Ministry of Works, Housing & Communications  
Entebbe  
Uganda  

SECTOR ENVIRONMENTAL POLICY AND MANAGEMENT  
ASSESSMENT OF FRSP  
VOLUME II: MAIN REPORT  

FINAL REPORT  

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<td>DEAP - District Environmental Action Plan</td>
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<tr>
<td>DEC - District Environment Committee</td>
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<tr>
<td>DEO - District Environment Officer</td>
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<tr>
<td>EIA - environmental impact assessment</td>
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<tr>
<td>EIR - environmental impact review</td>
</tr>
<tr>
<td>ELU - Environmental Liaison Unit</td>
</tr>
<tr>
<td>EU - Environmental Unit</td>
</tr>
<tr>
<td>FRSP - First Road Sector Project</td>
</tr>
<tr>
<td>GOU - Government of Uganda</td>
</tr>
<tr>
<td>LC - Local Council</td>
</tr>
<tr>
<td>MOWHC - Ministry of Works, Housing and Communications (formerly the Ministry of Works, Transport and Communications)</td>
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<td>MUIENR - Makerere University Institute of Environment and Natural Resources</td>
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<td>NBDB - National Biomass Data Bank</td>
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<tr>
<td>NEAP - National Environment Action Plan</td>
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<td>NEMA - National Environment Management Authority</td>
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<td>NGO - non government organisation</td>
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<tr>
<td>NWCMSP - National Wetlands Conservation and Management Programme</td>
</tr>
<tr>
<td>RA - Road Agency</td>
</tr>
<tr>
<td>RAFU - Road Agency Formation Unit</td>
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<tr>
<td>RMCU - Road Maintenance Coordination Unit</td>
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<tr>
<td>RSDP - Road Sector Development Programme</td>
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<tr>
<td>UNP - Uganda National Parks</td>
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<td>UWA - Uganda Wildlife Authority</td>
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<td>WB - World Bank</td>
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1. INTRODUCTION

1.1 Background to the Study

In July 1998, the Ministry of Works, Housing and Communications (MOWHC) awarded the contract for conducting a study to assess the environmental policy and management of the First Road Sector Project (FRSP) to ARCADIS Euroconsult.

The study was initiated as a result of three major developments:

i) the National Environment Statute of 1995 which made it mandatory for environmental impact assessments (EIAs) to be carried out for all new development projects;

ii) the realisation by the MOWHC that the FRSP would include major road works requiring EIAs; and

iii) increased funding for road sector activities by donors who stipulate environmental assessments as a condition of funding.

In addition, the World Bank (which is supporting the FRSP through the International Development Association) requires both road-specific and sectoral environmental assessments for all activities in all sectors to which it provides assistance.

The FRSP’s strategy for integrating environmental concerns into road sector activities is to:

a) identify the sectoral environmental impacts of the road program on Ugandan environmental management system, on the planning process and on the policy, regulatory and institutional framework; and

b) conduct site-specific impact assessments for each of the planned road sections and elaborating on activities that will mitigate these impacts and contribute to environmentally sound use of the land and its resources adjacent to the proposed road works.

This study addresses the first component, focusing on environmental policy and management as the basis of the Sectoral Environmental Assessment for the road sector in Uganda.

1.2 Objectives of the FRSP Environmental Policy and Management Assessment Study

The objectives of the study can be summarised as follows:

i) to assist the Government of Uganda to identify the status of the country’s procedures for conducting EIAs of road sector projects by reviewing policies, regulations and the institutional framework for conducting EIAs;

ii) to identify the most critical constraints to environmental management of the road sector in Uganda;

iii) to develop sector specific environmental impact assessment guidelines;

iv) to streamline and standardise the EIA process for road works in Uganda.

These objectives are elaborated in the Terms of Reference (TOR) presented in Annex 1.
This study intends to achieve these objectives by:

- illustrating how environmental concerns can be integrated into road construction, rehabilitation, improvement or routine/periodic maintenance;
- establishing the modalities of setting up units within the MOWHC and RAFU/road agency that will be responsible for environmental management and related issues;
- indicating training needs to undertake environmental assessments;
- developing practical guidelines for environmental impact assessment applicable to the road sector in Uganda.

1.3 Study Methodology

The Inception Phase of this study began in early July 1998. At this stage, however, the contract for the study had been signed by ARCADIS Euroconsult but not by the MOWHC. Understandably, until the contract had been signed by both parties, ARCADIS Euroconsult was hesitant to mobilise the entire study team. So for this phase, the Team Leader and Institutional Expert were mobilised and instructed to begin work on the study.

The contract was signed in mid-August 1998.

The postponement in mobilising the entire team resulted in a number of changes to the study workplan as proposed in the Technical Proposal. The changes were essentially related to the deferment of certain tasks from Phase I to Phase II. This, however, did not affect the overall output of the study.

Much of the first phase was spent on familiarisation with road sector activities and national environmental procedures and regulations through perusing documentation; holding meetings with affected parties, such as the National Environment Management Authority (NEMA) and the Uganda Wildlife Authority (UWA) among others; and field visits to Luwero and Mpigi Districts.

Phase II of the study got underway in mid-August. All the team members were deployed for this phase. Again, documentation was reviewed, and meetings were held with various stakeholders, organisations and institutions. During this phase, field trips were made to inspect the following FRSP roads: Jinja-Tororo Road, Mbale-Namunsi Road, Sironko-Kapchorwa Road, Mbale-Pallisa Road, Pallisa-Kumi Road, Pallisa-Tirinyi Road, Mbarara-Ntungamo Road, and the Kabale-Kisoro Road. These roads were selected on the basis of the different environmental and social situations through or near which they pass; eg. wetlands in Pallisa and Kumi Districts; mountainous/hilly terrain in Kabale and Kisoro where erosion protection measures such as terracing are practised, and Kapchorwa where they are not; and the Jinja-Tororo Road being a busy trunk road.

The initial findings of the study were presented at a workshop held at the Public Works Training Centre (PWTC) at Kyambogo on 30th September 1998. The workshop was attended by participants from the MOWHC, NEMA and various other government and non-government organisations that would play a role in road sector environmental management. The main issues discussed at the workshop pertained to the nature of the environmental guidelines and the procedures for conducting EIAs, and the institutional and training aspects of the study.

A Project Steering Committee (PSC) was set up to provide a platform for liaison between the stakeholders, MOWHC and the study team, and to give general guidance to the study team. The PSC comprised personnel from the MOWHC, NEMA, USAID and UWA. The first PSC meeting was held on 8th October 1998. Its purpose was to update the PSC members on the progress of
the study, explain the role of the Steering Committee and give an overview of the outcome of the workshop held on 30th September 1998 at Kyambogo. The consultant also requested some clarification on specific institutional aspects, these being confirmation of the acceptability of an environmental unit (EU) within RAFU, and an indication of the preferred location of an environmental liaison unit (ELU) within the MOWHC. With regard to the guidelines, the possibility of undertaking the first four steps in the EIA process (ie. preparation of the project brief, screening, scoping, preparation of terms of reference for the environmental study) simultaneously was discussed with a view to streamline the EIA process to avoid delays in road project implementation. This suggestion was affirmed by NEMA.

A second PSC meeting was held on 23rd October 1998. The main issues discussed at this meeting revolved around the location of the ELU. The consultant outlined the pros and cons of various options proposed for the location of the unit, while the MOWHC circulated a paper that indicated its preferred position as being within its Policy Analysis Unit.

The overall implementation of the study has more or less complied with its revised workplan as indicated in the Inception Report.

1.4 Report Organisation

The findings and recommendations of this study have been presented in four volumes, in order to separate the distinct study components. These are:

Volume I The Executive Summary
Volume II Main Report
Volume III Road Sector EIA Guidelines
Volume IV Environmental Management Resources

The Executive Summary is presented in Volume I. It gives a brief description of the study, summarises the components of the FRSP, indicates institutional changes within the road sector and lists NEMA's initiatives in road sector (and national) environmental management. The document highlights the main issues that have emerged during the course of the study. Summaries are provided of the proposed implementation plan and budget for implementation.

This document is the Main Report, which looks at various aspects related to the institutional framework for environmental management within the MOWHC and as applicable to the FRSP. It is aimed at decision-makers, including top level management in the MOWHC (these being the Permanent Secretary, the Engineer-in-Chief, Commissioners and Assistant Commissioners); the Director, Deputy Directors and Heads of Division of RAFU and the future Road Agency (RA), and donor agencies involved in the road sector.

The Main Report begins by describing the current institutional setting in the light of the Post Constitutional Restructuring of the Ministry of Works, Housing and Communications (Final Report, May 1998) and how this will affect environmental management in the road sector. The report also describes the role of the proposed environmental liaison unit (ELU) in the MOWHC and the environmental unit (EU) in Road Agency Formation Unit (which forms the transition to the establishment of a road agency). Training requirements for personnel involved in environmental management in the road sector within the MOWHC, and to some extent in RAFU, are discussed. The report describes local capacity to conduct EIAs. It also discusses the need for Geographic Information Systems (GIS) in road sector environmental management and possible locations for such a unit. In order to assess the performance of the FRSP at national
level, recommendations have been made for impact indicators, their monitoring, and for
cconducting evaluations of the road sector. Finally an implementation plan has been developed
which highlights tasks that need to be done in order to ensure the incorporation of environmental
considerations into road sector activities. A budget for execution of these tasks is provided.

EIA guidelines have been developed specifically for the road sector, and the roles and functions
of the ELU and EU, as well as the National Environment Management Authority (NEMA) are
specified. These guidelines are presented in Volume III of this report.

Volume IV is intended as a reference document for road engineers within the MOWHC, RAFU
(road agency), firms of consulting engineers, environmental practitioners and any individuals
interested in environmental issues related to the road sector. The document gives a description of
the legal framework for environmental management of the road sector. The physical, natural and
social environment of Uganda is presented as applicable to the FRSP and the road sector. The
report also presents, as a guide, an analysis of the types of impacts that may arise from road
works activities, indicating possible mitigation measures and responsibility for monitoring. The
importance of public participation in project planning and environmental assessment is
addressed. Of particular use to road engineers and EIA practitioners is a listing of environmental
considerations that are included in existing MOWHC documentation.
2. THE ROAD SECTOR IN UGANDA

2.1 General

A fundamental requisite for stimulating socio-economic development, maintaining security and consolidating national unity within the country is to have well-developed transport infrastructure, which includes road, rail, ferry and air transport.

The Ministry of Works, Housing and Communications is responsible for the planning, design, construction, improvement and maintenance of all roads, railways, airports and waterways.

Road transportation is the most important mode of transport in Uganda, carrying an estimated 90% of passenger and freight traffic. In addition, the road network links the eastern-most part of the Democratic Republic of Congo, southern Sudan, Rwanda and Burundi to the Indian Ocean port of Mombasa in Kenya.

Indeed, the President of Uganda, Yoweri Museveni, has declared that roads be given the highest priority in the development of infrastructure in the country.

2.2 The Road Network

The road transport system in Uganda totals some 60,000 km, and is categorised into Classified or Main Roads, Rural Feeder Roads, Urban Roads and Community Roads. Classified main roads, rural feeder roads and urban roads have been inventoried and make up half of the total network. Community roads are not inventoried. Table 2.1 below gives a breakdown of each road category.

Table 2.1: Road Network Categories

<table>
<thead>
<tr>
<th>Road Category</th>
<th>Length (Km)</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classified Main Roads</td>
<td>9,625</td>
<td>15.8</td>
</tr>
<tr>
<td>Rural Feeder Roads</td>
<td>20,168</td>
<td>33.2</td>
</tr>
<tr>
<td>Urban Roads</td>
<td>1,000</td>
<td>1.7</td>
</tr>
<tr>
<td>Community Roads</td>
<td>30,000</td>
<td>49.3</td>
</tr>
<tr>
<td>Total</td>
<td>60,793</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Sources: Ten Year Road Sector Development Programme (1996/7-2005/6), Vol 2; MOWHC (pers. comm).

2.2.1 Classified Main Roads

Classified main roads cover a length of 9,625 km, of which approximately 23% is paved while 77% is gravel.

There are three types of roads within the main road network: Primary, Secondary and Tertiary roads. The functions of each of these are summarised below.
Primary Roads

- connect major urbanised regions;
- connect major commercial centres;
- connect ports of entry, facilitating transnational traffic;
- connect major international airports

Secondary Roads

- connect regional commercial centres to major ones;
- connect district administrative centres to the Primary Road Network;
- connect the rural feeder road system to the Primary Road Network.

Tertiary Roads

- connect local streets and community centres to the Secondary Road Network;
- connect rural areas and small communities to district administrative centres and other public services.

2.2.2 Rural Feeder Roads and Urban Roads

The rural feeder and urban roads jointly make up the unclassified road network. Rural roads provide access for rural communities in the major agricultural areas.

Nearly all the rural feeder roads have gravel or earth surfaces. About 60% of the urban roads are paved and the remainder are gravelled.

The responsibility for both rural feeder roads and urban roads fell under the Local Authorities, but have recently been moved to the MOWHC.

2.2.3 Community Roads

These are also known as “unproclaimed roads.” They link small settlements and individual homesteads to the rural feeder road system. They are predominantly earth roads.

Community roads are maintained by local communities or individuals.

2.3 The Status of the Road Network

2.3.1 Condition of the Road Network

Approximately 72% of the classified main road network is regarded as being in fair to very good condition. This includes 87% of the paved roads and 68% of the gravel roads.

Rehabilitation of about 50% of the rural feeder roads network has been undertaken over the past decade through various donor-supported activities.

Only about one quarter of the urban roads in Kampala have been rehabilitated to date.
The condition of community roads varies throughout the country depending on the importance placed on the roads by the individuals or local communities.

