in the road agency responsible for the proposed study network broken down by number of engineers, technicians and support staff.
6. Other resources available to the road agency in the study area (functional vehicles, computers).
7. Annual maintenance budget of the road agency over the last 3 years and the proportion of the budget that was disbursed.
8. Source of budget (e.g. road fund, state budget).
9. Types of maintenance works carried out using the budget and the implementation mechanisms (e.g. in house force account, private contractors etc.).
10. Details of any formal maintenance management system used by the road agency.

The country proposals were also expected to respond to the following general requirements:

1. To be responsive to the Purpose of the project, which is to achieve economic and social benefits for local communities in rural areas as a result of improved performance in road asset management.
2. The road network in each project area should be under a single, sub-national, roads agency or authority<sup>13</sup>.
3. There should be an existing maintenance system in place with regular funding.
4. The road agency will be required to make the results of the self-assessment publicly available and to discuss the results with stakeholders in public meetings, including in periodic meetings of the PIT.

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<sup>13</sup> The requirement for the roads agency to be sub-national is not explicit in the letter of invitation but is clear in the project Mobilisation and Inception Reports, which accompanied the letter.

The countries were also asked to include any ideas for improving or strengthening the research methodology, and the submissions should be signed by a senior government official in the proposed participating region and the AFCAP national coordinator.

The final selection of project areas is based on:

- Responsiveness to all of the above requirements.
- Achieving a geographic spread of countries.
- Including a range of institutional, financial and operational arrangements for undertaking rural road maintenance.

The country proposals were required to demonstrate “commitment” to provide resources and “willingness” to be open and transparent with the outcome of the assessments of asset management performance. It is difficult to judge these two criteria, but it is assumed that the submission of a proposal confirms a basic agreement to support the project methodology.

### **8.3 Evaluation Summary**

The evaluation of the country proposals is summarised in Table 10. Where the response to a specific requirement is seen to comply with the project objectives and/or the details requested in the invitation letter, the cell is shaded green. The total of green shaded cells provides an indication of the level of compliance with the letter of invitation and provides a basis for shortlisting countries for more detailed consideration.

**Table 10: Summary of Evaluation of Country Proposals**

The response to the ten criteria listed in the country letter of invitation are summarised in Table 10. Where the table cell is shaded in green this indicates compliance with the requirements of the invitation letter. It can be seen that Sierra Leone, Zambia, Uganda and Malawi responded best to the specific requirements.

	Criteria	South Sudan	Sierra Leone	Zambia	Uganda	DRC	Ethiopia	Malawi
Specific details	1. Name of project area	Roads are in several different parts of the country.	Kono and/or Tonkolili Districts (which are adjacent)	Lundazi District in Eastern Zambia	Agago, Kitgum, Lira and Pader districts in northern Uganda	Province of Haut-Katanga in south of DRC.	Oromiya Region (but this is a very large area)	Lilongwe District
	2. Length of project network	554km	Kono -647km Tonkilil – 606km (feeder roads)	501km	No information given for project area, but UNRA is responsible for 16,900km of earth and gravel roads in 111 districts (average 152km per district).	Single road identified: Kasomeno – Kilwa - Pweto 325km (unpaved)	No project network identified but methodology for selection network given.	984 km of rural roads (194km paved) in Lilongwe District
	3. Population of project area	50,000	Kono - 335,400 Tonkolili – 347,000	314,000	Agago – 300,000 Kitgum – 248,000 Lira – 403,000 Pader – 231,000	841,000	No specific project are identified.	630,000 (not including urban area)
	4. Reasons for proposing area	No specific area proposed.	No reasons given.	High agriculture and economic potential.	The districts are recovering from armed conflict which resulted in massive dislocation of communities.	Project area has high agricultural potential. Road was rehabilitated 2 years ago and is under maintenance.	No specific project are identified.	Logistical considerations
	5. No of staff in responsible agency	8 engineers and technicians in Ministry plus support staff	1 district engineer 1 road s/intendant 2 road supervisors Support staff -in each district.	1 Regional Manager 3 engineers 2 technicians Support staff -In Regional Office for Eastern Zambia	3 engineers 2 technicians Support staff -In two UNRA station offices in project area. Plus staff from UNRA head office as required.	4 engineers 2 technicians Support staff -of Cellule Infrastructures (government road authority) but not clear if these are for	Staff of the ERA Road Asset Management Department and the Road Research Centre. One engineer would be dedicated to the project.	Regional Engineer 3 maintenance engineers 5 road inspectors Support staff -in Road Authority Regional Office (Centre)



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Criteria	South Sudan	Sierra Leone	Zambia	Uganda	DRC	Ethiopia	Malawi
					the project area or the whole country.		
6. Resources available to agency	Ministry has vehicles, computers and offices, but specific details not given	1 vehicle 1 computer 1 laptop –in each district.	7 vehicles and computers for all staff in Regional Office.	“Trucks, tractors, graders, chain loaders, excavators, wheel loaders, pickups, rollers, and offices equipped with computers and accessories”.	2 vehicles 3 computers -but not clear if these are for the project area or the whole country.	ERA would provide vehicles etc.	Resources available in regional office.
7. Maintenance budget of the agency	Maintenance budget provided by donor for one year (amount not given). Thereafter govt. required to finance maintenance.	USD 5.6 million disbursed to 13 districts in 2015, covering 4150 km of feeder roads.	USD 119 million for maintenance of all roads in Zambia in 2015. RDA has proposed that 25% of total maintenance funding is allocated to feeder roads. No guarantee that this will be adopted.	Average maintenance budget of UNRA over the past 3 years was USD 83 million for all roads. No indication of what proportion (if any) is guaranteed for rural roads.	Average maintenance budget for past 3 years was USD 37.6 for whole country (2,200km of road under maintenance)	ERA annual maintenance budget approx. ETB 1 billion (USD 50 million)	National budget for “recurrent programmes” in 2015 was MK8.6 billion (approx. USD 17 million) for whole country.
8. Source of budget	World Bank grant. No Road Fund in place.	Road Fund	Road Fund	Road Fund	Road Fund and national budget	Road Fund and federal budget.	Road Fund
9. Type of maintenance works	No maintenance current carried out.	Routine activities carried out by contractors engaged by the local councils.	No details given.	No details given, but evidently force account methods are used.	Maintenance of road currently carried out by equipment-based contractor supervised by a consultant.	No details given.	All maintenance let to private contractors. Conventional maintenance activities.
10. Maintenance management system	No maintenance management system in place.	SL Roads Authority has a maintenance management system, but not the local councils.	Priorities for feeder road maintenance based on submissions from local councils. RDA has management systems for higher traffic roads.	ROMAPS used by station offices to prioritise maintenance.	Performance specification used to guide maintenance interventions (all weather access, speed of travel etc.) but no maintenance management system.	ERA has Pavement Management and Bridge Management systems but currently no Maintenance Management System extending to rural roads.	No formal maintenance management system in place.
<b>Total number of compliant responses</b>	<b>3</b>	<b>9</b>	<b>7</b>	<b>8</b>	<b>6</b>	<b>4</b>	<b>8</b>

**Table 11: Summary of Compliance with General Requirements**

Table 11 summarises the country responses to the general requirements described in the letter of invitation. It can be seen that Zambia and Uganda responded best to the general requirements.

Criteria	South Sudan	Sierra Leone	Zambia	Uganda	DRC	Ethiopia	Malawi
1. Project Purpose	AM needed to protect donor and govt. investments in rural roads. Rural roads serve local populations.	“The provision and condition of feeder roads is vital for livelihoods and to attract social and economic development”.	“The project will also improve connectivity and mobility thus allowing the local population easy access to social amenities such as schools, hospitals and markets among many other things”.	“Any interventions targeted at asset management of rural road infrastructure will greatly improve people’s livelihoods by promoting social inclusiveness and economic wellbeing.”	The proposal to include a single road does not respond to the purpose of the project which envisages improved performance in AM for a road network.	The proposal includes the statement that “It is very important to develop a sustainable low volume road network” but there is no mention of the link to social and economic development.	No indication of project purpose.
2. Single sub-national road agency	Currently no national Road Authority or sub-national agencies. Project would come under the Ministry.	Local District Councils	Project network is managed by RDA Regional Office (Eastern Zambia)	Project network is managed by UNRA through station offices.	Maintenance of the project road is managed by Cellule Infrastructures, presumably through a regional office in Lubambazi (but this is not stated)	It is not clear whether the project network is under the responsibility of ERA or the Oromiya Regional Roads Authority (or both).	Maintenance of district roads is carried out by the RA on an ad hoc basis, however district road maintenance in Malawi is the responsibility of the district administration, which is not part of the proposal.
3. Existing maintenance system in place with regular funding.	No	Yes – maintenance contracted by local councils and financed by Road Fund.	No systematic maintenance on feeder roads in the project area. Availability of funding for feeder roads unclear.	Yes – maintenance organised by UNRA station offices and funded by Road Fund.	The road is currently under maintenance financed by Road Fund.	ERA implements road maintenance with allocations from the Road Fund but this does not currently extend to URRAP roads, which are under the responsibility of the RRAs and/or weredas.	No formal maintenance system in place and funding for maintenance is inadequate.

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Criteria	South Sudan	Sierra Leone	Zambia	Uganda	DRC	Ethiopia	Malawi
4. Assessment results made publically available	No mention of this requirement.	No mention of this requirement.	“Feedback workshop on the findings and recommendations from the project to all relevant stakeholders; published baseline information on condition and performance of the road network in the project area.”	“UNRA commits to own the project, and will participate fully in all aspects of the project; and to actively disseminate the lessons learnt and best practices that will result from the project”.	No mention of this requirement.	The proposal includes strong commitment to being “cooperative and work towards the success of the project to our benefit and other fellow AFCAP participating countries.	No mention of this requirement.
5. Ideas for improving methodology	None given.	None given.	Outline methodology given for Research and Development Unit of RDA.	Suggestions given for broad capacity development in UNRA for AM.	None given.	None given.	None given
6. Signature of senior government official	Proposal not signed but space for signature of Undersecretary in the Ministry.	Proposal signed by Director of Feeder Roads and not by officials of proposed districts.	Signed by Director of Planning and Monitoring in Ministry of Works. No signature of representative of Lundazi District.	Proposal submitted by AFCAP coordinator. No other signatures.	Signed by the coordinator of Cellule Infrastructures.	Signed by Director General of ERA but not by any representative of Oromiya.	Proposal unsigned but apparently endorsed by Chief Executive of RA.
7. Approved by AFCAP Country Coordinator	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of fields complying	2	4	6	6	4	4	1

Table 12 combines the scoring for the total of 17 criteria identified as requirement of the country proposals. Weightings have been given to the criteria to represent their relative importance to the project. This analysis shows Sierra Leone, Zambia and Uganda to have the strongest proposals.