2.3.2 Funding

Between 1995 and 1998, the GOU adopted the Four Year National Prioritised Main Roads Maintenance Programme. Under this programme, road financing was as follows:

Table 2.2: Financing of the Four Year Main Roads Maintenance Programme (in billion UShs)

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>1994/5</th>
<th>1995/6</th>
<th>1996/7</th>
<th>1997/8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>13.5</td>
<td>17.0</td>
<td>20.0</td>
<td>24.0</td>
<td>74.5</td>
</tr>
<tr>
<td>Donors</td>
<td>11.4</td>
<td>16.4</td>
<td>21.8</td>
<td>18.0</td>
<td>67.6</td>
</tr>
<tr>
<td>Total</td>
<td>24.9</td>
<td>33.4</td>
<td>41.8</td>
<td>42.0</td>
<td>142.1</td>
</tr>
</tbody>
</table>

Source: Ten Year Road Sector Development Programme (1996/7-2005/6), Vol 2

The GOU recognises that it is responsible for maintenance of main roads, and intends to provide annual Government contributions which will increase every year until 100% Government financing is achieved for road maintenance.

The financing of major road rehabilitation and construction projects has been largely donor-supported.

2.3.3 Organisation and Management

As a result of the recent post constitutional restructuring of the Ministry of Works, Housing and Communications, a number of changes are occurring within the MOWHC concerning its administration, management and organisational aspects (refer Post Constitutional Restructuring of the Ministry of Works, Housing and Communications, Final Report, May 1998).

The former Ministry of Works, Transport and Communications has taken on the additional functions of the Building and Human Settlement Departments and the Building Materials/Technology Research Station, all of which were under the Ministry of Lands, Housing and Physical Planning. Thus the MOWTC now becomes the Ministry of Works, Housing and Communications (MOWHC).

In addition, the Engineering Unit from the Ministry of Local Government, which dealt with District and Urban Roads has been transferred to the MOWHC. Two new units are also proposed which will report directly to the Permanent Secretary, namely the Policy Analysis Unit and the Resource Centre.

The Directorate of Transport and Communications will now have three departments: Communications, Transport Planning and Transport Regulation. The Directorate of Engineering will also have three departments: Quality Assurance, Roads and Housing.

The Finance and Administration Department will remain with its three divisions: Finance/Accounts, Personnel and Administration.
Finally, it is proposed that a national road agency be set up by mid-2000. In the meantime, the Road Agency Formation Unit (RAFU) has been set up as a transition stage.

2.3.4 Environment

In the past environmental issues have not been given due attention by the MOWHC, and environmental impact assessments have been carried out at the behest of donors supporting particular road projects.

With the establishment of NEMA, environmental matters are receiving more consideration in all sectors. The Environmental Impact Assessment Regulations, 1998, require that all projects falling under the Third Schedule of the National Environment Statute of 1995 must implement EIAs in accordance with the procedures set out in these Regulations. Major road construction and rehabilitation projects fall into this category.

2.3.5 Constraints

Major constraints related to the road network in Uganda include:

- rehabilitation backlog;
- heavily trafficked gravel road links;
- poor road drainage structures;
- traffic congestion throughout the Kampala urban and suburban zones;
- axle overloading;
- accident black spots;
- inadequate design;
- insufficient road financing mechanism.

In addition there are a number of institutional setbacks:

- fragmented road administration organisational set up;
- lack of a cost-effective road management approach;
- inadequately trained manpower for feeder road management at Local Administration level;
- poor motivation of staff;
- insufficient plant and equipment for carrying out maintenance activities;
- inadequately equipped physical facilities such as maintenance workshops, office accommodation, furniture and communications;
- lack of capacity within the private sector local construction industry.

2.4 First Road Sector Project

2.4.1 The Ten Year Road Sector Development Project

The Ten Year Road Sector Development Programme (RSDP) was formulated by the GOU to provide a framework for improving the efficiency and safety of the road network by removing the major constraints over a ten year period from Fiscal Year 1996/7 to 2005/6. (refer Ten-Year Road Sector Development Programme (1996/7-2005/6), October 1996). The RSDP has been divided into two phases; the first phase covers the first five years of the programme and is known
as the First Road Sector Project.
The objectives of the RSDP are to:

i) provide a road network which will meet the present and future traffic demand and at the same time enhancing road safety and environmental protection by carrying out effective maintenance, rehabilitation, and upgrading of the major road network, and by constructing new links where justifiable;

ii) establish and develop a road administration mechanism that will ensure an efficient and effective road network;

iii) enhance the capacity of the local construction industry.

2.4.2 FRSP Project Components

Activities within the FRSP fall into three components: road network links, road network improvement and road network administration and capacity building.

Component A: Road Network Links

Roads in the network have been prioritised for manual routine maintenance, mechanical routine maintenance and periodic maintenance

Component B: Road Network Improvement

Under this component, the following two lane roads will be upgraded to 4 lane dual carriageways, entailing capacity improvement of about 32 km of urban sections of trunk roads originating in Kampala:

- Kibuye - Busega Road
- Kibuye - Makindye Road
- Nalufenya - Roundabout - Njeru Road
- Kampala - Ggaba Road
- Kampala - Port Bell Road
- Kampala - Banda - Bweyogerere Road.

The component also involves pavement strengthening of selected main roads as follows:

- Katunguru - Kasese - Fort Portal, Equator Road and Kasese - Kilembe Roads
- Jinja - Malaba and Busia - Muwayo Roads
- Tank Hill and Luzira - Butabika Roads
- Kampala (Kasubi) - Nansana Road
- Mbale - Namunsi Road
- Mbarara - Ntungamo Road

Selected roads will be upgraded to paved standard:

- Gayaza - Bugema - Zirobwe Road, and Gayaza - Kalagi Road
- Ntungamo - Rukingiri - Ishasha Road
- Kyotera - Mutukula Road
- Fort Portal - Bundibugyo Road
- Busunju - Hoima Road
- Sironko - Muyembe - Kapchorwa - Suam Road
- Karuma - Pakwach - Arua Road
Some 1,700 km of feeder roads are to be upgraded. The component proposes a rural feeder road programming study and a national project for the provision of drainage structures for feeder and community roads.

The Kampala Bypass will be constructed under this component.

A number of studies are proposed under this component. These include:

- Road Safety Improvement Study (proposals have been invited)
- Rehabilitation of Bridges Phase II Study
- Malaba Border Post Improvement Study
- Kampala City Traffic Flow Improvement Study.

Component C: Road Network Administration and Capacity Building

Institutional building and technical assistance under this component includes, among others, programme coordination; establishment of the RSDP Transitional Management Unit and Management Information System; developing capacity within the local construction industry; Road Administration and Road Fund Studies; Road Network Management Policy Study (the contract for which is currently being negotiated); Road Financing and Cost Recovery Management Study (tenders have been invited), and TA for the Training Production Unit and the Central Materials Laboratory.

Physical facilities such as the upcountry mechanical workshops, Central Materials Laboratory and the Training Production Unit will be rehabilitated, while regional training centres and regional maintenance/testing laboratories will be established.

Studies to be undertaken under this component include:

- Transport Sector Strategy Study (tenders have been invited)
- Transport Master Plan
- Highway Capacity and Axle Load Control Study
- Study to Improve Rural Community Transport Services
- Standardisation of Non-Conventional Chemical Stabilisation of Road Pavements
- Implementation Manual and Management Information System for the Rehabilitation, Improvement and Maintenance of Rural Feeder Roads (at proposal stage)
- Rural Roads Strategy Review.

Rehabilitation of plant and equipment will also take place and a plant hire pool will be established.
3. ENVIRONMENTAL IMPLICATIONS OF THE FRSP

3.1 Impacts of FRSP on the Environmental Management System in Uganda

From the description of the FRSP in the previous chapter, it is apparent that the FRSP affects all levels of roads, i.e. classified roads and unclassified roads, paved and unpaved roads, and feeder roads throughout the country.

Roads play a major role in the economic development of the country, impacting on several sectors. Farm inputs such as fertilisers, insecticides, etc., are conveyed along roads to the farmers, while agricultural products (food crops, cash crops, horticultural crops) are transported to markets within the country and in neighbouring countries. Non-perishable goods and industrial products are taken to and from centres along the road network. Uganda's road network provides a transit route for inter-country traffic by linking Rwanda, Burundi, southern Sudan and the eastern part of the Democratic Republic of Congo (DRC) to the Indian Ocean, thus earning the country much-needed foreign exchange. Roads connect major tourist destinations to airports and border posts. They are instrumental in the maintenance of security. Finally, roads provide access to health centres, schools and the district administration centres.

The FRSP will undoubtedly influence all these sectors. Its activities may induce environmental changes that could directly or indirectly affect agriculture, commerce, industry, wildlife, tourism, health or education. Consequently, it is imperative that the approach for environmental management of the road sector is multi-sectoral.

Precisely because of this multi-sectoral nature of the impacts of road projects, a number of agencies or stakeholders must be involved at various stages of the road planning cycle. The most important of these is the National Environment Management Authority (NEMA) which is mandated by law to be "the principal agency in Uganda for the management of the environment" (Refer the National Environment Statute, 1995). Other stakeholders are the ministries/departments responsible for the sectors mentioned above, and of course, the public - i.e. road users and those who benefit from the road.

To date there has been little coordination between the MOWHC, NEMA and other government ministries or departments. Environmental impact assessments are done in an ad hoc manner, usually at the behest of a donor. When EIAs are commissioned, practitioners are restricted by the time and financial constraints dictated by the budgets for the feasibility studies, and are often unable to address pertinent environmental and social issues to the desirable extent. Cognisant environmental considerations in day to day road works activities, such as maintenance, are non-existent.

The outputs of this study will contribute to streamlining environmental management systems in the road sector in Uganda, particularly in terms of:

- illustrating how environmental concerns can be integrated into road construction, rehabilitation, improvement or routine/periodic maintenance;
- establishing the modalities of setting up units within the MOWHC and RAFU that will be responsible for environmental management and related issues;
- developing practical guidelines for environmental impact assessment applicable to the road sector in Uganda;
• indicating training needs to undertake environmental assessments;
• encouraging inter-ministerial/departmental cooperation in addressing environmental issues; and
• involving the public at critical stages in the road project planning cycle.

3.2 Major Environmental Impacts of Roads and Road Works in Uganda

The magnitude and significance of impacts due to a road or road works activities will be influenced by the type of road (whether it is a major highway or a rural road), its proposed design (eg. whether a realignment is planned, in which case the length of the realignment and the terrain/nature of land it traverses ), the purpose of the road and who it is supposed to serve. The construction of a new road is likely to cause more significant impacts than the rehabilitation, improvement or maintenance of an existing road.

While in most cases roads or road works impact on the environment, in some instances the environment affects roads. The physical, natural or sociological environment through which a road passes will also determine the magnitude of any impacts.

The most common environmental factors relating to roads in Uganda, and having both positive and negative impacts, can be listed as:
• increased runoff
• changes in land use
• soil stability and erosion
• changes in hydrology/drainage and impacts on wetlands
• exploitation of quarries and borrow pits
• pollution
• depletion of forest areas
• risk to protected areas and wildlife
• socio-economic aspects
• impacts resulting from service amenities for the workforce
• impacts on public health
• road safety
• impacts on sites of historic or cultural value.

Possible impacts due to these factors, contributing causes and examples of mitigation are summarised in Table 3.1. The table is by no means exhaustive, and should be regarded only as indicative in order to give a general idea as to the type and nature of the impacts that might be expected from road works activities.
Table 3.1: Major Environmental Impacts of Roads

<table>
<thead>
<tr>
<th>Factor</th>
<th>Possible Impact</th>
<th>Contributing causes</th>
<th>Examples of Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>hydrology</td>
<td>* changes in natural runoff flow; * changes in subsurface flow; * can control flooding; * changes in drainage patterns, affects swamps and wetlands.</td>
<td>* interception/obstruction of flow; * reclamation of land eg. for causeways.</td>
<td>* provide proper drainage structures; * ensure safe/controlled discharge; * restrict construction activities and clearing near wetland areas.</td>
</tr>
<tr>
<td>runoff (from road or upper catchment)</td>
<td>* soil erosion along road and in lower catchment; * gullying; * siltation; * increased sediment loads in water courses.</td>
<td>* soil stability; * gradient of road and/or catchment which affects speed of runoff; * amount of rainfall; * rainfall intensity; * poor vegetation cover in upper/lower catchments.</td>
<td>* protection of upper catchment (eg. terracing, planting vegetation, control grazing); * diversion ditches, catchwater drains in the upper catchment; scour checks/check dams in side drains; * infiltration ditches and soak pits within road reserve if water cannot be discharged onto lower catchment; * gully control using gabions or check dams; * proper drainage, safe discharge, artificial waterways; * discharge water frequently and in small quantities; * protect/stabilise culvert outfalls by installing aprons or cascades/steps; * protect slopes and embankments by planting with grasses and shrubs; * provide for gentle side slopes on embankment sections; * harvest road runoff for irrigation purposes by directing it to ditches, ground tanks, basins or canals.</td>
</tr>
<tr>
<td>land use</td>
<td>* change in type of land use; * loss of land; * destruction of vegetation; * destruction of wildlife habitats.</td>
<td>* acquisition of land for new roads/realignments, quarries, deviations, workmen's camps, storage of plant and equipment; * growth of settlements.</td>
<td>* prepare and execute a Compensation and Relocation Plan; * pay compensation for loss of land, crops and housing; * public disclosure of information; * avoid unnecessary clearing of vegetation; * avoid felling of trees, or replant where felling is absolutely necessary; * plant trees along the edge of the road reserve in market centres or towns; * discourage roadside development, or ensure settlements are planned.</td>
</tr>
<tr>
<td>quarries and borrow pits</td>
<td>* erosion; * reduced land productivity; * visual intrusion; * water-borne diseases, eg. malaria; * risk of falling into pits.</td>
<td>* excavation of large exposed areas; * unplanned excavation methods; * open pits accumulating water.</td>
<td>* reinstate/landscape exhausted quarries; * revegetate; * plan excavation, having separate stockpiles for each type of material; * fence off quarries * restrict access routes to quarries.</td>
</tr>
<tr>
<td>pollution</td>
<td>* public health risk</td>
<td>* activities eg. quarrying, grading, tarmacking, re-carpeting, asphalt plants, crushing plants; * traffic.</td>
<td>* due diligence during works; * maintenance of equipment and vehicles; * legal enforcement of standards for exhaust fumes, emissions, etc.</td>
</tr>
<tr>
<td>Factor</td>
<td>Possible Impact</td>
<td>Contributing causes</td>
<td>Examples of Mitigation Measures</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>forests</td>
<td>• loss of /disturbance to wildlife habitats;</td>
<td>• access to forest areas;</td>
<td>• avoid major road works through forest areas;</td>
</tr>
<tr>
<td></td>
<td>• reduced biodiversity</td>
<td>• clearing of vegetation;</td>
<td>• provide alternative routes outside forest areas;</td>
</tr>
<tr>
<td></td>
<td>• reduction of watershed areas</td>
<td>• traffic diversions;</td>
<td>• locate workmen's camps outside forest areas;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• quarrying;</td>
<td>• source material from outside forest areas;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• haulage;</td>
<td>• minimise haulage distance within forest areas;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• ensure proper disposal of construction debris;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• patrolling;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• prohibit felling through legal enforcement.</td>
</tr>
<tr>
<td>protected areas</td>
<td>• loss of /disturbance to wildlife habitats</td>
<td>• access to and through protected areas</td>
<td>• avoid major road works through protected areas;</td>
</tr>
<tr>
<td></td>
<td>• reduced biodiversity</td>
<td>• clearing of vegetation;</td>
<td>• provide alternative routes outside protected areas;</td>
</tr>
<tr>
<td></td>
<td>• disruption of migration routes</td>
<td>• traffic diversions;</td>
<td>• locate workmen's camps outside protected areas;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• quarrying;</td>
<td>• source material from outside protected areas;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• haulage;</td>
<td>• minimise haulage distance within protected areas;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• ensure proper disposal of construction debris.</td>
</tr>
<tr>
<td>socio-economic aspects</td>
<td>• encourages agricultural productivity;</td>
<td>• access to markets, health centres, schools;</td>
<td>• awareness campaigns in workmen's camps and centres along roads;</td>
</tr>
<tr>
<td></td>
<td>• improved health, but also increase in incidence of STDs;</td>
<td>• need for labour for road works;</td>
<td>• distribution of condoms to workforce.</td>
</tr>
<tr>
<td></td>
<td>• increased literacy;</td>
<td>• transmission of STDs by immigrant workforce.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• employment opportunities;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• increased incomes;</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• increased national productivity;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• improved standard of living.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>workmen's camp</td>
<td>• impact on local fuelwood resources;</td>
<td>• cooking with fuelwood;</td>
<td>• provide alternative fuel sources (kerosene, gas, electricity);</td>
</tr>
<tr>
<td></td>
<td>• impact on local water resources;</td>
<td>• need for water for cooking, washing and plant operations;</td>
<td>• provide water supply;</td>
</tr>
<tr>
<td></td>
<td>• organic pollution;</td>
<td>• generation of solid waste, wastewater, sewage.</td>
<td>• reduce amount of water and fuelwood used by having central canteen and ablation blocks;</td>
</tr>
<tr>
<td></td>
<td>• garbage.</td>
<td></td>
<td>• solid waste management plan;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• provide facilities for sanitation.</td>
</tr>
<tr>
<td>road safety</td>
<td>• improved road surface;</td>
<td>• road rehabilitation/ improvement works;</td>
<td>• improve sight distance and visibility;</td>
</tr>
<tr>
<td></td>
<td>• greater traffic efficiency;</td>
<td>• high speeds.</td>
<td>• clear and frequent road signs;</td>
</tr>
<tr>
<td></td>
<td>• improved vehicle operating costs;</td>
<td></td>
<td>• discourage parking on shoulders;</td>
</tr>
<tr>
<td></td>
<td>• accidents - increased risk to motorists, pedestrians, cyclists, especially at centres.</td>
<td></td>
<td>• regular maintenance of roads;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• sensitis motorists on safe driving.</td>
</tr>
<tr>
<td>cultural/traditional sites</td>
<td>• enhances cultural education;</td>
<td>• access to sites;</td>
<td>• dialogue with local people from planning stage onwards;</td>
</tr>
<tr>
<td></td>
<td>• creates opportunities for income generation or employment;</td>
<td>• increased number of visitors to sites.</td>
<td>• generate respect for local customs and traditions.</td>
</tr>
<tr>
<td></td>
<td>• vandalism/wear and tear;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• invasion by &quot;alien cultures&quot;.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.3 Environmental Impacts of Roads under the FRSP

It is seen from Section 3.1 and Table 3.1 that roads are fundamental to the development of the country and provide a considerable number of socio-economic benefits. It is for this reason that roads are usually built. In general, the social and economic benefits due to a road tend to outweigh the environmental disadvantages. However, these disadvantages cannot be dismissed as they will eventually impact on the public. As awareness of the value of the environment increases, there will be a growing demand to prevent and/or mitigate adverse impacts.

This section summarises very briefly the most significant environmental impacts of some of the sub-projects listed in the Road Network Improvement component of the FRSP (see Chapter 2) and is based on available reports. For sub-projects where EIA reports were not available or EIA studies have not yet been carried out, an indication of major environmental considerations is given. All roads, except the Kampala Bypass, are existing, but it has not been established in all cases whether realignments are necessary.

It will be noted that ALL impacts due to FRSP roads have not been listed as these will be similar to those described in Table 3.1 above; instead in each case environmental concerns that would warrant special attention have been highlighted.

3.3.1 Upgrading Urban Sections of Trunk Roads

The roads to be upgraded from 2-lane to 4-lane are the Kibuye-Busega Road, Kibuye-Makindye Road, Nalufenya-Njeru Road, and roads from Kampala to Ggaba, Port Bell, Banda and Bweyogerere. These roads all lie within urban, suburban or peri-urban areas and so the natural and physical environment in the areas of direct influence have already been considerably altered. Issues of particular concern will therefore include:
- acquisition of land for road and road reserve, quarries and deviations for which compensation will have to be paid;
- properties within the road reserve;
- nuisance caused by diversions (traffic);
- pedestrian and cyclist safety;
- dust, fumes and noise pollution during and after construction, resulting from road works activities such as quarrying, earthworks, asphalt and crushing plants, construction and road traffic.

3.3.2 Pavement Strengthening

Katunguru - Kasese - Fort Portal Road

An EIA was carried out for this road (refer Sabbour Associates, January 1996). The Katunguru-Kasese section of the road passes through Queen Elizabeth National Park, which means there will be high speed traffic through a protected area. The road also crosses the Kazinga Channel. The stretch from Kikorongo to Muhokya and towards Fort Portal will pass through wetland areas. Anticipated impacts of significance would include:
- disturbance to/destruction of wildlife habitats;
- disturbance to wildlife and disruption of wildlife movement;
• impacts associated with increased number of tourists visiting the park (generation of solid waste, demand for water and fuelwood, new lodges/camps, increased traffic within park, etc).
• impacts on wetland areas (including Kazinga Channel, Lake George).

Equator Road

This road runs along the northern boundary of Queen Elizabeth National Park to Katojo and on to Bwera and Mpandwe on the border with the Democratic Republic of Congo. Consideration here would be given to the fact that the road actually provides a more direct route to DRC, making it more attractive for border-bound traffic than the route through Katwe. The road would therefore benefit the park in that traffic would circumvent it.

Kasese - Kilembe Road

This road leads to a copper mine in Kilembe, which is at the base of the Ruwenzori Mountains. Here the issues to note are:
• soil erosion and potential landslides due to the mountainous terrain;
• access to Ruwenzori Mountains and its implications on encroachment into national park and its buffer zone (may lead to poaching and tree felling);
• increased tourist numbers to Ruwenzori Mountains National Park.

Jinja - Malaba and Busia - Muwayo Roads

These are heavily trafficked roads connecting Kampala and Jinja to towns on the Kenyan border. The roads pass mainly through small scale agricultural holdings. The section from Bugiri to Malaba traverses a large wetland area. At the Busia/Muwayo/Malaba junction the roads pass through the West Bugwe Central Forest Reserve. Thus issues of concern are:
• impact on wetland areas;
• impact on West Bugwe Central Forest Reserve;
• road safety and risks to pedestrians and cyclists.

Tank Hill and Luzira - Butabika Road, Kampala (Kasubi) -Nansana Road and Mbale - Namunsi Road

These roads are located in urban/semi-urban areas. Impacts will be the same as those described in Section 3.3.1, namely:
• acquisition of land for road and road reserve, quarries and deviations for which compensation will have to be paid;
• nuisance caused by diversions (traffic);
• pedestrian and cyclist safety;
• dust, fumes and noise pollution during and after construction, resulting from road works activities such as quarrying, earthworks, asphalt and crushing plants, construction and road traffic.

Mbarara - Ntungamo Road

Land use along this road is mainly small scale agriculture. The road traverses many wetland areas, which would be the main environmental concern.
3.3.3 Upgrading to Paved Standard

Gayaza - Bugema - Zirobwe Road and Gayaza - Kalagi Road

These roads pass through densely populated agricultural areas. The Gayaza-Bugema-Zirobwe Road traverses a major coffee producing area. The major considerations here will be:

- acquisition of land for road reserve, quarries, workmen's camps, due to the high population density;
- road drainage onto farms;
- wetland areas (along Gayaza-Kalagi Road).

Ntungamo - Rukingiri - Ishasha Road

An EIA study was carried out by Roughton International in August 1994 (see References, Annex II). The problems were typical of those shown in Table 3.1. The area of influence has a high population density. The road provides an alternative route from Ishasha on the DCR border to Mbarara, eliminating the need for traffic to pass through Queen Elizabeth National Park. This is seen as a major benefit. Problems associated with the project road are:

- acquisition of land for road reserve, quarries, workmen's camps, due to the high population density;
- hydrological considerations due to numerous river crossings;
- wetlands.

Kyotera - Mutukula Road

Roughton International carried out an EIA on this road in August 1994. The road passes through wetland areas, and thus the major issue here will be the impact on them.

Fort Portal - Bundibugyo Road

Sabbour Associates conducted an EIA for this road in January 1996. The road circles the northern tip of Ruwenzori National Park. It provides access to Semliki National Park, Semliki Forest Reserve, Semliki Wildlife Reserve and Sempaya Hot Springs. The road also links areas inhabited by pygmies to Fort Portal. Environmental and social concerns revolve around:

- improved access to Ruwenzori and Semliki National Parks, Forest Reserve and Wildlife Reserve and its implications on encroachment into these protected areas and their buffer zones (may lead to poaching, tree felling, destruction of wildlife habitats, etc);
- impacts associated with increased number of tourists visiting these protected areas (generation of solid waste, demand for water and fuelwood, new lodges/camps, increased traffic within park, etc);
- impact on pygmy tribes (exposure to alien cultures, erosion of traditions, income generation opportunities for the tribes, etc);
- landslides and erosion due to mountainous terrain;
- impacts on security due to proximity to DCR.

Busunju - Hoima Road

The feasibility study for this sub-project is in progress and includes an EIA. The road traverses through an agricultural area with a fairly dense population. There are many rivers/water courses en route. The road passes through Kikonda Forest Reserve and is the main road to Murchison Falls National Park. Issues to be addressed include:
• acquisition of land for road reserve, quarries, workmen’s camps, due to the high population density;
• hydrological considerations due to numerous river crossings;
• impacts on Murchison Falls National Park;
• impact on Kikonda Forest Reserve.

*Sironko - Mayembe - Kapchorwa - Suam Road*

This road circles the northern tip of Mount Elgon National Park, proceeding to Suam on the Kenyan border. The following need consideration:
• possibilities of landslides and soil erosion due to the mountainous terrain;
• impacts associated with improved access to Mount Elgon National Park (encroachment of buffer zone, increased tourist numbers, etc).

*Karuma - Pakwach - Arua Road*

An EIA was carried out in February 1997 by Associated Consulting Engineers. The prime concern here is that the road passes through the northern part of Murchison Falls National Park, and crosses the Albert Nile at Pakwach. It then goes on to Arua, where small scale agriculture is the predominant land use. The major impacts are associated with:
• destruction of /disturbance to wildlife habitats;
• disruption of wildlife movement (annual migration);
• impacts of improved access to Murchison Falls National Park (increased tourist numbers, etc);
• impacts on traffic on Lake Albert;
• impacts on archaeological sites at Labong, Fajawa Fort and Stone Age Sites;
• impact on Bondo Forest Reserve (and shea butternut tree).

*Matugga - Semuto - Kapeeka and Butalangwa - Luwero Roads*

Both roads pass through well populated agricultural areas, and wetland areas. The roads are also important in terms of commuter traffic to Kampala. Hence the major considerations are:
• road safety;
• impact on wetlands.

*Kabale - Kisoro - Bunagana Road*

An EIA study was carried out by Roughton International, August 1994. The road Kabale-Kisoro section passes through Bchunya Forest Reserve, and the road is the main route to Mgahinga National Park and Bwindi Impenetrable Forest. The issues to be considered here are:
• impacts of improved access to Mgahinga and Bwindi Impenetrable Forest National Parks (increased tourist numbers, improved security, etc);
• impacts on Bchunya Forest Reserve;
• landslides and soil erosion.

*Masindi - Kafu Road*

The EIA for this study was done by Associated Consulting Engineers in February 1997. This road forms part of the main access to Murchison Falls National Park. The main concern would therefore be the impacts on Murchison Falls National Park.
Kyenjojo - Mubende Road

This road traverses through coffee and tea growing areas. The road also passes through Matiri Central Forest Reserve and wetlands near Mubende, which are the main considerations.

Tirinyi - Pallisa - Kumi and Mbale - Pallisa Roads

Land use in this area is mainly small scale agriculture. The issue of environmental concern is the impact on the Lake Kyoga wetlands.

3.3.4 New Road Construction

The Kampala Bypass will be constructed under this component. A comparative impact assessment of the two alignment options (northern and southern) have been studied by Gibb (refer Gibb, February 1998). The major considerations here are:
- impacts on wetlands (Nakivubo swamp) that act as sewage systems for Kampala;
- acquisition of land for road and road reserve, quarries and deviations for which compensation will have to be paid;
- nuisance caused by diversions (traffic);
- pedestrian and cyclist safety;
- dust, fumes and noise pollution during and after construction, resulting from road works activities such as quarrying, earthworks, asphalt and crushing plants, construction and road traffic.