**Table 12: Combined Analysis and Scoring**

Criteria	Weighting	S Sudan	Sierra Leone	Zambia	Uganda	DRC	Ethiopia	Malawi
1. Name of project area	1	0	1	1	1	1	0	1
2. Length of project network	1	1	1	1	1	0	0	1
3. Population of project area	1	1	1	1	1	1	0	1
4. Reasons for proposing area	1	0	0	1	1	1	0	1
5. No of staff in responsible agency	2	2	2	2	2	0	2	2
6. Resources available to agency	2	0	2	2	2	0	2	2
7. Maintenance budget of the agency	2	0	2	0	0	2	2	0
8. Source of budget	2	0	2	2	2	2	2	2
9. Type of maintenance works	1	0	1	0	0	1	0	1
10. Maintenance management system	2	0	0	0	2	0	0	0
1. Project Purpose	3	3	3	3	3	0	3	0
2. Single sub-national road agency	3	0	3	3	3	3	0	0
3. Existing maintenance system in place with regular funding.	3	0	3	0	3	3	0	0
4. Assessment results made publically available	3	0	0	3	3	0	3	0
5. Ideas for improving methodology	1	0	0	1	1	0	0	0
6. Signature of senior government official	2	0	0	2	0	2	2	0
7. Approved by AFCAP Country Coordinator	1	1	1	1	1	1	1	1
<b>Total score</b>	<b>31</b>	<b>8</b>	<b>22</b>	<b>23</b>	<b>26</b>	<b>17</b>	<b>17</b>	<b>12</b>

## **8.4 Overall Comments on the Proposals**

### **South Sudan**

The institutional arrangements for the roads sector are still under development in South Sudan. There are no operational sub-national structures and no Road Fund. Current investments in roads are dependent on donor grants and there are no functional maintenance systems. It is recommended that AFCAP should provide support to South Sudan to develop a maintenance system, but not as a direct participant in this project.

### **Sierra Leone**

The local district councils are operational as roads agencies, with a basic establishment, ability to contract out works, and annual disbursements from the road fund. The proposal meets most of the key requirements but there is no confirmation that the proposed district councils are supportive of their own involvement. Sierra Leone is the only country from West Africa to submit a proposal.

### **Zambia**

The proposal envisages establishing AM in Lundazi District (755km from Lusaka). Responsibility would be with the Regional Office of the RDA for Eastern Zambia. The role of the district would be limited to the prioritisation of works. This is a centralised option for the management of feeder roads which is in place in many countries. There is a risk that Zambia will start to implement decentralised responsibility for feeder roads to the district councils, which may undermine any progress made with building capacity in the RDA Regional Office. The Ministry of Local Government is formally responsible for feeder roads yet the proposal is silent on their role.

The allocation of funding for feeder roads is unclear and may be a risk to the project.

The proposal envisages a significant role for the RDA Research and Development Unit. This should enhance the possibility of roll out to other parts of the country.

### **Uganda**

It is proposed to implement the project in 4 districts in the north of Uganda that were heavily affected by the civil war in the 1990s and early 2000s. The project network would be LVRs under UNRA responsibility in these districts rather than community access roads that are under the responsibility of the districts. This is probably appropriate since these districts would likely have very low capacity to organise road maintenance and are unlikely to receive allocations from the Road Fund.

The allocation of funding for maintenance of rural roads is unclear and may be a risk to the project.

The proposal envisages a significant role for the UNRA Research and Development Directorate of Network Planning and Engineering. This should enhance the possibility of roll out to other parts of the country.

## **DRC**

It is proposed to implement the project on a single 325km long road linking three towns (Kasomeno-Kilwa-Pweto). The road was rehabilitated 2 years ago and is under maintenance by a private contractor supervised by a consultant and paid from the Road Fund.

This project may result in useful research findings on appropriate specifications for gravel road maintenance in high rainfall areas, but it would be difficult to achieve the wider project objectives on a single road.

## **Ethiopia**

The proposal does not identify a specific road network to be included in the project but indicates that it would be in Oromiya Region. Oromiya is a very large region. The project would be implemented by ERA through its Road Asset Management Department in “partnership” with the Oromiya Regional Roads Authority. However, it is not clear what the role of Oromiya RRA would be and how they would benefit from capacity development for AM of rural roads in the future. Funds are available from the Road Fund for road maintenance of roads in Ethiopia but to date these have not been allocated to URRAP roads.

Given the unclear arrangements for management and funding of roads at the wereda level there is a risk that the project would fail to achieve all of its objectives, with ERA providing a national level perspective but insufficient focus at the local level.

## **Malawi**

It is proposed to implement the project in Lilongwe District for logistical reasons. The project would be managed by the RA, which implements ad hoc maintenance on district roads. Under the government decentralisation policy the districts are now responsible for district road maintenance, but they lack capacity and do not receive allocations from the Road Fund. There is a risk that capacity developed in the RA for AM on district roads would be lost when responsibility is handed over fully to the districts.

## **8.5 Analysis**

The scoring system in the table above indicates that Sierra Leone, Zambia and Uganda are most responsive to the requirements of the letter of invitation.

South Sudan is insufficiently advanced in the development of its roads sector institutions and funding arrangements to participate in the project.

DRC has proposed to implement the project on a single road rather than on a network of roads. This would significantly reduce the scope for research on the project.

Ethiopia has provided strong grounds for participation based on their proven track record in the successful implementation of AFCAP projects and high levels of cooperation and stakeholder involvement. However, Ethiopia has not yet identified a clear framework for the management and funding of rural roads, in particular those constructed under URRAP. There is a risk of a centralised perspective being applied to the project in this very large country which may undermine some of the project objectives. There is also currently no direct funding of maintenance on wereda (district) roads.

Zambia, Uganda and Malawi have similar arrangements for maintaining district roads. The annual maintenance programmes are managed by regional offices of the national roads authority on behalf of district administrations. Meanwhile local government is increasingly being given responsibility for district roads under decentralisation policies. In all three countries the districts have low institutional capacity and it is expected that the national roads authority will have a significant role in maintaining district roads for the foreseeable future<sup>14</sup>.

In Zambia, Uganda and Malawi there is a similar risk of inadequate (on no) funding being made available for maintenance of roads in the project network. However, given that Zambia and Uganda currently have more stable economies than Malawi and more stable and more adequate funding for road maintenance, it is recommended that they should be included in the project.

Sierra Leone is the only applicant that is already implementing maintenance through a decentralised local government structure. It is also the only submission received from West Africa. Therefore, Sierra Leone should be included in the project.

The proposed selection of Sierra Leone, Uganda and Zambia satisfies the need for a geographical spread of participating countries between West, East and Southern/Central Africa. These countries offer a range of institutional arrangements for road maintenance from the highly centralised approach of Uganda to the decentralised arrangements in Sierra Leone. In all cases funding is from a Road Fund. Uganda includes some force account maintenance activities, while in Sierra Leone and Zambia all maintenance is outsourced to private contractors.

The Uganda proposal as submitted as a draft to meet the submission deadline. It is recommended that the AFCAP Coordinator for Uganda should be requested to submit the final signed version. It is also recommended that more information is requested on staffing of

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<sup>14</sup> It is important that the project is sensitive to the reality of decentralisation and supportive of this policy where appropriate during the implementation phase.

the station office, where UNRA expect to recruit new staff to fulfil the required complement in the next three months. Any delays in this process could lead to delays in the start of project implementation. If Uganda is selected it is recommended that an alternative project area should be considered which is closer to Kampala to reduce logistical requirements and to ensure that most of the project roads are in a maintainable condition.

If Zambia is selected it is recommended that an alternative district should be considered which is closer to Lusaka to reduce the logistical challenges. Furthermore, it is likely that the existing road network in Lundazi District is in poor condition and not easily maintained.

It is noted that there are significant risks at the operational level with the implementation of this project. Delays in disbursement of road fund allocations in any one of the countries would disrupt maintenance activities and undermine progress. Delays in procurement of maintenance contractors would have a similar effect. Furthermore, it may take a participating country a year or more to become sufficiently organised to fulfil the project requirements, in particular the self-assessment of asset management performance and the collection of performance data. The project methodology and approach would be significantly undermined if the technical assistance team were required to take over responsibility for these activities in any of the project areas. Therefore, it might be prudent to expand the project to include four countries in addition to the Western Cape. This would allow for the possibility of a country partially or completely failing to participate. It would also broaden the overall impact and reach of the project.

The recommended fourth country is Ethiopia for the following reasons:

- Ethiopia has a strong record of successful implementation of AFCAP-funded projects.
- Ethiopia is increasing its focus on road maintenance with significant increases expected Road Fund revenues under the next Road Sector Development Programme<sup>15</sup>.
- The University of Birmingham has recently started a research and capacity building project with the Ethiopian Roads Authority through which a number of ERA staff will undertake 2- year MPhil research degrees on a split site basis at the UoB and in Ethiopia. Their degrees will be tailored towards tackling some common issues facing ERA, particularly on road asset management. The participation of Ethiopia in GEM would provide an opportunity to link one or more of the students with the GEM initiatives, thereby providing additional resources for the implementation of GEM at minimal additional cost to ReCAP.

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<sup>15</sup> Interview with the Director General of the Ethiopia Road Fund.