3.4 Critical Constraints to Environmental Management in the Ugandan Road Sector

There are a number of constraints to environmental management in the road sector. Among the most fundamental of these is the lack of awareness with regard to how roads impinge on the environment, and a lack of understanding as to the importance of environmental protection. Road engineers typically confine themselves to the road, road structures and the road reserve. Anything beyond that tends to be regarded as not being their responsibility. Thus a change in the attitude of road engineers towards the environment is crucial if environmental management within the road sector is to be successfully integrated into its activities.

Furthermore, procedures and guidelines that are currently in place are fairly complicated, and road sector personnel are at a loss as to how to implement EIAs, and when and how they should be done.

This study puts forward means to overcome such constraints.
4. REVIEW OF THE PRESENT INSTITUTIONAL FRAMEWORK

4.1 Overview of the Present Situation

This chapter describes the main institutions concerned with road sector environmental policy, the conduct of road sector EIAs and the implementation of mitigation measures. It considers the relationships between them, their relevant present capacities, and considers their operating procedures and organisation where this provides some insight into how they might incorporate environmental concerns into their road work. The chapter does not attempt to describe all the stakeholders of roads and the environment.

The institutional setting is critical because achievement of the study’s ultimate goal will depend not only on developing appropriate EIA methods and training staff in their application, but also on ensuring that they are properly integrated AND that those with authority over road sector developments are given the responsibility for their application. The Terms of Reference recognise this in paragraph iv under ‘Overall Objectives’:

Streamlining and standardising the EIA process for road works, including the incorporation of environmental considerations in all stages of a road project from the identification and selection of roads and alignments, through design, implementation, monitoring, and the content of works contracts for engineering consultants.

In addition, it is a requirement of NEMA that the Ministry, as a lead agency, establishes an Environmental Liaison Unit (ELU) and our proposal includes work in support of this. However, it should be noted right at the outset that the Road Agency Formation Unit, currently being formed, will lead to the transfer of most lead agency responsibilities in respect of road sector matters and the need to place environmental management capacity in RAFU. This complicates matters and we pick up on the point below.

The main institutions are:

- Ministry of Works Housing and Communications which is the ministry responsible for the road sector
- Road Agency Formation Unit a new, semi-autonomous agency under the Ministry responsible for road construction.
- National Environmental Management Authority which has statutory responsibility to review and approve EIAs.
- The local authorities which bear responsibility for the implementation of works on rural feeder, urban, and community roads and for overseeing management of the environment in the districts.
- The Uganda Wildlife Authority which is responsible for protected areas
- The road contracting industry which is used by the MOWHC to implement the majority of road works.
- The consulting engineers who are used by the MOWHC for the design and supervision of major road developments, and who have been responsible for carrying out EIAs.

As described in detail below, the situation is somewhat fluid due to the recent transfer of the department of urban and feeder roads from the Ministry of Local Government to the Ministry of
Works Housing and Communications. This transfer took place under the post constitutional restructuring of ministries. The MOWHC has still to take a number of steps internally in respect of restructuring. The situation is likely to continue to be fluid for some time as the formation of the Road Agency Formation Unit is underway and will lead to the eventual formation of a road agency.

4.2 Ministry of Works, Housing and Communications

The Ministry is broken into two directorates and the Department of Finance and Administration. The Directorate of Engineering is responsible for roads. It is broken down into two departments: Maintenance and Development each headed by a commissioner. The Maintenance Department has divisions for Mechanical and Maintenance, and is also responsible for the 22 district stations around the country. (Although the district stations represent the MOWHC in their full range of responsibilities, about 75% of their work is related to roads). The Development Department has divisions for: Materials, Planning Design and Documentation, and Construction.

The post constitutional organisation is shown in the charts on the following pages. The reorganisation involved changing the name of the Ministry which was formerly the Ministry of Works, Transport and Communications.

The main changes can be summarised in the following table:

Table 4.1: Comparison of Old and New Organisation for Roads

<table>
<thead>
<tr>
<th>Responsibilities of Directorate of Engineering</th>
<th>Old</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roads</td>
<td>Roads, Housing, Quality Assurance</td>
<td></td>
</tr>
<tr>
<td># departments responsible for roads</td>
<td>2 Development and Maintenance</td>
<td>1</td>
</tr>
<tr>
<td># divisions responsible for construction</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td># divisions responsible for maintenance</td>
<td>1</td>
<td>2 (classified, urban and feeder roads)</td>
</tr>
</tbody>
</table>

This reorganisation was proposed by the Ministry of Public Service. Their report recommended further consideration of the form of the Road Agency Formation Unit. Further consideration is indeed happening now that the Director of RAFU has taken up his post and is bringing his own perspectives into account. It might reasonably be anticipated that the Ministry organisation structure may be revised slightly to take any resulting developments into account.

4.2.1 Construction Planning and Delivery

Construction (which includes rehabilitation and upgrading) takes place within the context of long term forward plans. These are prepared periodically with consultancy assistance. The most recent is the 10-year Road Sector Development Project 1996/7 to 2005/6. The first 5 years of this plan is described as the ‘First Road Sector Project’ which is described in detail elsewhere in this report.
RECOMMENDED ORGANISATION STRUCTURE:
DEPARTMENT OF ROADS

- Commissioner for Roads
  - Assistant Commissioner Eng Devt
  - Asst Comm Mechanical Services
  - Assistant Commissioner Training
  - Asst Comm Roads Maintenance
  - Asst Comm District & Urban Roads Mnce
The detailed design of each road is carried out by consulting engineers according to specifications laid down by the Planning, Design and Documentation Division who supervise the necessary contracts.

Construction is carried out by contractors supervised by consulting engineers. The tendering of contracts is managed by the Planning Division, but once they are let contracts are supervised by the Construction Division.

4.2.2 Maintenance Planning and Delivery

Maintenance planning is conducted according to an annual planning cycle timed to tie in with government planning procedures. The starting point is the annual road condition survey carried out by the District Engineers and their teams.

Delivery is carried out in three ways:
- using small scale labour based contractors.
- by force account (mechanised), accounting for approximately 60% of non-labour routine maintenance and all periodic maintenance works
- by mechanised contract accounting for approximately 40% of non-labour routine maintenance works.

There is a plan to increase the proportion of non-labour routine maintenance that is contracted out to 80%.

The first and second of these are essentially the responsibility of the District Engineer who determines requirements, administers the tendering of small scale contracts, and supervises their implementation. The tendering of mechanised contracts is managed by Ministry headquarters, according to Bills of Quantities prepared by the District Engineers. District Engineers supervise the contracts.

4.2.3 Training

The 'old' organisation chart shows the training unit falling under the Training Department which was headed by the Assistant Commissioner for Training, who reported to the Engineer-in-Chief. In practice the unit's head has in recent years reported directly to the Permanent Secretary in line with the fact that the unit serves the whole Ministry.

The training unit has three sub-units: the Public Works Training Centre at Kyambogo, the Mechanical Training Unit at the Central Mechanical Workshop, and the Training Production Unit at Luwero.

The training unit runs courses in-house. It also sends course participants to Ugandan, regional and international training centres. In the case of regional and international centres, arrangements are sometimes made for trainers to be sent to Uganda for training to take place in country. It has to be said that the use of training centres outside Uganda has been very limited in recent years. The training unit does not at present have capacity to conduct training courses in environmental management. At this stage of the study it can be anticipated that external (Ugandan, regional, and international) resources will be used to deliver training.
The work of the training unit is set out in the document *Training Policy, Programmes and Strategies for 1993-1998*, prepared by the Training Task Force in February 1993. However, the actual achievement of training delivery has been affected by budgetary allocations, which where for example about 20% of estimated requirements in the last financial year. In practice, most of the training that has taken place in the last five years has been directly linked to donor funded projects. As a result, much of the five year training programme will roll forward unchanged and we understand that there are no plans at present to produce a new complete five year plan. From this it appears likely that specific sources of funding will need to be identified for any EIA related training.

Normal practice for training courses is to: (a) develop a course specification setting out: objectives, benefits, target group, duration, venue and sponsor; and (b) develop a course manual setting out course contents. This study will develop course specifications for all courses that it recommends. These specifications will set out the range of topics that the course should cover, but will leave the selection of venue and sponsor to the implementing agency. The exact duration of the course will be determined later in discussion with those selected for training delivery.

Although the unit bears responsibility for coordinating all training within the MOWHC, the situation is somewhat confused by the fact that the Road Maintenance Coordination Unit also has responsibilities for training.

### 4.2.4 Road Agency Formation Unit

The Government of Uganda has declared an intention to create a road agency that will be responsible for all roads by 2001. As part of the transition arrangements, the MOWHC is in the process of forming the Road Agency Formation Unit. This has significant implications for this study, because responsibility for many of the activities resulting from this study are most appropriately located within RAFU.

Present plans for RAFU are set out in the *Transitional Institutional Reforms for the Establishment of a Road Agency* prepared by the Ministry of Works, Transport and Communications in April 1998. As already noted, these will inevitably be subject to a degree of revision now that the formation of RAFU is underway. Despite its name, RAFU is intended to be a precursor to the eventual road agency and will manage important parts of the First Road Sector Development Project. An executive director has been appointed and the other senior positions were advertised in mid-July 1998. It will not exist as an independent legal entity but will fall under the Permanent Secretary. This means that although contracts will be managed by RAFU, they will be formally let by the MOWHC.

Within three years RAFU is expected to:

i. Conduct feasibility analyses and eventually come out with final engineering designs for 22 roads and a bypass totalling 2300 km of aggregate alignment length. The corresponding 22 study contracts will be awarded to consulting engineering firms grossing a cumulative value of US$12 million.

ii. Let out consultancy supervision and works contracts for 79 works projects both maintenance and development for a total cost of US$ 388 million covering approximately 7000 km of alignment length, and

iii. Supervise 79 contracts mentioned in (2) above for a total value estimated at US$ 8 million.
The MOWHC will be left with the following functions:
- formation of the policy framework
- sector policy with intermodal and sectoral transport strategies and programmes
- international representation and cooperation
- fund-acquisition, allocation of financial resources and cost recovery
- management of central materials laboratory and central mechanical workshop
- district level small scale maintenance (labour based and small mechanical contracts, and force account operations)
- engineering training services
- management, evaluation and auditing of RAFU and the road agency after the transition period.

The MOWHC will appoint a number of additional staff to manage its relationship with RAFU. RAFU will be responsible for all contracts over UShs 250 million.

The organisation chart of RAFU is set out in the diagram overleaf. Two sections are of particular importance to this study.

The responsibilities of RAFU’s Project Preparation Section (as presently proposed) will include:
- Environmental impact assessment
- Preparation of the projects included in the FRSP
- Establishment and enforcement of quality awareness
- Control system for maintenance and construction
- Contracting sizing and tender documents for outsourcing feasibility studies.

The Programming and Evaluation Section (as presently proposed) will
- prepare workplans for all work contracts, and
- evaluate performance of projects during and after implementation.

4.2.5 Overall Policy Formulation and Planning

The macro structure of the restructured Ministry is shown in the diagram overleaf. Two elements have a bearing on the present study:

- **The Policy Analysis Unit** is responsible for the identification of key policy issues, their research, analysis and development, their documentation and the monitoring and evaluation of policy implementation.
- **The Directorate of Transport and Communications** is responsible executing the policy and planning function of the transport and communications sector, including the road sector.

There is some potential in practice for overlap here, the more so when one considers the eventual creation of a road agency will leave the Department of Roads responsible solely for policy matters with implementation transferred to the road agency. These issues will not doubt be resolved during the discussions in progress on the post constitutional restructuring report. The creation of organs devoted to policy is of advantage in the formation of bodies responsible for environmental management.
4.3 District Authorities - Roads

During the post constitutional reorganisation of ministries, the Department of Feeder Roads was transferred from the Ministry of Local Government to the Ministry of Works, Housing and Communications.

At the same time, Uganda has in recent years pursued a policy of decentralisation. It is the broad intention of the decentralisation policy that as far as possible government should work at the district level, but exceptions would be made national level assets such as the trunk road network. We were told by the MOWHC that following the transfer the Ministry would be responsible for policy and planning matters concerning feeder roads.

During field visits to Luwero and Mpigi the study team were told that although the head of the Feeder Roads Department in the district (confusingly with the formal title of ‘District Engineer’ but not the same individual as the head of the MOWHC’s district station) would continue to report to the Chief Administration Officer detailed plans and the bulk of budgetary allocations would be made by the Ministry of Works, Housing and Transport. If this is the case, it is not clear to what extent if any, responsibility for feeder roads is devolved in a meaningful way to the local authorities. Conversely, it is not yet clear how the Division of Urban and Feeder Roads of the Ministry will have overall responsibility in practice. However, its key functions have been identified as:

- plan and coordinate rural feeder and urban roads rehabilitation and maintenance programmes; oversee rehabilitation of feeder and urban roads projects sponsored by Government or donors;
- monitor districts’ performance in routine maintenance of feeder roads and where necessary advise appropriate action;
- plan and carry out capacity building programmes for works department staff in local governments;
- provide policy guidelines on feeder roads rehabilitation and maintenance work to local governments.

Whilst central control by the Ministry makes the implementation of environmental policies easier, we must anticipate a fluid situation whereby the working modalities between the MOWHC and the local authorities are worked out.

The field visits revealed that at present very little money is spent on feeder roads. While the field visits we undertook cannot claim to be statistically representative, the economic situation in Uganda suggests that a similar situation is likely to be found in most other districts.