The impact of the project would be further extended if wider participation was permitted in the Project Implementation Team. Attendees at PIT meetings from non-participating AFCAP member countries would be free to learn from the experiences of their peers and to take these lessons back to their own countries for implementation under their own programmes.

## **8.6 Summary of Recommendations**

Two options are provided for consideration by the ReCAP PMU and Steering Group.

Option 1: This is the least cost option and would include participation by Sierra Leone, Uganda, Zambia and the Western Cape Province, with representatives of these countries attending the PIT meetings.

Option 2: This option would be more expensive than Option 1 but would have a wider impact. It includes participation by Ethiopia, Sierra Leone, Uganda, Zambia and the Western Cape Province, with representatives of all 11 AFCAP member countries attending the PIT meetings.

Option 3: This is an intermediate cost option and would include participation by Sierra Leone, Uganda, Zambia and the Western Cape Province, with representatives of all 11 AFCAP member countries attending the PIT meetings.

Cost estimates will be prepared for these three options to facilitate a decision by the ReCAP PMU.

## 9 Project Management

### 9.1 Oversight and Supervision

The overall management of the project is being provided by the ReCAP PMU with input both from the AFCAP Steering Committee and the ReCAP Technical Panel. The ReCAP Infrastructure Research Manager is responsible for supervision of the technical assistance contract and quality control of project outputs.

### 9.2 Technical Assistance

Technical assistance and management support to all aspects of the project implementation is being provided by Roughton International. The Roughton Team comprises the following experts:

Team Leader	Rob Geddes	Core team
Road Maintenance Expert	Kingstone Gongera	
Road Condition Monitoring Expert	Charles Bopoto	
Rural Transport Economist	Camilla Lema	
Institutional and Financing Expert	Mike Pinard	
Asset Management Expert	Michael Burrow	
Field Researchers (UoB PhD Students)	To be confirmed	
Other Technical Experts	Gerrie van Zyl Robert Petts Gumel Ghataora.	

The roles and responsibilities of the team members during the implementation and dissemination phases are summarised below.

#### **Team Leader**

- Manage and coordinate the technical assistance team
- Plan and programme the TA inputs
- Liaise with the participating roads agencies
- Organise the PIT meetings
- Provide technical support to other members of the core team and oversight of project inputs
- Ensure quality control of project outputs
- Assist UoB post graduate students to identify and implement research projects linked to the project objectives
- Report to the AFCAP PMU
- Disseminate study findings and lessons learned and provide recommendations for follow-up activities.

### **Road Maintenance Expert**

- Conduct an initial visit to each project area and follow-up visits (on average three times per year) until the end of the project.
- Assist each participating road agency (except the Western Cape) to conduct their own self-assessment of performance in road asset management using the project framework
- Provide feedback to the Asset Management Expert on the usefulness of the framework and make recommendations for modifications where necessary
- Assist each participating road agency (except the Western Cape) to prepare a capacity development plan
- Monitor the implementation of the CDPs
- Provide mentoring to roads agency staff as required
- Prepare technical guidelines and training materials as required
- Conduct ad hoc training courses on demand
- Support the work of the Road Condition Monitoring Expert and Rural Transport Economist wherever possible
- Attend the annual regional PIT meetings
- Report to the Team Leader
- Disseminate study findings and lessons learned.

### **Road Condition Monitoring Expert**

- Conduct an initial visit to each project area in order to train road agency staff on the requirements for road condition monitoring
- Conduct a follow-up visit to each project area during the initial phase to verify the data collected and its analysis, and introduce any refinements to the methods
- Visit each project area during the annual monitoring activities to verify the road condition data collected and its analysis, and introduce any refinements to the methods
- Support the work of the Road Maintenance Expert and the Rural Transport Economist wherever possible
- Attend the annual regional PIT meetings
- Report to the Team Leader
- Disseminate study findings and lessons learned.

### **Rural Transport Economist**

- Conduct an initial visit to each project area in order to train road agency staff on the requirements for collecting the social and economic indicators
- Conduct a follow-up visit to each project area during the initial phase to verify the social and economic data collected and its analysis, and introduce any refinements to the methods

- Visit each project area during the annual monitoring activities to verify the social and economic data collected and its analysis, and introduce any refinements to the methods
- Support the work of the Road Maintenance Expert and the Road Condition Monitoring Expert wherever possible
- Attend the annual regional PIT meetings
- Report to the Team Leader
- Disseminate study findings and lessons learned.

#### **Institutional and Financing Expert**

- Attend the annual regional PIT meetings
- Contribute to refinements to the Performance Framework for Rural Road Asset Management and the road condition monitoring methodology based on feedback from the core team and the PIT
- Provide technical training inputs in the project areas or through the PIT as required
- Quality control of reports
- Disseminate study findings and lessons learned.

#### **Asset Management Expert**

- Attend the annual regional PIT meetings
- Implement refinements to the Performance Framework for Rural Road Asset Management based on feedback from the Road Maintenance Expert and the PIT
- Support and oversight of UoB post graduate students
- Report to the Team Leader
- Disseminate study findings and lessons learned.

#### **Field Researchers (UoB PhD Students)**

- Facilitate project activities where they are being implemented in their home country including resolving bureaucratic impediments at national level
- Identify and implement research projects linked to the project objectives, and conducted within the auspices of the project, for purposes of the post graduate qualifications
- Report to the Team Leader
- Disseminate study findings and lessons learned.

#### **Other Technical Experts**

- Provide technical advice and support as required
- Provide technical training inputs in the project areas or through the PIT
- Contribute to project reports as required
- Quality control of reports
- Disseminate study findings and lessons learned.

### **9.3 Project Implementation Team**

The Project Implementation Team (PIT) will comprise two representatives from each of the participating roads agencies and representatives of the technical assistance (observer status). Representatives of AFCAP member countries that are not participating directly in the project could be invited to attend the PIT meetings. This would provide these countries with an opportunity to learn from the project experiences and implement the approaches within their own programmes. The PIT will elect a Chairperson who will moderate meetings of the group and will act as spokesperson on behalf of the other members. The PIT will meet annually for the duration of the implementation phase.

The principal purpose of the PIT is to provide a forum for the participating agencies to share the outcome of their self-assessment of performance in road asset management, the road network condition monitoring and the social and economic indicators. It is expected that the process of sharing this information will provide an incentive to roads agency staff to improve their performance in accordance with their strategic plan. Feedback from peers in the other participating regions and the wider AFCAP group will be invaluable in supporting and refining the capacity development process.

The PIT meetings will be held in the participating regions on a rotational basis. The first meeting of the PIT will be held in the Western Cape. Each meeting will include a visit to a selection of roads under maintenance by the host agency. Travel expenses and accommodation and subsistence at the meeting venue for the participants will be met by the project. Three days will be allocated for each meeting, including the site visit.

The PIT will be required to report on progress of the project including achievements in each of the participating project areas. The report will include comments and suggestions from the PIT on the project design and implementation strategy, including the quality and appropriateness of the technical assistance. The report may take the form of a written submission coordinated by the Chairperson of the PIT and/or a verbal presentation where this is possible. The PIT will report annually, after each PIT meeting, to the AFCAP PMU, the ReCAP Steering Group and the Annual General Assembly of the Africa Road Maintenance Fund Association (ARMFA)<sup>16</sup>. If the project is successful there is a possibility that AFMRA will absorb the PIT within its own structures and take over responsibility for the wider roll out of the project approaches.

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<sup>16</sup> The next General Assembly of ARMFA is scheduled for September 2016 in Ghana.

## **10 Work Plan for the Implementation Phase**

### **10.1 Initial Phase (4 months)**

The initial phase of the project implementation will include the following activities:

- Identify a target road network in each participating area.
- Conduct baseline studies in each participating area including:
  - Self-assessment by each participating road agency of their performance in road asset management against the new performance framework for rural roads asset management; review by the project team of the self-assessments.
  - Collect road condition data on the target road network
  - Collect social and economic data linked to road condition.
- Prepare a Capacity Development Plan (CDP) for each participating road agency.
- Discuss the baseline data and CDPs with sector stakeholders initially in each area and at a regional meeting of the PIT. Prepare a progress report of the PIT to AFCAP management.
- Report to the next Annual General Assembly of ARMFA.

### **10.2 Growth Phase (24 months)**

The growth phase of the project will include the following activities by the technical assistance team:

- Visit each participating region (excluding the Western Cape) three times per annum (on average) to provide technical back-up support, mentoring and training inputs, advise on refinements to the CDP, etc.
- Repeat the self-assessments of asset management performance and the monitoring data collection in each project area one and two years after the initial baseline survey.
- Arrange annual meetings of the PIT
- Report on progress to the AFCAP PMU, ARMFA and other relevant regional and international forums.

### **10.3 Conclusion and Dissemination (2 months)**

The conclusion and dissemination phase of the project will include the following activities by the technical assistance team:

- Conduct a workshop with sector stakeholders to disseminate the results of the project and prepare a Dissemination Workshop Report; it is likely that this workshop will be held in conjunction with the final meeting of the PIT
- Prepare appropriate guidelines for rural road asset management including the Performance Monitoring Framework, road condition monitoring tools and indicators for social and economic impacts of rural roads

- Produce a paper (or papers) suitable for peer review that may be presented at regional or international conferences and/or published in recognised technical journals.

#### **10.4 Deliverables**

The following project deliverables are proposed. Where the timing of these deliverables varies from the timing envisaged by the Terms of Reference, the original timing is indicated in italics in parentheses.

- An Inception Report for the implementation and dissemination phases - 1 month after receiving the go-ahead for the implementation.
- A Baseline Study Report - 5 months after receiving the go-ahead for the implementation (*8 months after contract signing*).
- Quarterly Progress Reports - starting 3 months after the Baseline Study Report (*no timing given in TORs*).
- A Final Study Report - 36 months after contract signing (*24 months after contract signing*).
- Guidelines for monitoring of performance in rural road asset management - included in the Final Study Report (*24 months after contract signing*).
- Dissemination Workshop Report - included in the Final Study Report (*27 months after contract signing*).