4.4 District Authorities - Environmental Management

The National Environment Statute 1998 makes a number of provisions for the institutional arrangements for environmental management at the district level. These provisions include the establishment of a District Environment Committee (DEC) and the appointment of a District Environment Officer (DEO). These provisions are, as yet, only partially implemented and so we do not know yet what the impact of these bodies will be in practice. Seven districts are being assisted on a pilot basis under a World Bank funded technical assistance package. The statute sets out a number of provisions that are relevant to the conduct of EIAs, and the bodies formed are a potentially important resource.
The DEC is intended to be a sub-committee for the LC V council, but representatives of the private sector may be invited to attend. The functions of the DEC may include the following:

- to coordinate the activities of the District Resistance Council relating to the management of the environment and natural resources.
- to ensure that environmental concerns are integrated in all plans and projects approved by the District Resistance Council.
- to coordinate with NEMA on all issues relating to environment management.
- to prepare a district state of the environment report each year.

This last point indicates that the DEC will be an important resource of environmental information for anyone preparing EIAs. However, in practice most districts will have insufficient funds for a separate DEC and it is likely that its functions will be merged into another committee to form, for example, a production and environment committee or an environment and health committee.

The DEC is responsible for preparing every three years a District Environment Action Plan (DEAP) that shall be binding on all persons within the district. No DEAPs have yet been formed, although it is anticipated that they will be prepared in the 7 districts under the pilot project.

The District Environment Officer's functions may include:

- to advise the DEC on all matters relating to the environment.
- to liaise with the Authority on all matters relating to the environment.
- to gather and manage information on the environment and the utilisation of natural resources in the district.
- to serve as the Secretary to the District Environment Committee.

At present, DEOs have been appointed in 35 of Uganda's Districts. Based on our discussion with NEMA, the DEO would be responsible for the conduct of EIAs where the lead agency was a district level body. For classified roads where the lead agency is a national level body, the DEO will play a consultative and advisory role.

**4.5 National Environmental Management Authority**

The National Environment Management Authority was established by the National Environment Statute, 1995. It is the principal agency in Uganda for the management of the environment and shall coordinate, monitor and supervise all activities in the field of the environment. Amongst its functions is 'to ensure observance of proper safeguards in the planning and execution of all development projects, including those already in existence that have or are likely to have significant impact on the environment'. The Statute provides that NEMA may delegate its functions to a lead agency, which in this case would be the Ministry of Works, Housing and Communications.

The Statute gives NEMA quite wide powers to require and regulate the conduct of environmental impact assessments. Although it is not envisaged that NEMA will actually conduct EIAs, lead agencies are required to collaborate closely with the Authority. In practice, this means that NEMA should be satisfied with the terms of reference for undertaking EIAs and the selection of people to undertake the EIA. NEMA's requirements are set out in its EIA Guidelines and the

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1 Excerpted from 15(2) of the National Environment Statute 1995
2 National Environment Statute 1995, section 19
3 Excerpted from 16(2) of the National Environment Statute 1995
1998 EIA regulations which are discussed elsewhere in this report.

NEMA is organised into four divisions:
- Policy Planning and Legal
- Information and Monitoring
- Education Awareness and Training
- Finance and Administration.

Information and Monitoring is the division responsible for overseeing environmental impact assessments and audits and will review and approve the road sector EIA guidelines developed by this study.

NEMA describes itself as 'lean and mean' when it comes to staffing. This is consistent with the approach that NEMA itself is not responsible for undertaking environmental impact assessment studies.

It is fair to note that at least two initiatives required by NEMA are still evolving: the development of sector specific guidelines; and the creation of ELUs. The practical implication for this study is that the outputs from this study will be more routine and specific than those that have been done before.

4.6 Uganda Wildlife Authority

The Uganda Wildlife Authority was formed from a merger of Uganda National Parks and the Game Department in 1996. It is a parastatal whose responsibilities include the National Parks, Wildlife Reserves, Wildlife Sanctuaries and Community Wildlife Areas in the country and these occupy about 11% of the total land area.

Roads affecting protected areas can be grouped into three categories: public roads leading to protected areas; public roads passing through protected areas; and UWA roads developed within protected areas for management or tourism purposes. UWA has undertaken a major road building programme within National Parks in recent years. The other types of protected areas tend to have very few roads within them.

Under a USAID funded planning project, UWA has been developing EIA capacity and guidelines. However, these guidelines focus principally on the granting of concessions, and not roads or other sectors. It is likely that UWA will need to develop its own EIA guidelines for roads prior to the anticipated development of roads within the Wildlife Reserves.

4.7 The Ugandan Contracting Industry

As will be clear from the description of delivery approaches for maintenance and construction, under the policy of privatisation, the MOWHC has relied on contractors to a large extent in recent years.

The contractors fall into small scale and large scale mechanised. The small scale contractors are used for routine maintenance of unpaved roads usually up to 10 km sections and are based in the neighbourhood of the road being maintained. They use labour based techniques and are closely supervised by the district engineers' staff. Some district engineers periodically hold short training
sessions with the small scale contractors and these occasions might present a convenient opportunity to communicate environmental mitigation practices in routine maintenance.

Large scale contractors are both local and international, although international ones tend to dominate the larger jobs. This has some implications in terms of communicating Uganda’s environmental practices to them. The number of contractors used on a regular basis by the MOWHC is estimated to be around 20.

4.8 Consulting Engineers

Again as noted from the description of delivery approaches above, the Ministry makes considerable use of consulting engineers for the design and supervision of major works.

There are a number of consulting engineering firms with offices in Uganda. Most of those used by the MOWHC are international organisations, with head offices overseas and Ugandan staff employed locally. In practice only a small volume of the work is handled by locally owned firms.

The industry forum in Uganda is the Association of Consulting Engineers.

The capacity of the industry to conduct EIAs is considered further in Chapter 7: Developing Capacity to Conduct EIAs.
5. PROPOSED INSTITUTIONAL ARRANGEMENTS FOR ENVIRONMENTAL
MANAGEMENT

5.1 Introduction

The effective uptake of environmental management and policy matters by the Ministry and
RAFU is as much an institutional matter as a technical one. This report provides information,
guidelines, policies and procedures, but unless staff are in place to implement and management
them they will not be used. We believe it will be necessary to have staff dedicated to
environmental matters.

It is helpful to break this issue into three questions that need to be answered:

• where should they be placed in the hierarchy?
• how many staff, and with what skills, are needed?
• what are the responsibilities of the staff?

Before attempting to answer these questions, it is important to recognise that the volume of work
is substantial. We do not list all the tasks here, since this would simply duplicate the tasks listed
in the job descriptions provided later. However it is sufficient to justify the appointment of a
small number of full time staff. Whilst the initial workload includes efforts to develop and
introduce systems and procedures, it will continue for ever to ensure their operation and
application.

5.2 Position in the Hierarchy - General Considerations

In determining the position of staff dedicated to environmental management, the following
considerations are key:

• In 3 years, RAFU will evolve into an independent agency. Based on our discussions with
NEMA, it is normal practice for such an agency to have its own environment unit. RAFU
itself will take on many of the lead agency functions of the Ministry in the road sector.
• Good practice indicates that ‘Road Agencies should have a clearly designated staff member
with overall responsibility for environmental matters and knowledge of environmental laws
and regulations’ and ‘The environmental coordinator should have access to senior
management, and have their support in coordinating environmental actions throughout the
organisation’.
• Most of the significant environmental impacts will arise from activities managed by RAFU
and not by the Ministry. In practice EIAs will be undertaken by the engineering consultants
responsible for the detailed road design and managed by RAFU.
• RAFU not withstanding, it is a NEMA requirement that the MOWHC as a whole has an
ELU since it acts as a lead agency in other transport sectors.

6 This poses a problem for this study as the scope of that ELU should go well beyond roads to all other
aspects of the Ministry's operations. These other aspects are outside the terms of reference for this study,
which makes it inappropriate for us to make firm recommendations.
• The implementation of the post constitutional reorganisation, the creation of RAFU with posts being remunerated at many times Ministry levels, and the planned eventual take over by the road agency of all Ministry road matters is likely to leave the MOWHC highly demotivated for the next two or three years.
• RAFU will be responsible for implementation, the Ministry will be responsible for policy, and for monitoring the performance of RAFU against that policy.
• NEMA’s practice is to delegate detailed work to lead agencies, and its capacity for detailed review of EIAs will be limited.

On this basis, it appears that two units will be required. One within RAFU (the ‘Environment Unit’) to undertake much of the detailed day to day work, and one at the Ministry (the MOWHC Environmental Liaison Unit), with a much smaller workload, to review RAFU’s environmental work, liaise, and input into the Ministry’s wider policy machine.

The function of the ELU is to incorporate environmental concerns into the policies of the Ministry in accordance with national guidelines, policies and regulations, and to inform environmental policy makers of relevant Ministry issues and activities.

The function of the RAFU environmental unit will be to provide the resources and inputs required to ensure that RAFU acts in accordance with national guidelines and legislation concerning the environment.

In summary, the two units would be responsible for the tasks summarised as follows. A more detailed description of these tasks is included as an attachment.

Table 5.1: Summary of Responsibilities of the 2 Environmental Units

<table>
<thead>
<tr>
<th>1. Ministry ELU</th>
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<tbody>
<tr>
<td>• policy development in accordance with environmental regulation</td>
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<tr>
<td>• overseeing environmental compliance of individual programme elements</td>
</tr>
<tr>
<td>• advising the RSDP steering committee on the overall performance of RAFU</td>
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<tr>
<td>• providing information on environmental matters to the Ministry’s units</td>
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<tr>
<td>• providing information on Ministry activities to NEMA</td>
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<tr>
<td>• monitoring environmental impact of Ministry’s overall programme</td>
</tr>
<tr>
<td>• liaison with other countries on road sector environmental matters</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>2. RAFU Environment Unit</th>
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</thead>
<tbody>
<tr>
<td>• advising Ministry on practical implications of environmental policy</td>
</tr>
<tr>
<td>• disseminating environmental policy and regulation to RAFU sections</td>
</tr>
<tr>
<td>• managing the conduct of EIAs by consulting engineers</td>
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<tr>
<td>• environmental monitoring and auditing of RAFU’s activities</td>
</tr>
<tr>
<td>• ensuring RAFU’s operating practices take into account environment issues</td>
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<tr>
<td>• other matters as may be required to integrate environmental issues into the project cycle</td>
</tr>
<tr>
<td>• disseminating and supervising a code of practice in environmental management throughout RAFU.</td>
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</table>
The level of effort required to undertake these tasks will vary considerably. The largest task will probably be the management of the conduct of EIAs by consultants.

The splitting of responsibilities into two units may seem complicated but it does overcome a critical problem that has limited the effectiveness of ELUs in other sectors. Put simply, the work of environmental units can be divided into ‘hands on, practical matters’ such as the preparation of TORs for EIAs and ‘high level, policy matters’. It has proved difficult in practice to combine these into one unit. The arrangement proposed here nicely overcomes this problem. A further advantage is that RAFU is a relatively small organisation with a relatively shallow hierarchy. This means that as RAFU evolves into an autonomous road agency we do not anticipate that such problems will start to manifest themselves.

The concept of creating two units was discussed during the conduct of the study and generally accepted. There are some precedents in other sectors where the lead agency is not the parent Ministry. These include the Uganda Revenue Authority and Uganda Wildlife Authority. In these cases NEMA tends to deal directly with the authority concerned. Nevertheless, the situation in the road sector does not exactly parallel these cases and the establishment of two units does create some potential issues concerning the relationship between them. We discuss this below in Section 5.5.

5.3 Position in the Hierarchy - Ministry Environment Liaison Unit

The positioning of the environment liaison unit within the Ministry is, as already noted, subject to matters that are beyond the scope of this study, which has a roads only perspective. The situation is made more complicated as the Ministry is still digesting both the post-constitutional Ministry restructuring and its implications on the operations of RAFU. It is yet to be seen how it will respond to the fact it will now be able to concentrate to a much greater extent on road policy matters, and whether similar transformations will apply in other sectors. We therefore can only set out the main considerations, and list the most likely alternatives.

It will not be appropriate to staff the ELU with staff who take on such duties in addition to their existing assignments (this has been common practice in other sectors). It is hard to see how any officer could find the time to undertake the initiatives required to make the ELU function effectively in addition to even a partial workload. The more so, when the potential for conflicts of interest - ELU activities might well increase the burden of the officer’s other tasks - are taken into account.

It will be important for the ELU to have access to senior staff of the Ministry. If not, its influence on policy will be greatly diminished, and it cannot really fulfil its function.

It may be anticipated that there will be some revisions to the proposed organisation chart as a result of the post-constitutional restructuring. Now is a convenient time for the Ministry to incorporate the ELU into its structure.

During the study, we prepared and circulated a discussion paper setting out the main alternative locations for the ELU, in the Ministry hierarchy and discussing the pros and cons. The Ministry has indicated that its preferred position is in the Policy Analysis Unit since this most clearly covers all sub-sectors. Accordingly, we present here a brief summary only of the options which are illustrated in the chart overleaf.
Alternative Positions for the Environment Liaison Unit
Ministry of Works, Housing and Communications

Office of the Minister

Permanent Secretary

Policy Analysis Unit

Resource Centre

Directorate of Transport & Comms

Commissioner Communications

Commissioner Transport Planning

Commissioner Transport Regulation

Commissioner Quality Assurance

Commissioner Roads

Directorate of Engineering

Commissioner Housing

Under Secretary Finance & Administration
Option 1: In the policy analysis unit. This would put it at a very senior level within the Ministry and cover all sub-sectors. However inter-departmental politics may hinder the achievements of the unit.

Option 2: A small stand alone unit under the Director of Transport and Communications where it would, at least in theory, be able to cover all sub-sectors and would allow for specialisation.

Option 3: A unit under the Commissioner for Transport Planning (Directorate of Transport and Communications) which is responsible for strategic planning, and in practice is likely to do much of the Ministry's policy formulation, except perhaps for roads.

Option 4: A small stand alone unit under the Director of Engineering. In this case there is the danger that the unit would then be regarded as interfering with the functions of the other departments when reviewing their projects.

Option 5: A small stand alone unit under the Commissioner of Roads.

The last two options would only be appropriate if one sees the ELU as supervising and checking the work of the RAFU environment unit (this is the issue discussed below in Section 5.5) and considered there to be little environmental management work in the other transport sectors.

From the perspective of this study, the Ministry's choice of the policy analysis unit as the home of the ELU is reasonable as this gives it the greatest prospect of ensuring environmental matters are fully integrated into the work of the Ministry. Options 2 and 3 are sound against the theory of the post constitutional restructuring report, but may face practical difficulties. Options 4 and 5 no longer seem appropriate.

5.4 Position in the Hierarchy - RAFU Environment Unit

The organisation of the RAFU has already been the subject of detailed study, but is subject to review as senior staff take up their posts.

The main considerations in positioning the unit are the need to give the unit: proper access to the Director of RAFU; ability to coordinate with planning and design; and independence to concentrate on environmental matters.

The consultant's recommendation is that this is established as an additional section within the Engineering Division. This is shown in the attached chart. We have discussed this arrangement with the Director RAFU is in general agreement. Whilst some of the details of the overall RAFU organisation chart may be revised during the formation process, it is not anticipated that such revisions will affect the environment unit.
PROPOSED POSITION: RAFU ENVIRONMENT UNIT

RAFU Directorate
1. Director
2. Deputy Director

Division 1: Engineering
1. Engineering Division Chief

Division 2: Information
1. Information Div Chief
2. MIS
3. UHMMS
4. PR

Division 3: Administration

Internal Monitoring Team
1. Monitoring Engineer

Proposed Section: Environment Unit

Section 1: Programming Evaluation Unit
Section 2: Project Preparation
Section 3: Procurement
Section 4: Implementation
Section 5: Maintenance
Section 6: Finances and Accounts
Section 7: Personnel Services
5.5 Relationship Between the ELU and RAFU Environment Unit

The creation of two units each with some responsibility for environmental management matters for the road sector creates the issue of the relationship between them. To what extent is the ELU responsible for the supervision of the environmental unit in RAFU? The issues are thrown into sharpest focus in the case of environmental impacts assessment. There are two alternative treatments, which we state here starkly for clarity:

Treatment 1: Sees the Ministry as the lead agency in road sector matters, and RAFU as a body that will inevitably have a bias to road sector development over environmental management. NEMA will not have the capacity to monitor RAFU closely enough to provide a counterbalance - this responsibility must fall on the ELU. The ELU should therefore have the authority to approve stages in the EIA process, including the TORs and the EIS itself.

Treatment 2: Sees RAFU as an autonomous body, whose head reports to the PS, but is not in day to day operational matters controlled by the Ministry. The RAFU EU will develop considerable experience and expertise in EIAs. Precedent suggests that NEMA would be comfortable with the RAFU EU reporting direct to it.

Whilst it might be argued that the Ministry is the Lead Agency and RAFU is the Developer, the facts are that RAFU will always contract out development works and for the reasons already described, much of the environmental management capacity is rightly placed in RAFU.

We lean towards treatment 2 on the grounds that this is more consistent with the semi-autonomous status of RAFU (and the autonomous status of the proposed road agency). Detailed approval of individual outputs from RAFU by the ELU gives considerable potential for bureaucratic dispute and delay and could even undermine the accountability of RAFU. At the same time, it is hard to see the ELU being able to combine a role that adds value at this level with its policy oriented functions.

We have therefore, in drawing up the detailed description of the functions of the ELU and RAFU EU adopted the following approach. The ELU will not formally approve RAFU EU documents, except for those describing procedure where the ELU will be responsible for ensuring that they comply with policy. Nevertheless the ELU will be responsible for monitoring the overall performance of RAFU in respect of environmental management. This means that if it is not satisfied with the performance of the EU it should take the matter up.

If the Ministry and RAFU do not agree on this approach, then a number of amendments will need to be made to the EIA Guidelines (Volume III) and the description of the responsibility of the various units set out below.

5.6 Size and Composition - Ministry Environment Liaison Unit

The tasks of the ELU suggest that the staff should have the following skills:

* transport sector policy formulation, planning and monitoring
* environmental planning.
The consultant’s estimate of the workload in respect of road sector items is that this is less than a full time position. The inclusion of non-road sector transport matters will increase this. The Ministry has indicated that it wishes to place two full time staff in the ELU: an Assistant Commissioner, and a principal engineer/officer. These appointments will be made from the Ministry’s existing establishment.

It can therefore be anticipated that those appointed will come from an engineering background. We suggest that they are given training in environmental planning matters, probably through attendance at a short course at an overseas university. This is elaborated in Chapter 6 on Training.

5.7 Size and Composition - RAFU Environment Unit

The tasks of the environment unit suggest that the staff should have the following skills:
1. road engineering and planning
2. environmental impact assessment
3. community participation methods
4. socio-economics and relocation
5. ecology

It would take three staff to provide this range of skills, with (2 & 5) and (3 & 4) each being combined into one individual. The consultant’s experience elsewhere suggests that the workload is also likely to require three individuals. However, the high calibre expected of RAFU staff, and the need to build the unit up in phased manner in line with the development of RAFU more generally, suggest that the unit should start with less than three full time staff.

Our recommendation is that initially, there should be a full time head of the unit who would be an environmentalist with experience of road sector. The unit would have access to a part time specialist in socio-economics with experience in community participation methods. This might be conveniently be arranged through a draw-down contract for consultancy services. The environment unit would rely on engineers in the planning section for engineering inputs during this initial phase.

This establishment would then be reviewed after one year.

5.8 Tasks of the Ministry Environmental Liaison Unit

Note: While some of these tasks apply to all aspects of the Ministry, they have been prepared from the perspective of the FRSP Environmental Policy and Management Study and therefore contain a number of tasks specific to roads. It is expected that to the list will be added a number of tasks specific to other sectors under the Ministry’s responsibility.

The tasks have been formulated with reference to:


b) functions/roles of ELUs as set out by NEMA.
5.8.1 Overview

The function of the ELU is to incorporate environmental concerns into the policies of the Ministry in accordance with national guidelines, policies and regulations, and to inform environmental policy makers of relevant Ministry issues and activities.

5.8.2 Policy Development

The ELU will participate in policy development by the Ministry to ensure that it meets environmental concerns and regulations. This includes:

- Ensuring that the Ministry is aware of policies and regulations laid down by other arms of government, particularly NEMA.
- Commenting on draft policies from an environmental perspective, and advising the Ministry on the environmental impacts of existing policies.
- Developing and reviewing sub-sector EIA guidelines as and when required.
- Identifying environmental issues relevant to the Ministry.
- Reviewing and commenting on policy instruments, such as design standards, prepared by the Ministry.
- Reviewing and commenting on sector planning documents, including, for example, road network plans.
- Commenting on terms of reference for internal and external studies and policy development exercises to ensure that they take into account environmental issues as appropriate according to the nature of the study.

5.8.3 Environmental compliance of individual programme elements

The Ministry will be the lead agency in the development of a number of sub-projects. The key mechanism for ensuring that these are designed and implemented with appropriate reference to the environment will be the environmental impact assessment. However, it should be noted that much of the detailed work of environmental impact assessments will be fully delegated to individual departments and agencies where these have their own environmental units (and possibly further delegated to contractors). In this regard, in the road sector, the Ministry (as opposed to RAFU) will only be the lead agency in respect of maintenance contracts and the work involved will be relatively minor.

Detailed tasks in this regard in those areas where the Ministry is the lead agency include:

- Scoping projects and preparing TORs for EIRs/full EIAs in compliance with guidelines.
- Reviewing the statements resulting from EIRs/EIAs to ensure that: (a) the terms of reference have been complied with and (b) that they give a result that is likely to be accepted by NEMA (if not a discussion should be initiated on whether or not the project should be implemented). Forwarding the statement to NEMA.
- Communicating the results of the NEMA review to the developer to ensure that required mitigation measures are implemented.

Where the Ministry is not the lead agency, as in the case of RAFU projects, the ELUs role is to provide feedback on TORs and Environmental Impact Statements in response to consultation by the lead agency and to provide monitoring of such work.
5.8.4 Monitoring of RAFU

The RSDP steering committee will have responsibility for monitoring RAFU’s performance. The assessment of corporate efficiency will include coverage of standards of environmental impact assessment. If possible (this may be difficult) the ELU should develop indicators to quantify this. Whether quantified or not, the ELU should monitor the EIA standards achieved by RAFU and report to the RSDP coordination committee according to its reporting cycle.

5.8.5 Information Dissemination

The ELU will be responsible for providing information on environmental matters to NEMA. Much of the detailed information will come from the individual departments and agencies of the Ministry. The ELU will be responsible for coordinating the collection of this information, where appropriate setting standard formats, consolidating and aggregating it before submission to NEMA.

This report does not make firm recommendations concerning a ‘home’ for GIS - it is beyond the terms of reference - though it could conceivably be in the ELU.

5.8.6 Programme Monitoring

The ELU will be responsible for developing and implementing a programme to independently assess the environmental impact of the Ministry’s detailed programmes. The programme should include measures to assess that road development activities do not lead to infringements of environmental standards.

5.8.7 Other Matters

The ELU will be responsible for overseeing and coordinating programmes to develop the capacity of the local consulting industry to carry out EIAs.

The ELU will be responsible for ensuring that each sub-sector develops and applies suitable EIA guidelines.

The ELU will liaise with neighbouring countries and relevant regional organisations to exchange information on relevant standards and procedures.

5.9 Tasks of the RAFU Environmental Unit

5.9.1 Overview

The function of the environmental unit will be to provide the resources and inputs required to ensure that RAFU acts in accordance with national guidelines and legislation concerning the environment.
Responsibility for compliance rests with RAFU’s top management. However, the unit will be closely involved in the design and implementation of all of RAFU’s road projects. Much of this will be done through the unit’s involvement in the EIA process, which is expected to form the bulk of its work.

5.9.2 Policy Development

Primary responsibility for policy will rest with the Ministry and its environmental liaison unit. The environmental unit in RAFU will feed back on the practical implications of policies, proposed and existing. This will cover issues relating to:

- EIA guidelines and regulations
- Design standards
- Standard contracts
- Maintenance procedures used by the Ministry

5.9.3 Policy and Regulation Dissemination

The unit will be responsible for keeping a library of policies and regulations affecting the road sector and for ensuring that RAFU staff are kept informed of changes. Where appropriate this will include the conduct of short seminars or training sessions.

5.9.4 Conduct of Environmental Impact Assessment

The environmental unit will carry primary day to day responsibility for arranging that environmental impact assessments are carried out in accordance with laid down guidelines and procedures. All work will be subject to approved road sector EIA guidelines.

Its duties will include:

Screening/Scoping/Project Brief/Terms of Reference for EIRs and full EIAs
- Screening projects and preparing project briefs for NEMA.
- Preparing terms of reference for EIRs/full EIAs in accordance with the guidelines
- Coordinating with the planning unit on the incorporation of TORs into larger contracts.
- Consulting with the Ministry ELU on the TORs
- Liaising with NEMA for the review of the TORs.

Contracting EIAs and EIRs
The actual contracting of EIAs and EIRs will be subject to procurement guidelines for RAFU and the Ministry (which will actually issue the contracts.) The unit will provide inputs to the short-listing process and evaluation process as required.

Conducting EIRs/EIAs
- Providing information and clarification to the EIA contractor as required on a day to day basis. This will include practical matters relating to the interpretation of guidelines
- Participating in the facilitation of the public consultation process
- Reviewing the outputs of the study to ensure that it meets the terms of reference
- Liaising with design to ensure that any identified planning issues are responded to.
Approval of EIRs/ELAs
- Liaising with NEMA for the approval of the EIA
- Ensuring that the results of the approval are incorporated into the design and planning process.
- Consulting with the Ministry ELU on any issues that may arise from the EIA.

5.9.5 Environmental Monitoring and Auditing

RAFU will bear responsibility for ensuring that: implementation of road works is conducted in accordance with mitigation plans; unforeseen environmental consequences are identified and addressed; and that maintenance addresses environmental as well as engineering concerns. Much of the detailed work will be done by the consulting engineers supervising works contracts and by District Engineers in formulating their workplans. The role of the environmental unit in this regard will be:
- Coordinating and reviewing arrangements to make sure that environmental issues are addressed in district maintenance plans.
- Ensuring that environmental matters are taken up by consulting engineers supervising works contracts.
- Reviewing environmental impacts of roads after the defect liability period.

5.9.6 Development and Incorporation of Environmental Practices

RAFU will have a number of standard systems, procedures that will be documented. The environmental unit will be responsible for reviewing these as they are developed and providing necessary inputs. Thereafter, they will be responsible for suggesting revisions and changes as appropriate.

5.9.7 Input into the design and implementation process

A responsibility of the unit will be to ensure that environmental matters are taken into account by RAFU during the design and implementation process. Formally, much of this responsibility will be discharged during the EIA. Beyond this, it may be necessary to take additional steps to ensure that environmental matters are taken into account at all stages of the design and implementation process. In particular, detailed design should not commence until the environmental issues relating to different alternatives have been considered. The environmental unit's tasks in this regard will include:
- participating in the initial identification of alignments and the consideration of alternatives.
- providing inputs on environmental and social matters to the preparation of pre-feasibility and feasibility studies for particular roads.
- reviewing detailed designs for compliance with environmental guidelines.
- reviewing draft contracts with contractors and supervising consulting engineers for compliance with environmental guidelines.
- supporting the maintenance unit in ensuring that emerging environmental problems are addressed in maintenance plans.
5.9.8 Code of Practice

The unit will be responsible for documenting a code of good practice in environmental management matters, and ensuring that RAFU staff are familiar with it and comply with it. This may require the conduct of briefings and seminars for staff.

5.10 Job Description for Head of Environmental Unit

We have drafted the following job description for the head of the environment unit. It is brief as it draws on the task list for the unit set out above.

Job Title: Head of Environment Unit
Reports to: Assistant Director Engineering
Reported to by: None

5.10.1 General

The Head of the Environment Unit will be responsible for ensuring that the unit conducts its tasks in an efficient and effective manner and in accordance with laid down procedures, policies, guidelines and codes of practice.