#### **10.5 Workplan and Inputs**

The indicative workplan and time inputs by each member of the technical assistance team are shown in Figure 1. Estimated inputs for the project team are given for the two options for country selection described in Section 8.6. It is assumed that implementation will commence in June 2016.

According to the Terms of Reference the overall duration of the project is 27 months, of which 5 months comprise the Formulation Phase and 22 months the Implementation and Dissemination Phases. It is recommended that the implementation and dissemination period should be extended to 29 months given relative immaturity in asset management in the participating countries. By extending the implementation and dissemination period to 29 months it will be possible to conduct three rounds of self-assessments in the participating regions as well as three meetings of the PIT.

The proposed workplan and inputs for the implementation and dissemination phase are shown in Figure 1. It is proposed that the total time input of the advisory team should be increased from 81 person-months (as per the TORs) to 86 person-months for Option 1 and Option 3 and to 91 person-months for Option 2. The reasons for the increase in inputs include the following:

1. The increase in the number of participating countries from three to four (or 5 for Option 2) through the inclusion of a region already implementing 'best practice' in road asset management namely the Western Cape in South Africa.
2. The increase of the core professional team from two to four members to improve the range of skills and experience available to the project.
3. The need to accommodate the significant increase in the number of knowledge sharing and dissemination events through the annual PIT meetings (comprising representatives of AFCAP member countries), and attendance at the ARMFA Annual General Assembly.
4. Extension of the project implementation period from 21 months to (the proposed) 29 months to enable three rounds of baseline data collection and self-assessment of road asset management practice in the project areas and three meetings of the PIT.



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Activity	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	
Project launch meeting	■																													
Baseline data collection and analysis	■	■	■										■	■	■												■	■	■	
Self assessments of performance	■	■	■											■													■			
PIT Meetings				■												■													■	
Technical assistance inputs			■		■			■					■				■				■					■				
Dissemination workshop																													■	
Inception/Baseline/Quarterly Reports			■		■			■					■				■				■					■				
Final Report																													■	
Phase	Initial			Growth																							Diss.			

OPTION 1 and 3 (3 countries + W Cape)

Expert	Estimated time inputs (days)																										Total days					
Team Leader	6	14	2	6	3	1	1	1	10	1	1	1	3	2	2	6	3	1	1	1	12	1	1	1	4	2	2	10	6	105		
Road Maintenance Expert	6	18	2	6	18				20				20	2	2	6	20				20				20	2	2	8	2	174		
Road Condition Monitoring Expert	6	22	1	6	1				2				1	10	2	6	1							4			2	10	2	8	2	86
Rural Transport Economist	6	14	1	6	1				2				1	10	2	6	1						4			2	10	2	8	2	78	
Institutional and Financing Expert	6		1	6					1				1			6	1						1			1	1		8	2	35	
Asset Management Expert	6		1	6					1				1			6	1						1			1	1		8	2	35	
Field researchers	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	1320	
Other Technical Experts				6					12				6			4	6				12				6			4	2	58		
<b>Days</b>																										<b>1891</b>						
<b>Months</b>																										<b>86.0</b>						
(TOR budget 81 months)																																

■ Inputs provided in participating project areas.  
 ■ Launch meeting in Pretoria.

OPTION 2 (4 countries + W Cape)

Expert	Estimated time inputs (days)																										Total days				
Team Leader	6	16	2	10	4	1	1	1	14	1	1	1	4	2	2	10	3	1	1	1	14	1	1	1	4	2	2	12	6	125	
Road Maintenance Expert	6	24	2	8	24				24				24	2	2	8	24				24				24	2	2	8	2	210	
Road Condition Monitoring Expert	6	24	2	8	2				2				2	13	2	8	2						5			2	13	2	8	2	103
Rural Transport Economist	6	16	2	8	2				2				2	13	2	8	2						5			2	13	2	8	2	95
Institutional and Financing Expert	6		1	8	1				1				1			8	1						2			1	1		8	2	41
Asset Management Expert	6		1	8	1				1				1			8	1						2			1	1		8	2	41
Field researchers	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	1320
Other Technical Experts				8					15				6			4	6				15				6			4	2	66	
<b>Days</b>																										<b>2001</b>					
<b>Months</b>																										<b>91.0</b>					
(TOR budget 81 months)																															

■ Inputs provided in participating project areas.  
 ■ Launch meeting in Pretoria.

Figure 1: Workplan and Inputs for Implementation and Dissemination

## 11 Monitoring and Evaluation

### 11.1 Approach

Monitoring and evaluation are inherent in the project design. The research concept is based on building incentives for government agencies and road agencies to improve their performance in rural road asset management by monitoring their performance and publishing the results.

In addition to the monitoring of road agency performance using the tools described above, the project team will also collect data for the ReCAP performance indicators. The indicators will be included in the project quarterly report and the final report at the end of the project.

### 11.2 Log Frame Indicators

An initial assessment has been made of the likely contribution of the project to the ReCAP log frame indicators, with any relevant assumptions. This assessment is summarized in the Table 13. Milestone 2 will apply if the project is restricted to the current duration of 27 months. The achievement of the Milestone 3 targets assumes that the project timeframe will be extended until at least July 2018.

**Table 13: Summary of Log Frame Indicators and Targets**

INDICATOR	Milestone 1 (July 2016)	Milestone 2 (July 2017)	Milestone 3 (July 2018)	Assumptions
Outcome Indicator 1				
SUSTAINABILITY: Partner Government and other financiers co-funding research with ReCAP. Contribution in kind (K) relates to funding of trial sections, staff time, to funding of research programme core costs, research contracts, dissemination and training. Core contributions (C) relates capacity building and knowledge management.	K = £10,000	K = £20,000	K = £30,000	Participating countries allocate two staff-months per annum to data collection plus vehicle and allowances
	C = 0	C = 0	C = 0	
Outcome Indicator 2				
Concrete examples of change (applied or formally adopted), influenced by ReCAP research that will be applied to km of road in focus countries. Note: km of road lifespan of ReCAP influenced incorporates road programmes that are planned and designed based on ReCAP	0 km	600 km	1,200 km	Improved maintenance on (average) network of 400 km in 3 countries. Improvements on only 50% after first round of

INDICATOR	Milestone 1 (July 2016)	Milestone 2 (July 2017)	Milestone 3 (July 2018)	Assumptions
guidelines. Implementation does not necessarily have to occur during lifespan of ReCAP.				performance monitoring.
Outcome Indicator 3				
Number of citations in academic articles of ReCAP articles and/or working papers, conference papers etc.	2	4	6	2 papers at Mombasa conference and 4 in subsequent conferences.

Output Indicator 1.1				
LVR: Number of peer reviewed papers generated from ReCAP supported or related LVR research projects made available in open access format.	0	1	2	Appropriate journals identified.
Output Indicator 1.2				
TS: Number of peer reviewed papers generated from ReCAP supported or related transport services research projects made available in open access format.	0	1	2	Papers on economic indicators related to transport services.
Output Indicator 1.3				
ENGINEERING Research: National policies, manuals and guidelines and document outputs fully incorporated into Government/Ministerial requirements, specifications and recommended good practice that have been modified or introduced as a result of ReCAP engineering research (including climate change adaptation and AFCAP and SEACAP adaptations)	0	1	3	Improved asset management practice adopted in 3 countries by 2018.
Output Indicator 1.4				

INDICATOR	Milestone 1 (July 2016)	Milestone 2 (July 2017)	Milestone 3 (July 2018)	Assumptions
TRANSPORT SERVICES Research: National policies, regulations and/or practices for rural transport services modified or introduced as a result of ReCAP research (including road safety and gender and AFCAP and SEACAP research )	0	0	0	Currently not part of project objectives.
Output Indicator 1.5				
Cost Benefit Analysis conducted to determine cost effectiveness of the solutions proposed based on ReCAP research, conducted on a whole of life road cost basis.	0	0	4	Cost benefit analysis carried out on maintenance investments in 4 countries.
Output Indicator 1.6				
LVRR and TS information generated for dissemination, and disseminated, that is not peer reviewed. Total to include research papers, final research reports, workshop reports, manuals and guidelines	4	10	14	Country performance reports prepared and disseminated locally and in PIT. Research findings include in UoB short course curricula.

Output Indicator 2.1				
Research capacity: Proportion of research projects undertaken by country-based African/ Asian experts or institutions taking lead roles.	0.8	0.8	0.8	All researchers based in Africa except UoB staff.
Output Indicator 2.2				
Number of research projects managed through National Research Centres and supported by ReCAP funding for technical assistance and capacity building. Operational-initiating, carrying out and producing papers from research projects.	0	0	0	Links established to national research centres but not directly involved.
Output Indicator 2.3				

INDICATOR	Milestone 1 (July 2016)	Milestone 2 (July 2017)	Milestone 3 (July 2018)	Assumptions
Number of research projects with female researcher inputs at senior technical level.	1	1	1	Min 2 females on research team.

Output Indicator 3.1				
Research centres in partner countries are linked to an electronic repository for rural transport knowledge.	0	0	0	Not part of project objectives.
Output Indicator 3.2				
ReCAP generated knowledge presented and discussed at high level international development debates and conferences. Cumulative targets where high level = multilateral such as UN, IFIs, AU, ECOWAS, SAARC or other similar inter-ministerial level.	0	0	1	AFCAP PMU will identify appropriate forum.
Output Indicator 3.3				
ReCAP generated knowledge disseminated through dedicated training and workshops, virtually or physical, that are positively rated by participants. Cumulative number of workshops organised by ReCAP.	4	8	12	Workshops in each participating country and regional PIT meetings. Additional dissemination workshops at regional conferences.

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## **Annex B: Review of Existing Rural Roads Asset Management Practice**

### **Overview**

Many African countries gained independence in the late 1950s and 1960s. This resulted in a shift in policy from the provision of roads mainly for strategic and military reasons to the provision of roads for national development. There was a marked increase in road construction and by the end of 1980 over 2 million kilometres of roads had been constructed in Sub Saharan Africa with an estimated asset value of US\$150 billion (World Bank, 1995). Unfortunately this expansion of the network did not take into account the limitation of national governments to sustain the recurrent maintenance requirements. The World Bank estimates that by 2000 over 33% of the asset value had been lost due to lack of routine and periodic maintenance.

Institutional reforms implemented under the Road Management Initiative (RMI), which started in the mid-1990s, resulted in the establishment of road maintenance funds in many countries and semi-autonomous roads authorities. This resulted in improved the maintenance of national roads but less impact at a sub-national level on rural road networks. Funding to maintenance continues to be inadequate and there are severe capacity constraints in roads agencies and the private sector.

The following case studies summarise the current arrangements for road maintenance in several countries and regions in Africa. The purpose is not to provide a comprehensive description of rural road maintenance arrangements in each country, but to identify any common themes including “what works” and “what is less successful”. This will inform the further development of the methodology for the implementation phase of this project and the selection process for the participating countries. A more detailed description of the country programmes and the outcome of the desk study will be included in the Design Report of the Formulation Phase.

### **Ethiopia**

Rural accessibility in Ethiopia is low. It is estimated that only 10% of the rural population live within 2 kilometres of an all-weather road (Vivien et al, 2010). In 2010 the Ethiopian government, through the Growth and Transformation Plan (2010 -2015), directed that all the villages (kebeles) should be connected by an all-weather road. In response to this the government launched the Universal Rural Road Access Programme (URRAP) which aimed to construct more than 70,000 km of gravel access roads over a five year period. The cost of the programme exceeds US\$1 billion. The programme of road works is being managed by the regional roads authorities under the coordination of the Ethiopia Roads Authority (ERA) and has achieved an impressive output of new roads.

The dramatic expansion of the rural road network in Ethiopia has, however, not been matched by development of a corresponding system for maintenance of the roads. The responsibility for rural roads falls under the wereda administrations but the weredas lack



capacity to manage the roads and receive no funding allocations from either the central government, regional government or the Road Fund. There is no national strategic plan in place for the establishment of a viable road maintenance system with sustainable long term funding. Given the difficult terrain and climatic conditions in much of Ethiopia it is expected that the lack of maintenance will lead to an accelerated decline in the condition of the network.

### **Malawi**

The Malawi economy is strongly dependent on agriculture and therefore on reliable access to rural areas. Several rural road initiatives have been made in support of agriculture from the 1970s. These include the District Road Improvement and Maintenance Programme (DRIMP-World Bank), Village Access Roads and Bridges Assistance Unit (VARBAU-World Bank), Malawi Social Action Fund road works (MASAF-World Bank, DFID), Public Works Programme (PWP-EU), Income Generating Public Works Programme (IGPWP-EU), Agriculture Sector Wide Support road component (ASWAp-World Bank) and the Rural Infrastructure Development Programme (RIDP-EU). All the above programmes had one thing in common: they tended to be donor driven, including parallel management arrangements (Project Management Units), and resulted in limited local ownership and a consequent lack of maintenance of the completed roads. The construction and rehabilitation programmes did not develop the institutional, human and capital capacity to maintain the road infrastructure. The district councils in Malawi are responsible for district roads under the government's decentralisation policy but they do not receive regular allocations for maintenance from the road fund (Human Dynamics, 2015).

Maintenance initiatives established under projects such as IGPWP and RIDP as part of their exit strategies have received some support from the government, but none of these programmes has managed to establish an effective national strategy for rural road maintenance. Most of the road maintenance is organised by the Malawi Road Authority, with ad hoc interventions on district roads when funds permit.

### **Mozambique**

Road maintenance in Mozambique is organised at provincial level by provincial "delegations" of National Road Administration (ANE). The ANE delegations are supported by private consulting firms who assist with the management of the annual work programmes. The annual programme is coordinated by the Directorate for Maintenance (DIMAN) at ANE Head Office and is funded by the Road Fund. All of the works are contracted to the private sector following the disbanding of the government force account operation (ECMEP) in the early 2000s. ANE is responsible for the maintenance of all classified roads.

The provincial maintenance programme is relatively well funded (approximately US\$10 million per province per annum) and there have been significant improvements in the standard of maintenance in the past decade. However, the current strategy to let multiple short duration (mainly one year) maintenance contracts to a large number of small

contractors is inefficient and is not contributing to long term development of capacity in the sector. The management of a large number of small maintenance contracts requires a full procurement department within ANE at provincial level, which may not be necessary if there were only a few maintenance contracts in the province and they were for longer duration. ANE also maintains a substantial complement of technical staff at provincial level, notwithstanding the services of the provincial consultants. In addition to this the Road Fund now has its own provincial delegations. All of these staff need offices and vehicles etc. Funds spent on management are not available for maintaining roads (Mott MacDonald, 2015). Meanwhile there have been reports of road works paid for at provincial level but either not completed on site or completed to a low standard<sup>17</sup>.

Non-classified feeder roads are maintained by the district administrations. They receive direct (but small) allocations from the Road Fund and are authorised to let their own maintenance contracts. Most of the works at district level include spot improvements and minor repairs. Technicians employed by the district receive technical support from the ANE provincial delegations.

**Tanzania** (also refer to Annex A- notes on team meeting in Dar es Salaam)

The maintenance of higher level rural roads in Tanzania is the responsibility of the Tanzania National Roads Agency (TANROADS), which was established in 1997 as part of institutional reform in the road sector. TANROADS is an implementing agency reporting to the Ministry of Infrastructure Development<sup>18</sup>, which is responsible for policy formulation and monitoring. TANROADS is responsible for a network of trunk roads and regional roads comprising 28,510 km of which about 4,100 km is paved. All maintenance works are contracted out and managed by the TANROADS Regional Managers.

The district road network in Tanzania comprises about 56,000 km and is the responsibility of district councils. The district councils are required to adhere to uniform procedures for planning their maintenance programmes and funding applications. This process is coordinated by an infrastructure unit in the PMO-RALG<sup>19</sup>. PMO-RALG uses information from the districts to prepare the annual work programme and enters into a performance agreement with the Road Fund Board on behalf of the districts (IT Transport, 2010).

The management of road maintenance at the district level is constrained by several factors. An institutional assessment carried out in 2010 identified the following constraints from the perspective of the District Engineers:

- Limited budget and unsteady flow of funds

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<sup>17</sup> Author's personal experience.

<sup>18</sup> It is noted that there have been frequent changes in the name of the responsible ministry in recent years.

<sup>19</sup> Prime Minister's Office - Regional and Local Government.

- Political interference
- Lack of motivated staff (low salary; lack of accommodation)
- Lack of equipment
- Erosion problems
- Lack of gravel material.

The 2010 study found that maintenance works were mainly carried out by contractors using large equipment. There were no small scale contractors that had been awarded significant road maintenance contracts in the study area. Communities were involved only in a passive manner, for example through providing materials for road works when required. Some people from the district had attended training in labour based technology in road maintenance, but most had never been awarded any contracts.

PMO-RALG conducted a research project on alternative and improved district road maintenance systems between 2010 and 2012. The project was supported by AFCAP. The methodology included implementing different forms of contract for maintenance in three different districts. The results and key findings were as follows (IT Transport, 2013):

- Community contracts for routine maintenance (Mpwapwa Districts) were the most successful of the alternative road maintenance systems tested.
- Longer term maintenance contracts would provide more continuous attention to the maintenance of roads than the short duration contracts currently used.
- The procurement process for the maintenance contracts was affected by bureaucratic delays and staffing problems. This resulted in significant delays. The potential gains through improved efficiency and reducing the bureaucratic delays in the institutions responsible for implementing district road maintenance contracts, primarily the councils, may exceed any gains achieved through improved forms of contract.

### **Uganda**

Uganda received significant funding from the AfDB and BADEA<sup>20</sup> in the 1990s under the Uganda Strategy for Rural Feeder Roads Rehabilitation and Maintenance Programme. This was aimed at improving rural access as a catalyst to agricultural production. The programme was managed centrally by the Ministry of Works and Transport (MOWT). By 2004 the rural feeder roads had improved significantly from 15% to 60% in good condition. Following this major investment in rural roads a Strategy for Sustainable Maintenance of District and Urban Roads (DUCAR) was launched.

The 2004 Government “Strategy for Sustainable Maintenance of District, Urban and Community Access Roads (DUCAR)”. It envisaged a reliance on private contractors for maintenance of the DUCAR network with the contractors engaged by the local authorities.

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<sup>20</sup> Arab Bank for Economic Development in Africa.

This strategy was supported by development partners, in particular DANIDA, who made considerable investments in capacity development in the MOWT, district local government and the training of small contractors. The DUCAR strategy was, however, undermined by inadequate budget allocations to support the maintenance works and local authority revenue streams were cut by the abolition of the Graduation Tax in the mid-2000s. The policy of the government to create new districts through sub-division further reduced revenue for individual councils, and reduced their capacity to support a basic establishment for road maintenance.

In 2008 the government then decided to change its approach to the maintenance of district roads through the reintroduction of force account. This included the establishment in each district of a unit for light road maintenance works and Zonal District Roads Regravelling units, which would act as plant hire organisations for the districts. The government also decided to reintroduce direct labour road gangs for routine maintenance of district roads and districts were advised to prepare for the recruitment of the workforce, procurement of tools and implements and the construction of road camps.

The government's decision to strengthen district force account was in response to the continued poor condition of district roads and demonstrated a lack of confidence in the private sector to implement the works efficiently and at cost effective rates. It also reflected a lack of confidence in the capacity of district road agencies to act as the client for road maintenance works under commercial contracting arrangements. However the new policy tended to undermine gains that had been made in recent years with the training and establishment of local contracting firms and the promotion of labour based techniques for district road construction and regravelling. It failed to recognise that some districts already operated road construction equipment, yet their roads were in poor condition as a result of insufficient funds for purchase of fuel, lubricants and spare parts, lack of capacity to maintain construction equipment and abuse of equipment and illegal hiring to the private sector (Parsons Brinckerhoff, 2010). It also contradicted the government's Construction Industry Policy which aimed to reduce direct labour units employed by government to 10% , leaving the 90% of all work implemented by the private sector by 2013 (Govt. of Uganda, 2008)

By 2015 district local government councils continued to manage the classified rural road network (and some non-classified roads), with the rest of the non-classified road under sub-county local government. However the government is discussing the formation of DUCA – District, Urban, Community and Access Roads Authority, which would centralise the management of the non-national roads. This may reveal an ongoing concern at central level concerning the standard of district road maintenance. The districts and sub-counties receive

direct allocations for road maintenance from the Road Fund but the roads are reported to be in “fair” and “poor” condition<sup>21</sup>.