5.10.2 Specific Tasks

In addition to conducting the tasks of the unit, the head will:

- Secure service contracts with additional staff as may be required for the unit to perform its duties.
- Supervise any staff contracted by the unit.
- Advise the directorate of any changes that may be needed in the staffing arrangement of the unit.
- Ensure that the staff of RAFU are adequately informed and briefed on environmental management matters.
- Consult with NEMA and the Ministry ELU.
- Participate in the evaluation of bids (such as for road design and supervision) that have an environmental management (eg. EIA) component.

5.10.3 Qualifications and Experience

The Head of the Unit will have a Masters in Environmental Management or a related discipline. She/he will have at least five years practical experience, including at least one in the road sector. She/he will have experience in managing multi-disciplinary teams. Knowledge of environmental issues, initiatives and actors in Uganda would be helpful, and experience in EIA would be an added advantage.
5.11 Involvement of District Bodies in EIA

In prescribing the role of these district bodies in road sector EIAs, the consultant recognises that much of what is said here about the road sector applies to other sectors as well. What is set out here, must therefore be considered preliminary, pending the development of more general guidelines and practice regarding the role of DECs in local EIAs.

In conducting a road sector EIA, the following steps should be included:

(1) The most recent state of the environment report should be consulted to identify:
   - environmentally sensitive areas and environmental issues
   - relevant plans/initiatives in the district that might be impacted by the study.
   - other persons/bodies that should be consulted.

(2) The current District Environment Action Plan and District Environment Policy should be consulted to ensure that the proposed road does not threaten any of the proposed measures.

(3) The DEC and DEO should be consulted:
   - for recent information
   - to discuss any issues emerging from (1) and (2) above
   - to comment on draft EIAs.
   - to ascertain any district level environmental bye-laws.
   - at the auditing stage to determine if there are any issues that he has identified.

In addition, the DEC and/or DEO should be involved in the public consultation process.

We have discussed the above proposals with the Head of the NEMA District Coordination Unit.

5.12 Role of Other Ministries in Environment Impact Assessment

Many of the impacts of road development affect matters that are in the realm of other ministries. Standard mitigation measures and a sensitive design may help reduce the immediate impacts, but not eliminate them. Secondary impacts will be harder to assess and making reasonable judgement will require the knowledge and input from other ministries, departments and agencies.

The organisations involved are shown in the following table. The list attempts to cover negative impacts and not those that might be consulted about benefits as part of an EIA.
Table 5.2: Other Ministries Involved in EIA

<table>
<thead>
<tr>
<th>Ministry/Department/Agency</th>
<th>Factor</th>
</tr>
</thead>
</table>
| Ministry of Agriculture and Livestock | - changes in land use  
- loss of agricultural land  
- erosion from run off  
- pressure resulting from migration |
| Ministry of Water Lands and Environment | - changes in water flows  
- siltation  
- affects on swamps and wetlands |
| NEMA                            | - environmental quality                          |
| UWA                             | - destruction of wildlife habitats  
- loss of migration patterns  
- landscape spoiling           |
| Ministry of Health              | - disease transmission from migration or creation of vector breeding grounds |
| Forest Department               | - reduction of biodiversity  
- reduction of watershed  
- access to poachers            |
| Culture                         | - invasion by alien cultures  
- opportunities for vandalism of cultural sites |

The scoping exercise for the EIA should determine which ministries/departments/agencies need to be consulted, and this should be reflected in the terms of reference for the detailed study.
6. TRAINING

6.1 Introduction

This Chapter examines the training requirements of Ministry and RAFU staff in environmental management and proposes suitable training courses. The training proposed takes place against the institutional changes discussed elsewhere in this report.

The work done in preparing this session draws on discussions with the Assistant Commissioner for Training and the Principal Personnel Officer concerning Ministry training practice and policy. With a very small number of exceptions there has been little or no training in environmental management or EIA and so the training proposed here is based on our assessment of what is needed for staff to have the skills and awareness needed to implement the practices described in this report.

In estimating numbers for training we have drawn on the Ministry of Public Service’s report on the post constitutional restructuring of MOWHC, and the MOWHC’s report on Interim Institutional Reforms for the Creation of a Road Agency. These reports were prepared at different times and for different purposes, and therefore there are inevitable inconsistencies. In drawing our estimates we have reconciled the two by assuming that there will be no planning or construction staff within MOWHC, only in RAFU. We have also taken numbers from the full operation stage of RAFU although this will not be reached until the year 2000.

6.2 Overview of Training Objectives

The emphasis of the training will be on short courses aimed at

i. developing an awareness of the need to consider environmental issues during road development,

ii. giving an understanding of the environmental impact assessment regulatory framework in Uganda,

iii. developing skills for a) setting terms of reference for EIA studies, b) identification and assessment of environmental impacts of road projects, c) incorporation of mitigation measures at the various stages of road development, and d) reviewing environmental impact studies reports and providing guidance on integrating results of these studies in decision-making.

The training will be directed at all staff with responsibility for construction and maintenance. Mostly the training will consist of seminars and courses lasting from 1 day to 2 weeks. Specialist staff in environment units may be given longer training.

6.3 Ministry Training

As described in the session on the institutional framework, from the inception of RAFU, Ministry operations will be concerned primarily with maintenance.
The present arrangements for training within the Ministry are set out in the Chapter on the Institutional Framework. However, we note that the objectives of training as set out in the Training Policy, Programmes and Strategies for 1993-1998 are:

- to upgrade and update professional experience of existing employees (refresher training)
- to prepare outstanding employees for new responsibilities (upgrading and specialisation)

The above training objectives show that the EIA training recommended in this study is in line with MOWHC’s training policy. There is however, no EIA or specific environmental management training included in present training courses. (In stating this we recognise that road engineering does of its very nature include consideration of the environment - the point here is that the existing training focuses only on what is needed to construct the road).

6.4 RAFU Training

RAFU is still in formation and does not have a training programme or policy. It has been noted that, because of the salaries being offered RAFU staff should come ‘fully trained’, as it were. However, it is accepted that there will be a need for professional development and that RAFU will need to hold a number of working sessions to introduce working practices and procedures. Based on discussion with those involved, we take the ‘fully trained’ concept to rule out long term courses, but to allow the short term training we propose here.

In the courses listed below under the recommended training programme, we have set out some common courses for Ministry and RAFU staff. This is because we believe that the staff involved need similar skills (for example, a reasonable understanding of the regulatory environment). However, it may well be that RAFU wants full control over its own training programme, and in the implementation plan we have provided for the training to be delivered to RAFU and Ministry staff separately if wished.

6.5 Recommended training programme

The recommended environmental management training courses/workshops for each of the four groups are described below.

Group 1 - Top Management at the Ministry and RAFU

This group consists of those holding the posts of Assistant Commissioner/Assistant Director and above who are responsible for the road sector. This essentially includes all top management concerned with road construction and maintenance who are not included in the specific categories below.

*aim*: To raise awareness and give an introduction to formal obligations.

*objectives*: The objectives of training top management will be

i. to give an understanding of the environmental impact assessment legislation in Uganda;

ii. to develop an awareness of environmental implications of roads, and procedures for assessing them;
iii. to develop an understanding of the human resource and institutional arrangements for managing environmental impact studies and integrating the results of these studies into project implementation;

iv. to develop an understanding of how policy development will incorporate environmental management concerns.

A suggested curricula of this course is given in Annex IV.

**Numbers:** Based on the establishment proposed in the post constitutional restructuring report (as analysed in Annex V), the numbers would be approximately 12 staff from MOWHC and 3 from RAFU.

**Duration:** The workshop would take 2 days and would include both formal presentations and discussions.

**Group 2 - Middle Management**

This group includes:
- District Engineers and their deputies responsible for road sector matters (not including those responsible for mechanical engineering), engineers responsible for overseeing construction and maintenance
- all staff in RAFU directly concerned with planning and rehabilitation and construction
- those responsible for overseeing construction in RAFU
- those responsible for overseeing maintenance in RAFU and the Ministry.

**Numbers:** Based on the proposed establishments as analysed in Annex V, the numbers would be approximately 70 from the Ministry and 32 from RAFU.

**Aim:** To ensure staff have a sufficient understanding of EIA to ensure that environmental issues are adequately addressed in the planning design, construction and maintenance of road projects.

**Objectives:** The objectives of this training are

i. to give an understanding of the environmental impact assessment legislation in Uganda;

ii. to enable these officers to contribute effectively during scoping of EIA studies and develop terms of references for these studies;

iii. to familiarise the participants with procedures used during a) impact studies, b) incorporating mitigation measures during road planning, and design, c) implementing an environmental monitoring programme, d) review of EIA reports.

An outline of the proposed curriculum for this training course is given in Annex IV.

**Duration:** The training would take 5 days.
Group 3 - Environmental Liaison Unit Staff

This group would comprise staff members proposed for the environment liaison unit in the Ministry.

**Numbers:** Two

**Aim:** To convert road engineers into ELU staff.

**Objectives:**

i. to develop an understanding of potential environmental impacts of road projects and their mitigation;  
ii. to give an understanding of the environmental impact assessment legislation in Uganda;  
iii. to develop a thorough understanding of the EIA process and its integration with the project development cycle;  
iv. to impart skills for developing environmental auditing and monitoring plans for road projects;  
v. to enable participants to contribute on environmental management issues in policy formulation;  
vi. to enable participants to contribute on the implementation arrangements for incorporating environmental management into Ministry activities.

**Duration:** The training will take up to 3 months as a post-graduate course at a university.

Group 4 - Road Inspectors and Overseers

This group would comprise all district based senior inspectors, inspectors and overseers.

**Numbers:** Based on the proposed establishments as analysed in Annex V, the numbers would be approximately 94 from the Ministry.

**Aim:** The aim of this training will be to enable the road inspectors and overseers to ensure that mitigation measures are identified and implemented by small scale contractors.

**Objectives:** The objectives of training this group will be

i. to develop a practical understanding of environmental implications of road projects;  
ii. to develop skills for implementing environmental mitigation measures;  
iii. to develop skills for undertaking basic environmental monitoring of road projects, develop an awareness of environmental impact assessment legislation in Uganda.

**Duration:** The training would take approximately 8 days and include a substantial field based element.

6.6 Training Resources

A number of organisations in Uganda have already had experience in conducting EIA courses. It is anticipated that some of these will be drawn on as resource persons for the courses proposed. However, it is important to recognise that the courses (with the possible exception of oversees training for ELU staff) should be Ministry and RAFU courses. They should be strongly tailored
to the road sector, concentrate on practice rather than theory and on the application of regulations rather than the regulations themselves. They will not be off-the-shelf courses as any such will be too generic and theoretical. We recommend that the courses should not be contracted in their entirety to any one training organisation. However, it may be helpful to contract a consulting firm with suitable experience in EIA to co-ordinate training programme development.

Institutions in Uganda

Several departments at Makerere University have courses that cover environmental management. Some of the relevant courses are listed below.

Department of Geography
A BA/BSc Degree in Environmental Management which is offered for both day and evening students. EIA is one of the modules offered.

Institute of Environment and Natural Resources
An MSc in Environment and Natural Resources. EIA is part of the Introduction to Remote Sensing and Geographical Information Systems Module. Other relevant modules are Environmental Economics, Environmental Ethics and Law.

Faculty of Law
Master of Law Programme has Environmental Law as a one of the modules. A Certificate Course on Natural Resources Law will be offered in 1999. This will be conducted during evenings and week-ends over a 9 months period. Some of the modules that will be covered are Environmental Law, Water Law, Law of Contract. The course is targeted at Natural Resources Managers.

The above training programmes will not in the short-term be able to contribute to building EIA capacity for the road sector in MOWHC, so that they can undertake tasks indicated above. Therefore a training programme that addresses this need is required. The following may be able to contribute to short courses.

Makerere University - Institute of Environment and Natural Resources
Contact: Director Tel 041 533462

Makerere University - Faculty of Law
Contact: Dean 041 532956

National Environmental Management Authority
Contact: Director Tel 041 251064/5/8

Overseas

The following universities are known to offer short courses in environmental management related topics.

University of Edinburgh
Contact: Tropag course
EnivEd Technologies Ltd
Abden House
1 Marchall Crescent Edinburgh EH16 5HP
United Kingdom
Wye College, University of London
Department of Agricultural Economics  
Wye College  
University of London  
Contact: Short Course Manager  
Ashford  
Kent, TN25 5AH  
United Kingdom  
Tel +44 1233 812401 email m.arnold@wye.ac.uk

University of Natal Pietermaritzburg  
Contact: Short Course Office  
School of Environment and Development  
University of Natal Pietermaritzburg  
Private Bag X01  
Scotsville 3209  
South Africa  
Tel +27 331 260 6223  
Email: envdev@envdev.unp.ac.za

Harvard University, Harvard Institute for International Development  
Contact:  
Programme Director  
International Environment Programme  
Harvard Institute for International Development  
One Eliot Street  
Cambridge MA 02138  
USA  
Fax: +1 617 496 3956  
Email: tpanayot@hiid.harvard.edu

Australian National University, The National Centre for Development Studies  
Contact: Course Administrator  
ANUTECH Pty Ltd  
Canberra ACT 0200  
Australia  
Tel +61 6 2495671 or 2490617  
Fax +61 6 2495875 or 2571433

CORDAH  
Contact: Director  
Kettock Lodge, Aberdeen Science and Technology Park  
Bridge of Don, Aberdeen AB 22 8GU  
UK  
Tel +44 1224 414200  
Fax +44 1224 414250

University of Cape Town  
South Africa  
Contact: not available
6.7 Organisation and Coordination

It is recommended that Groups 1, 2, and 4 be trained through workshops. Each workshop will have a maximum of 25 participants. Therefore the number of training workshops to be conducted are

Group 1: 1 workshop
Group 2: 4 workshops
Group 4: 4 workshops

As noted above, and further discussed in the implementation plan, group 2 may be broken into training for the Ministry and Training for RAFU.

Therefore a total of 9 training workshops will be held. Budgets for these are set out in the attached schedule.

The issue of scheduling and implementation is discussed in the implementation plan. There are two alternative approaches to the coordination of the training programme.

Option 1: Relies on internal resources (for coordination) both present and proposed. This does pose some difficulties: the training should involve the ELU and RAFU EU, but this will inevitably lead to delay; and the Ministry has as yet no experience with environmental management courses. In the case of RAFU, the delay may not be an issue since staff will be extended with other start up activities.