### **Zambia**

A large part of the Zambia road network was constructed in the early 1960s following independence, and during a period when the Zambian economy was performing well supported by the copper revenue. Nationalization of the mines in 1972 triggered a decline in economic performance and the increase in oil prices in the 1970s further worsened the situation. Roads that had been constructed during the economic boom did not receive maintenance and this resulted in significant deterioration. A road condition survey in 1995 showed that 95% of rural feeder roads were in poor condition (RDA, 2014).

In the late 1990s and 2000s the government established a National Road Fund Agency (NFRA) and the Road Development Agency (RDA). The focus of these agencies was the rehabilitation of roads constructed in the 1960s and new construction. In the 2000s the RDA commissioned maintenance contracts on higher traffic rural roads using the Output and Performance Based Contract (OPRC) specification and with support from the EU and World Bank. Whilst successful in achieving improved road conditions for the duration of the project neither the EU nor World Bank funded initiative contributed to the development of a sustainable national strategy for rural road maintenance (NYU, 2007; Crown Agents, 2009). Meanwhile the responsibility for district roads has been delegated to District Councils, who tend to prioritize urban streets. There are no allocations from the NRFA specifically for rural roads.

The literature review and discussions in Zambia highlighted the following situation prevailing in Zambia:

- The procurement of services for construction and maintenance is affected by bureaucracy resulting in delays in implementing the projects
- Private sector capacity to implement and supervise road works is limited resulting in poor quality work being produced by contractors and paid for by government
- There is a general lack of maintenance culture for roads in Zambia.
- Inadequate funding and unclear institutional arrangements for the management of rural feeder roads has exacerbated the problem of lack of maintenance.

A visit was carried out to Zambia in January/February 2016. The purpose of the visit was to verify information obtained during the literature review. The visit confirmed the following:

- Funding for low volume rural roads was not treated as a priority since the budget provisions did not provide allocations specific to rural roads.

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<sup>21</sup> Project internal sources.

- The responsibility to maintain rural roads was given to District Councils who have very limited capacity to do the work.
- The District Councils prioritize urban access roads within the administrative town and totally neglected the rural roads serving the villages.
- Where tenders for maintenance of rural roads were issued, the approach focused on single routes and not the entire road network thus limiting the impact of improved access to the single route and not the road network as a whole.
- The visit also confirmed that procurement procedures for goods and services followed a cumbersome process that can last up to three months before goods/services are procured.
- Funding for road maintenance on the entire road network was very low. Out of an annual budget requirement of US\$721 million dollars, only 21.5% was availed for maintenance while the bulk of the funds were allocated to new construction and rehabilitation.

### **Zimbabwe**

The major rural roads construction project was carried out in Zimbabwe following Independence in 1980. The construction programme was co-funded by the government of Zimbabwe and Germany. The construction work was carried out using plant hired from the private sector and government equipment through force account. The programme started in 1985 with a national road network planning and economic evaluation exercise that identified and prioritised a core rural road network of 25,000km. All 60 district councils in Zimbabwe were involved in this process, but it was decided that this network would be managed centrally. The prioritization process used a socio economic planning procedure linked mainly to agricultural outputs.

The project included:

- Establishment of a Road Engineering Division headquartered in Harare to carry out the construction works
- Development of a road maintenance system.

The road maintenance system divided the road network into small manageable units of between 150 -200km. These units were provided with a dedicated allocation of funds from the state budget based on the length of roads to be maintained. The unit also received a full complement of equipment comprising a tractor, towed grader, trailer and a water bowser. The unit was allocated personnel specific to the network under its geographic boundary and a Road Unit Supervisor. A total of 204 units were formed and the programme recorded significant success during the 15 years of implementation (1985 -1999). This was primarily due to the following reasons:

- Rural roads were managed by a separate entity from the one looking after the national trunk roads; this organisation was a semi-autonomous government department which enjoyed relative independence.
  - The road construction funded by the donor had a number of conditions:
  - The government of Zimbabwe had to spend 100% of the money required for construction, and then upon producing proof of expenditure and related progress, the donor refunded 80% of the money. The up-front funding and 20% government net contribution forced the government to take ownership of the programme.
  - The provision of funds for construction in the following year was based on the condition that adequate maintenance funding for the roads constructed in the previous year were fully provided through the government recurrent budget.
- A comprehensive staff development exercise was conducted during the inception phase to “qualify” personnel for their roles.
- The use of low cost intermediate equipment made road maintenance affordable and efficient.
- The parcelling out of roads into smaller units with a full complement of equipment, funding and personnel assisted with the overall management of the scheme.

At the end of 2000, which coincided with the end of the programme, the Zimbabwe currency started to lose value against major currencies. The roads had reached their design life of 15 years and periodic maintenance work was required across the network. The equipment was reaching the end of its life: the tractors had clocked more than 10 000 hours, and the donor funding ceased. Declining government salaries resulted in staff turnover and the organisation lost its institutional memory. Roads started to deteriorate due to lack of maintenance. The government abandoned the tractor based maintenance approach and ordered motorized graders to carry out road maintenance. By 2010 the tractor based maintenance system was no longer effective and was replaced by expensive, inappropriate heavy graders. The administration perceived that motorized graders were more efficient and faster than the tractor drawn graders. The allocations from the Road Fund were not sufficient to sustain the operations and the system collapsed.

### **Western Cape Province of South Africa**

The Western Cape province of South Africa offers an example of good practice in management of rural roads on the continent. Situated in the south western corner of the continent, it is the fourth largest province in South Africa both in size and population. The province has a gravel road network of some 10,500 km<sup>22</sup>. The management of these roads is

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<sup>22</sup> In addition to a paved road network of 7,000km. The Province also has about 15,000km of “other” roads with known locations but receive no regular attention from the Province.

under the responsibility the Department of Transport and Public Works in the Government of the Western Cape. The provincial government recognises the importance of roads to support local economic development and the maintenance of roads receives high-level political support. The Department is well funded by regular allocations from the provincial treasury (annual budget R3.1 billion<sup>23</sup>). It has managed to retain a cadre of experienced and dedicated staff who operate in a business-like manner and share a vision to provide a world-class service to the public.

Road maintenance is guided by a strategic plan and programme of works for an annual and five year programme. A relatively sophisticated asset management system has been installed as an important tool for the road network managers. Road condition and traffic counts are collected routinely and stored in an Oracle database with all road assets spatially referenced and linked to display information through a GIS. Sources for gravel wearing course material are closely managed. Economic and preservation analyses are used to distribute the available funding to different major activities and to provisionally prioritise activities. Final prioritisation of periodic maintenance (reseals) is done in consultation with District Municipalities (DM). Regravelling, upgrading and rehabilitation priorities are determined in consultation with the DMs as well as communities. The system is managed by a team of project managers, district engineers and technicians each with a well-defined set of roles and responsibilities. Regular checks and evaluations of the programme are carried out with independent performance assessments.

The bulk of maintenance on the gravel road network is carried out by in-house force account units. It has been found that prices submitted by private contractors are competitive for routine maintenance works. The in-house units are also seen as an important training ground for staff. Capacity development of staff is an ongoing priority for the Department with technical staff encouraged to spend time on the roads.

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<sup>23</sup> Currently equivalent to about US\$200 million.



## **Annex C: Summary of Team Meeting Discussions in Dar es Salaam**

The meeting was held at the Protea Hotel Courtyard in Dar es Salaam on 11<sup>th</sup> and 12<sup>th</sup> February 2016. It was attended by N Leta, R Geddes, M Pinard, M Burrow, C Lema (11<sup>th</sup> only), C Bopoto, K Gongera and G van Zyl. Each Roughton team member made a presentation of the work they have done to date and proposals for their component of the project. The morning session on the 11<sup>th</sup> was attended by representatives of the Tanzania Road Fund, Tanroads Maintenance Department and PO-RALG (Dr Magafu). Abdul Awadh participated for the whole day on the 11<sup>th</sup> and gave a PowerPoint presentation on “LGA’s Road Network Management Achievement, Challenges & Strategies”.

### Road maintenance in Tanzania

- The role of the Road Fund was discussed including revenue sources (fuel levy and other road user charges), split between Tanroads and PO-RALG (70:30), length of road network (Tanroads 35,000km; PO-RALG 108,000km), procedures for disbursing funds to the road agencies and monitoring the maintenance works. The recent increase in the local government road network from about 56,000km to 108,000km is a big challenge for funding.
- Tanzania has a standard system for the planning and budgeting of district road maintenance. Each year the district engineer is supposed to carry out a condition survey of the council’s road network using the Annual District Roads Inventory and Condition Survey (ADRICS) system. The data from ADRICS is used to prepare the annual workplan and budget proposal that is submitted to PO-RALG. A computer-based planning tool, the District Road Maintenance System (DROMAS) was developed for Tanzania in the early 2000s and rolled out to all districts. However, the development process was not completed and the system is generally not in use. It is thought that perhaps 10% of districts carry out the ADRICS properly. It is seen as too time consuming and a low priority by district engineers. However DROMAS is a high priority for PO-RALG and there is a current project to update the system. Each district receives TSh 5 million annually from the Road Fund for the annual planning process.
- There is an existing GIS survey of the rural road network.
- Audits of the local govt maintenance programme and presented annual PO-RALG / Road Fund meetings. Action is taken against poor performers.
- Staffing has improved in the districts: the basic establishment includes the district engineer and two other engineers responsible for roads and buildings.
- The attorney general office is required to vet all contracts over TSh 50 million (about USD 25,000). The vetting is carried out in Dar es Salaam and taken a minimum of 21 days. PO-RALG is trying to increase the minimum contract value for this vetting process.
- Tanroads road maintenance is managed through 25 regional offices. A system is in place for prioritisation of maintenance works. Roughness measurements are taken on

paved roads but condition surveys of unpaved road are only visual. Condition surveys are carried out twice a year. 88% of the Tanroads network was reported to be in good or fair condition, though this may have dropped recently due to a delay in funding.

- All road works are outsourced by Tanroads except a very small amount for emergencies.
- Priorities for Tanroads to improve the current maintenance arrangements are: more funding, improved remuneration for staff and better materials testing laboratories. The procurement procedures need to be streamlined.
- Maintenance contracts are let on an annual basis. The Road Fund is unable to guarantee long term funding, which is necessary for longer-term contracts to be used.
- The Maintenance Dept of Tanroads does not track the asset value of the network.

#### Monitoring economic impacts (Camilla Lema)

- There will be two types of monitoring: 1) routine monitoring of social/economic impacts by the road agency (e.g. traffic counts) and 2) stand-alone time-bound research projects by transport services experts, students etc. An example of the second category could be the minimum roughness of a road that allows viable public transport services.
- Can we assist road agencies to establish more effective complaints procedures for road users and communities?
- The detailed design of the social and economic monitoring framework can only be finalised once we know the project areas.
- Monitoring of social and economic impacts is not primarily for assessing the impact of the project. It is part of the evidence-based strategy that will be used to influence road agencies and political leaders to give greater priority and importance for rural road network management for long term sustainable change.

#### Road condition monitoring and asset value (Charles Bopoto)

- The valuation of road assets is contentious. It was agreed to adopt a recognised method and follow it (despite any possible or perceived shortcomings). We should avoid creating a monster that can't be easily fed.
- We should adopt any existing methods for visual condition surveys in the project areas since the agency is already required to collect these data. We can develop a method of comparing the results from different project areas measured using different methods.
- In addition to the existing visual condition surveys we should ask the agencies to conduct a mobile phone survey, which will give GPS location of the roads, travel times/average speed on links, and an estimate of roughness.
- The vehicles used for the roughness surveys need to be calibrated – options for doing this will vary from area to area.

- We will liaise with the consultants for the AFCAP project on road condition measurement using satellite imagery, in particular to share data on the condition of the project networks.

#### Western Cape and Namibia road network management and lessons learned (Gerrie van Zyl)

- Namibia is measuring the RAI by marking homes on Google Earth images. This has been effective and we should consider for the project areas.
- In the W Cape there is a training session for visual condition assessors before the condition surveys are conducted, with certification of trainees. 15% of the network is assessed by experienced “control assessors’ for quality control purposes.
- Gravel thickness is measured every 1 km on gravel roads.
- DCP surveys are conducted to assess the cost of upgrading to LVSR.
- The W Cape is planning to conduct a self-assessment of asset management performance using PAS-55 / ISO 55000. The spider diagram used to show assessment scores is useful but does not consider any weighting of the different aspects measured.
- The W Cape set-up is well beyond what could reasonably be expected of road agencies participating in the project. However it does offer an example to which the agencies can aspire. In the short term a site visit of the PIT would be useful, and this is expected to be conducted early in the implementation period. Within the W Cape region it will be necessary to identify a small network that is comparable with the networks identified in the other project areas.

#### New specification/framework for road asset management (Michael Burrow and Mike Pinard)

- It was agreed that the simplified spec included in the Inception Report (Table 1) contains an appropriate level of detail and number of items to be assessed, but the wording needs to be revised to use more common terminology.
- Additional rows will be added to the matrix (Table 1) to allow assessment of wider aspects of road network management included in the CRM approach.
- An additional column will be added to Table 1 for a zero score.
- The questionnaire format used for the CRM evaluations should be used (with the shaded blocks indicating where ticks can be placed).
- The draft spec/framework is expected to undergo further revisions during the implementation phase as it is field tested.

#### Identification and selection of participating regions

- The draft letter to the AFCAP countries was reviewed and endorsed by the team.
- It was noted that the process to identify the countries may result in a delay to the completion of the formulation phase (programmed for 23 April).

- The design of some components (particularly the social and economic monitoring and road condition monitoring) depends to some extent on knowing the project areas.

## Annex D: Invitation Letter to AfCAP Participating Countries



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Eng Billy Tshibambe  
AfCAP National Coordinator  
Cellule Infrastructures  
Democratic Republic of Congo

Dear Eng Tshibambe

### Motivation to participate in the the AfCAP Asset Management Project – GEN2018A

The Africa Community Access Programme (AfCAP) is funding a research and capacity building project on asset management for rural roads. Following approval of the inception report, the project is now called "Economic Growth through Effective Road Asset Management" (Ref GEN2018A). The purpose of the project is to achieve economic and social benefits for local communities in rural areas as a result of improved performance in road asset management.

The Mobilisation Report and Inception Report for the project are attached for background information on the project to date. Three countries from sub-Saharan Africa will participate in the first phase of the project. The first phase is expected to be completed within 27 months, although the project may be extended if it is found to be successful. A fourth country, with established rural asset management systems and processes, will provide a benchmark for best practice.

The project will provide technical assistance to achieve improvements in asset management performance on a selected network of rural roads within each participating country. The performance will be measured against a new specification for rural road asset management that will be developed as part of the study. Measurements will also be taken of the road network condition and the impact of the road condition on the rural economy. The study network in each project area is expected to comprise between about 300km and 500km of mainly earth or gravel roads. The selected network should be under a single roads agency or authority.

Representatives from each of the project areas will form a steering group (The Project Implementation Team) which will guide the implementation of the project. The group will meet periodically during the implementation period and will report on progress to the ReCAP/AfCAP Programme Management Unit (PMU). Roughton International of the UK has been appointed by AfCAP as the Consultants to provide technical assistance for all aspects of the implementation of the project.

The success of the project will depend on the cooperation and commitment of the participating project areas. The road agency responsible for the identified road network in each project area will be responsible for the periodic collection of road condition data and economic indicators that have been selected by the Consultants. In order to undertake these tasks the agency will be required to provide basic resources including vehicles, fuel and allowances for their own staff. These resources must be sufficient to visit the entire network included in the study at least once a year to collect agreed road condition data and the economic indicators. The road agency will also be required to conduct periodic self-assessments of their performance in the management of their road assets. This information will be publicly available and discussed with stakeholders in public meetings. It will also be shared between participating countries in periodic meetings of the Project Implementation Team and with the ReCAP/AfCAP PMU.

Countries and regions that participate in the project will benefit from exposure to the latest innovations in rural road asset management. They will receive technical support to implement these innovations on their road networks. This will result in improved road conditions in the project area,

Research for Community Access Partnership  
is funded by the UK Government and managed by  
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with benefits to the local population. The participating regions will receive opportunities to share their experiences with professional colleagues in other project areas, and will provide new benchmarks for improved performance in rural road asset management in sub-Saharan Africa.

All AfCAP participating countries are invited to submit motivations in the form of a short proposal to participate in the project including the following details:

1. Name of the state/province/district/region which is proposed to be included in the project and the capital city/town;
2. Length of the proposed study road network by paved, gravel and earth standard;
3. Population of the project area;
4. Reasons for proposing this project area;
5. Total number of staff in the road agency responsible for the proposed study network broken down by number of engineers, technicians and support staff;
6. Other resources available to the road agency in the study area (e.g. number of functional vehicles, computers etc.);
7. Annual maintenance budget of the road agency over the last 3 years and the proportion of the budget that was disbursed;
8. Source of budget (e.g. road fund, state budget);
9. Types of maintenance works carried out using the budget and the implementation mechanisms (e.g. in house force account, private contractors etc.);
10. Details of any formal maintenance management system used by the road agency.

The proposal to participate in the project should include any ideas for improving or strengthening the research methodology and specific reasons why the proposed region should be included in the project.

A final selection of countries/regions to participate in the project will be made on the basis of objective criteria including a geographic spread of countries and range of institutional, financial and operational arrangements for undertaking rural road maintenance. If the first phase of the project is successful it is expected that it will be extended to additional countries and regions. Countries that are not selected to participate in the first phase will be eligible to participate in subsequent phases.

The proposal and commitment to participate in the project must be signed by a senior government official in the proposed participating region and the AfCAP national coordinator.

Applications should be submitted by email to the project Team Leader, Mr Rob Geddes ([rgeddes@cgsafrica.com](mailto:rgeddes@cgsafrica.com)) and copied to myself on the following email [les.sampson@cardno.uk.com](mailto:les.sampson@cardno.uk.com) to be received by close of business on Friday 25 March 2016.

Yours Sincerely



Les Sampson

Infrastructure Research Manager, AfCAP/ReCAP

## **Annex E: Mombasa Workshop Report**

### **Purpose of this Report**

A project workshop was held during the prestigious ‘International Conference on Transport and Road Research’ in Mombasa, Kenya, from 15<sup>th</sup> to 17<sup>th</sup> March 2016. The purpose of the workshop was to present formally the proposed approach to be adopted on the project so that the team could receive constructive views from the audience of practicing road network managers, engineers and rural transport professionals. A paper describing the project was presented during a conference plenary session prior to the workshop to ensure wider awareness of the project.

This report includes a summary of the workshop proceedings and its outcome. It includes a summary of presentations made by the consultancy team, feedback from participants during the discussion period and an analysis of participant responses through a feedback questionnaire. The feedback received during the workshop will influence the final design of the project and the method of implementation.

### **Title of the Workshop**

The title of the workshop was “A New Specification for the Effective Management of Rural Roads”. This reflected the initial intention to focus the discussion on the new framework for assessing road agency performance that is being developed as part of the project. A decision was subsequently made to broaden the workshop theme to include a summary of the literature review carried out on existing rural road management practices in Africa and the approach to defining indicators of social and economic impact of rural roads in the project areas.

### **Objectives of Workshop**

The main objective of the workshop was to present a draft “Framework for Assessing Rural Road Agency Performance in Asset Management” and obtain feedback from technical experts, road maintenance and rural transport practitioners and other stakeholders. The feedback from participants will inform the finalisation of the draft framework for trialling in the four participating countries.

The workshop was also intended to contribute to increased awareness amongst stakeholders in the region of the AFCAP project and its aims, approach and implementation plan. This would enhance interest and ownership of the project amongst government officials, development partners and practitioners, and contribute to its successful outcome, including possible scaling up and roll out across the region.

### **Workshop methodology**

The workshop included four formal presentations and an open discussion period. The first presentation provided a summary of key issues arising from the literature review of current

practice in rural road management in the region. The second presentation summarised current road asset management practice in the Western Cape. The third presentation outlined the proposed approach to monitoring social and economic impacts of roads in the project areas, and the fourth presentation (for which a written paper was provided) outlined the proposed assessment framework.

The PowerPoint presentations used by each of the presenters are included in an annex to the separate Workshop Report. Delegates were given hard copies of the questions comprising the draft assessment framework for their comment.

The following questions were developed to guide the discussion period. They were intended to stimulate thought and discussion, rather than to capture any specific information.

- Do you have any issues, associated with what we have presented, which you would wish to be clarified?
- Do you have any comments on the overall approach in developing the framework (i.e. consideration of the 6 building blocks and determining, from AM standards, a set of criteria by which Rural Road AM can be assessed)?
- In addition to the 6 Building Blocks (Political, Organisational, Financial, Managerial, Operational, Technical) are there any others you think need to be considered?
- From your experience, or knowledge, what are the 3 most important factors affecting the sustainable rural road asset management?
- Do you have any comments regarding how well you believe the suggested approach may be received in road administrations?

Unfortunately it was not possible to discuss these questions due to time constraints. However partial responses to some of the issues were received during the general discussion period.

### **Workshop Programme**

The following was the programme of activities for the workshop. The workshop began at about 16:40 as a result of general time overruns within the conference, and finished at about 18:40. It was evident that at least one additional hour was required to fully achieve the workshop objectives, but it was not possible to continue beyond 18:40 due to other evening activities.

**Table 14: Workshop Programme**

<b>Time (planned)</b>	<b>Item</b>	<b>By</b>
16:00 – 16:05	Introduction of participants and the research project	RG
16:05 – 16:15	Maintenance of Rural Roads in Africa: 2015 Status Update.	KG
16:15 – 16:35	Asset Management Systems for Rural Roads in the Western Cape	MH
16:35 – 16:40	Clarifications on the presentations	RG/KG/MH



16:40 – 16:50	Monitoring Economic and Social Impacts of Rural Roads – Proposed Indicators	CL
16:50 – 17:10	Framework for Rural Road Asset Management Performance	MB
17:10 – 17:50	Facilitated discussion with questions/comments from the participants.	RG
17:50 – 18:00	Summary of key points arising	MB

**KEY:**

RG: Rob Geddes (Facilitator)

KG: Kingstone Gongera (Presenter)

MH: Mervyn Henderson (Presenter)

CL: Camilla Lema (Presenter)

MB: Michael Burrow (Presenter)

**Key Issues Arising**

The following key issues arose during the technical presentations and the discussion period.

- Effective road asset management depends on having the right people in the organisation. They must be appropriately qualified and experienced. They must receive training and skills development.
- Inadequate funding is a challenge for many countries in the effective AM of rural roads.
- Continual research and development are needed within the asset management organisation.
- Knowledge management is important within the organisation to avoid “reinventing the wheel”.
- A champion within the organisation is essential for the success of the asset management; they must have a passion for asset management.
- Good quality data are essential for effective road asset management.
- The asset management system should be kept as simple as possible.
- In some countries there is a need for a change in the mentality of the people towards maintaining roads. This starts with a national pride and sense of belonging, which may be absent in some post-conflict societies.
- The road asset management systems currently implemented in the Western Cape might be too complex for many other African countries.
- The success of the road asset management system in the Western Cape was seen as a result of political support and assignment of dedicated staff.
- Recent technological innovations (e.g. smart phones) can be used effectively by semi-literate people to collect data for the asset management.

- It is expected that the proposed self-assessment of road asset management performance in the participating areas will assist to identify areas where improvements can be made.
- A related project on rural road asset management is being carried out in Lao PDR and could provide lessons for the AFCAP project. The project includes factors to strengthen the climate resilience of the roads. The GEM project should establish links with the ReCAP climate resilience research project<sup>24</sup>.
- The GEM project should establish links to the ReCAP project on high tech road condition monitoring<sup>25</sup>.
- Will the GEM project duration be sufficient to monitor long term impacts? For example gravel loss on unpaved roads may only be evident over a relatively long period of time.

### Analysis of Participant Evaluation Forms

Feedback was obtained from 27 of the workshop participants. This was based on a standard evaluation form prepared by ReCAP management. The form is included in an annex to the separate Workshop Report. Forms were submitted by about one-third of those present. Some forms were incomplete with some questions left blank. The evaluation scores and comments are summarised in Table 15.

**Table 15: Workshop Evaluation Scores**

Questions		Number of responses					Average of scores
No	Rating score	A=5	B=4	C=3	D=2	E=1	
2	Overall impression	9	15	3			4.2
3	Meeting expectations	5	16	5			4.0
4	Usefulness of workshop	13	10	4			4.3
5	Meeting workshop objectives	4	12	9			3.8
6	Usefulness of introduction	11	9	6			4.2
7	Impression of MRRRA presentation	10	11	6			4.2
8	Impression of presentation on draft spec.	7	12	7			4.0
9	Impression of panel discussion	3	10	8	2		3.6
10	Usefulness of discussion	3	12	7	1		3.7
12	Workshop facilitation	14	8	3			4.4
13	Workshop schedule / timetable	1	10	8	4	3	3.1
14	Logistical organisation	5	4	6	1		3.8
15	Hotel workshop facilities	11	9	4	1		4.2
16	Pre-workshop information	4	7	8	2	1	3.5

<sup>24</sup> The project is known as “Climate Adaptation: Risk Management and Resilience Optimisation for Vulnerable Rural Road Access”.

<sup>25</sup> This project is known as “The use of appropriate high-tech solutions for road network and condition analysis, with a focus on satellite imagery”.

Average of all scores		3.9
1	Three things learned	Role of effective road asset management in economic growth (x7)
		Importance of road maintenance in road management (x6)
		Practical indicators for impact of roads (x6)
		Status update on road maintenance performance in Africa (x6)
		Western Cape is a benchmark for road asset management practice (x3)
		The conceptual model for road asset management (x2)
		There is more emphasis on road development than maintenance (x2)
		Political interference is a major hindrance (x2)
		Research on innovations in road management not given enough attention (x2)
		Draft specification for road asset management and its use as self-assessment tool (x2)
		Road funds not supporting rural roads (x2)
		Need to stakeholder engagement in road asset management (x2)
		Need simple models for road asset management (x2)
		Planning tools are vital for efficient road transport
		Private sector important partner in ensuring road infrastructure sector remains vibrant
		Involve politicians in budget seeking
		Link research findings to policy makers and implementing agencies
Need to change attitudes to road maintenance		
Need continual improvement through objective annual assessments		
17	What were the best and most useful aspects of the workshop?	Overall awareness of the way of thinking about rural road maintenance and new thinking on asset management (x4)
		Asset management and introduction to the specification (x2)
		Knowledgeable and experienced presenters (x2)
		Good workshop venue (x2)
		Interaction of the best brains in research on roads; mastery of workshop content by presenters.
		Internal communication was good; resource persons knowledgeable and experienced.
		Presentation on W Cape asset management system was valuable.
		Good explanation of what is possible and necessary.
		Realisation of the need to involve stakeholders including politicians so they can champion the allocation of resources for maintenance.
		Case studies of road maintenance in Africa
		Brain storming session on improvements to proposals (x2).
18	How could the workshop have been improved?	More time for the workshop (x6)
		More time for presentations (x4)
		More time for discussion (x2)
		More prior information (x2)
		Improved time management (x2)
		Use of video for case studies
19		More similar conferences (x2)

Any other comments?	Immediate uptake of lessons learned from research (x2)
	Increase time available for the session; dialogues should continue after the workshop.
	Hold regular transport research conferences.
	Conduct a simplified version of the workshop with top management of roads authorities, the decision makers who are not necessarily technical to empower them with knowledge to make a stronger case for AM to politicians and financiers.
	On the asset management self-assessment form include section on institutional capacity and staff awareness on maintenance.

### Summary of Participants' Comments

The average score of 3.9 for questions 2 to 16 indicates a general overall satisfaction with the content and conduct of the workshop. The lowest scores were given for Question 13: Workshop schedule/timetable. There were also some low scores given for the discussion period, which probably relate to the limited time available. In the written comments under question 18 several participants called for more time for the workshop, more time for presentations and more time for discussion.

The comments received under questions 1 and 16 show that many of the participants appreciated exposure to asset management issues for rural roads and the importance of road maintenance. The value of research in rural roads was acknowledged by participants as well as the importance of the uptake of research findings. There were several positive comments related to the high quality of the presentations and the technical competence and experience of the presenters. The work being done on road asset management at the UoB and in the Western Cape were specifically mentioned. There was strong interest shown by the participants in learning more about asset management approaches for rural roads and for using such approaches to influence senior decision makers, politicians and financiers on the allocation of more funds for maintenance.

### Incorporating the outcomes of the workshop into the project design

The feedback received during the workshop will be incorporated into the design of the project in the following ways:

1. The approaches to rural road asset management will be framed in a way which can be easily understood by practitioners, in particular through appropriate design and thorough field testing of the road agency self-assessment questionnaire.
2. The indicators of social and economic impacts of roads will be designed to ensure that the benefits of improved asset management are clearly demonstrated to key sector stakeholders, particularly government decision makers.
3. The research study outcomes and the approach adopted in the participating countries will be disseminated to as many rural road agency managers and practitioners as possible (within budget constraints). This includes practitioners in SE Asia.