Option 2: Engages a consultant from a firm of consultants with experience in EIA to coordinate the training programme development and implementation. The consultant would act as one of the resource persons on the training courses providing an element of continuity and consistency. This option would be quicker but more expensive.

In making the choice, we would note that the training is largely a one-off exercise - which is an indicator in favour of using a consultant. Nevertheless we do not make a firm recommendation either way.

6.8 Budgetary Considerations

The likely costs for each workshop with 25 participants are given below. It is recommended that each of the workshops should be conducted by up to 4 resource persons consisting of

- EIA Specialist
- Environmental lawyer
- Roads Engineer with EIA experience
- Sociologist/Environmental Economist

 together with a representative from NEMA.

In preparing a budget, we have allowed:
- three resource people continuously present for the top management seminar
- two and a half resource people continuously present for the middle management workshop
- two resource people continuously present for the inspectors and overseers course
- an average resource person cost of $500 including expenses except travel
- $20 per day for food for the top management seminar
- $15 per day for food for the middle management workshop
- $10 per day for food for the inspectors and overseers course
- $50 per day residential costs for the middle management workshop
- $30 per day residential costs for the inspectors and overseers course
- $100 per day for course facilities
- $50 per participant for course materials
- $200 per day for course transport on the days needed.

Table 6.1: Budget for Training Courses

<table>
<thead>
<tr>
<th>BUDGET FOR TRAINING COURSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>US$</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Top Management Seminar</td>
</tr>
<tr>
<td>Instruction</td>
</tr>
<tr>
<td>Food</td>
</tr>
<tr>
<td>Facilities</td>
</tr>
<tr>
<td>Transport</td>
</tr>
<tr>
<td>Course Materials</td>
</tr>
<tr>
<td>Accommodation</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
<tr>
<td>Middle Management Workshop</td>
</tr>
<tr>
<td>Instruction</td>
</tr>
<tr>
<td>Food</td>
</tr>
<tr>
<td>Facilities</td>
</tr>
<tr>
<td>Transport</td>
</tr>
<tr>
<td>Course Materials</td>
</tr>
<tr>
<td>Accommodation</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
<tr>
<td>Inspectors and Overseers Course</td>
</tr>
<tr>
<td>Instruction</td>
</tr>
<tr>
<td>Food</td>
</tr>
<tr>
<td>Facilities</td>
</tr>
<tr>
<td>Transport</td>
</tr>
<tr>
<td>Course Materials</td>
</tr>
<tr>
<td>Accommodation</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

These are the estimated costs, PER COURSE, and do not include development which is included separately in the overall budget.
A detailed budget has been prepared in the attached schedule. It does not allow for course development fees. These have been provided for in the overall budget and allowed at approximately 50% of instructors fees.

6.9 Institutionalisation

The course proposed here are designed to ‘kick start’ environmental management in the Ministry and RAFU. It is not envisaged that they would be repeated in the form shown here after this start up. Instead the materials should be used to integrate environmental management into the regular training of the Ministry.

6.10 Summary

Table 6.2: Summary of Indicative Environmental Training Needs

<table>
<thead>
<tr>
<th>Composition</th>
<th>Nos Ministry</th>
<th>Nos RAFU</th>
<th>Subjects</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Top Management</td>
<td>12</td>
<td>-</td>
<td>- Introduction and overview of environmental issues</td>
<td>2 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Ugandan regulatory framework</td>
<td></td>
</tr>
<tr>
<td>2 Road planners, senior construction</td>
<td>70</td>
<td>32</td>
<td>- Road engineering and the environment</td>
<td>5 days</td>
</tr>
<tr>
<td>and maintenance staff (including</td>
<td></td>
<td></td>
<td>- EIA</td>
<td></td>
</tr>
<tr>
<td>District Engineers)</td>
<td></td>
<td></td>
<td>- Contracts and environmental matters</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Regulatory framework</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Design and implementation of mitigation measures</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Working with small scale contractors</td>
<td></td>
</tr>
<tr>
<td>3 Ministry ELU</td>
<td>2</td>
<td>-</td>
<td>- Environmental Impact Assessment</td>
<td>up to 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Natural Resources and development issues</td>
<td>months</td>
</tr>
<tr>
<td>4 Inspectors and Overseers</td>
<td>94</td>
<td>-</td>
<td>- Environmental assessments - practical</td>
<td>8 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Working with small scale contractors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Standard practical mitigation measures</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Environmental monitoring systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Review of existing practices from an environmental standpoint.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Very practical orientation)</td>
<td></td>
</tr>
</tbody>
</table>
7. DEVELOPING CAPACITY TO CONDUCT EIAS IN UGANDA

7.1 Introduction - Needs and Objectives

The number of road sector EIAs that have been conducted in Uganda in the last five years is limited and could be estimated to be around two a year. In some cases, it can be fairly stated that the EIAs were not well integrated into the design process and were rather limited in scope compared with the approach now envisaged.

In contrast, under the FRSP, it can be anticipated that 22 sub-projects will require full (very detailed) EIAs, while for 6 sub-projects partial EIAs will be conducted. On the assumption that most of these will be done during the three years of RAFU\(^7\) we can roughly estimate that seven EIAs a year will be required, and this number can be expected to grow.

Outside the road sector, Uganda has greater experience in conducting EIAs in the water, waste and sanitation sectors, and in projects specific to protected areas. However, the need for EIAs in these and other sectors can also be expected to grow sharply as a result of the regulatory framework developed by NEMA and the policy initiatives associated with the environment act. As a result, we can expect capacity to conduct road sector EIAs in Uganda to be stretched and there is a need for measures to manage this situation.

Most, if not all the road sector EIAs have been conducted by international firms, with or without Ugandan partners. A second, but no less important objective is to contribute to the overall development of the country by building Ugandan capacity to do EIAs.

7.2 The Local Industry

Because of the need to fully integrate EIAs into the design process, it is the consensus of NEMA and the consultant, that in most cases it will be appropriate for EIAs to be undertaken by the consulting engineers conducting the design, if necessary in association with individual or corporate subcontractors with experience in environmental issues.

From this perspective, the local industry can be characterised as:\(^8\)

- International firms of consulting engineers with full offices in Uganda. These are limited in number but have road sector experience. Typically, top management is expatriate and most or all of the other staff are Ugandan. There is some EIA capacity, but probably not specialising in the road sector. EIAs might be carried out with an expatriate team leader brought in especially for the job, coordinating a team of Ugandan specialists most of whom will have worked with the firm previously.

\(^7\) Work has been done on eight EIAs (some of these at the pre-feasibility stage only) prior to the inception of RAFU. However, it might be anticipated that a similar number of studies may be conducted by RAFU prior to the inception of the road agency.

\(^8\) The consultant emphasises that this is analysis is based on interviews with a number of key informants and not an exhaustive survey.
International firms of consulting engineers with representation in Uganda. This category covers most of the international firms operating in Uganda. Representation is carried out by an office established for a particular project, and possibly supported by a regional office, usually in Nairobi. Most such firms have road sector experience. Most project staff will be Ugandan. EIAs would be staffed as for those firms with a full office, but the connections with Ugandan specialists may be less strong.

Ugandan firms of consulting engineers. The Association of Consulting Engineers has about 10 corporate members. Their experience with road projects is generally limited to relatively small roads. There is some experience with EIAs often in association with international firms.

Regionally based freelance environmental specialists (mainly based in Nairobi).

Ugandan freelance environmental specialists. This group is diverse and therefore hard to characterise. Some sub-groups include: staff of Makerere, and senior former government employees. Several informants indicated that there are a number of skilled and experienced staff in this sector, but that the total number available may not meet needs as the best staff often prefer to seek full time employment - this applies particularly to staff who are at the stage of their career where they are willing to undertake field work.

From the consultant's interviews with key informants a number of points became clear.

There is no shortage of staff in Uganda with sound formal training. There is a need to increase practitioners' knowledge of issues specific to road sector EIAs but this is not a difficult matter. Relatively few Ugandan staff yet have skills or practical experience to manage a multi-disciplinary EIA team, but this is simply a matter of time.

The volume of road sector EIA work will not be sufficient to make it worthwhile for any firm to develop permanent capacity. Work is therefore likely to be done by forming alliances and using sub-contractors. Use of Ugandan staff is seen as important because of their knowledge of both the country and its EIA practices.

Capacity can and will grow to meet the expected demand provided that it grows steadily. In the short to medium term the industry may be expected to be dominated by international firms taking the lead role. However, for the reasons given above, they will have to use Ugandans, often as sub-contractors. The experience gained will become available to Ugandan contractors.

7.3 Overview of Proposed Support

In developing a package of proposed support, a principle has been that any training should be modest given that: skills already exist; and the volume of work is such that practitioners will be unwilling to devote substantial time to training. However there is a need to ensure that practitioners are aware of the opportunities and are familiar with the specific requirements of Uganda. In addition there should be some facilitation of the linkages that will be required to carry out EIAs. Once this initial support has been provided, the private sector can be expected to secure the inputs necessary for its own development.

It might be noted that informants were faced with the difficult dilemma of wanting to impress their competence and capacity on the interviewer, and signal an appreciation of an initiative to build capacity.
The proposed support therefore comprises two main elements.

a) Seminar for top management, lasting for less than a day, to introduce senior managers of consulting firms to practices and requirements.

b) Cross training for existing practitioners, lasting for a few days, to introduce EIA practitioners to specific road sector matters.

In addition, it is recommended that the industry to develop databases of consultants to include EIA practitioners.

7.3.1 Top Management Seminar

Purpose

To inform senior management of consulting firms operating in Uganda (both local and international) of the likely future requirements (both quantitatively and qualitatively) for EIAs in Uganda.

Composition

The seminar would be open to consulting organisations' senior executives in charge of the whole organisation or roads or environmental impact assessment. All firms with local and regional representation would be invited.

Numbers

It is likely that around 10 to 15 firms would respond. Some may send more than one person, giving a total of around 25.

Duration and Timing

The seminar might last 4 hours. The seminar might reasonably be combined with the dissemination of other information about the RSDP or RAFU to make a full day.

It is suggested that the seminar is conducted as soon as possible after the end of this study. Pragmatically this means in January 1999.

If successful, the seminar might be repeated after some years when the details of a second road sector project are known and/or there are major changes in the regulatory environment.

Content

The seminar would cover the following topics:
- FRSP/RSDP and the EIAs that are likely to be required
- Overview of the regulatory environment - the NEMA guidelines and regulations
- Overview of the road sector EIA guidelines
- The links between EIA and the project development and implementation cycle
- Overview of the resources required to conduct an EIA.
Results

At the end of the seminar, participants would know:

- the regulatory framework for EIAs for the road sector
- the likely future demand for EIA services and the level of effort required to meet them
- the human resources required to conduct an EIA
- how EIA activities should be scheduled into project feasibility and design.

As a result they would be able to plan and direct studies that include a major EIA component.

Resources

The seminar would be conducted by Ministry, NEMA and RAFU staff. It would be desirable to have support from the consultants preparing the guidelines, if this can be contracted.

Payments

The seminar would be free to participants.

7.3.2 Cross Training for Practitioners

Purpose

To train Ugandans already experienced in EIA in the details of the road sector guidelines.

Composition

Ugandans who have already have practical experience with the conduct of EIA with road sector issues. The course would be open to Ugandans who work freelance, at University, for local, or for international firms.

Numbers

A preliminary estimate of the numbers likely to attend is around 20.

Duration and Timing

The course should include some practical experience including a field visit. The total length of the course would be about 5 days.

The course should take place at least six weeks after the executive seminar (to give firms the opportunity to schedule the attendance of their staff as they consider appropriate). The timing may be delayed to allow the formation of the ELU, the RAFU EU and the development of training materials.

We do not anticipate that this course would be repeated, except perhaps in an altered form as an initiative of the private sector.
Content

The course would cover:
- Overview of the regulatory environment - the NEMA guidelines
- The road sector project development cycle
- The links between EIA and the road project development and implementation cycle
- The EIA guidelines, with a detailed description of each issue, and specific reference to public participation methodology
- Methods for analysing impacts of road projects
- Mitigation measures for impacts of road projects
- EIAs and socio-economic issues (compensation, resettlement, etc)
- EIAs and ecologically sensitive environments (protected areas, wetlands, forests, etc)
- Monitoring of road projects
- The resources required to conduct an EIA
- Reporting - the preparation of environmental impact statements.

Results

At the end of the seminar, participants would be able to plan and conduct major elements (as determined by their background and experience) of a detailed environmental impact assessment.

Resources

The seminar would be conducted by staff from RAFU, NEMA and the Ministry. It would be desirable if the main resource persons could be those with environmental responsibilities from RAFU and the Ministry. If these were not in place in time, it would be desirable to have support from the consultants preparing the guidelines, if this can be contracted.

Payments

Participants should be asked to meet the costs of transport, accommodation, meals and refreshments. There would be no charge for tuition.

7.3.3 Developing Lists of Consultants

No inputs are proposed under this recommendation. There is a modest need to improve the information available on both individual consultants and small specialist firms that might be subcontracted by consulting engineers to assist with EIAs.

NEMA has not published its list of individual consultants. This should be done in recognisance that while these may not generally undertake full EIAs as individuals, they are a valuable resource as sub-contractors.

The Association of Consulting Engineers may find it helpful to compile its own list of potential sub-contractors and partners that it would make available to its members. This could usefully include regionally based individual practitioners and firms.

The Consultant’s Association of Uganda may also find it helpful to publish a list of members with relevant environmental experience.
8. GEOGRAPHIC INFORMATION SYSTEMS AS A MANAGEMENT TOOL AT MOWHC

8.1 Introduction

The Ministry of Works, Housing and Communications has a small Geographical Information System (GIS) unit under the Road Maintenance Section. The unit is operated by two staff members: a civil engineer (in charge of the unit) and a database assistant. In addition to manipulating existing road network data, the staff of the unit is involved in collecting field data such as confirming road alignment and status of bridges.

The GIS Unit provides basic information on the road network under the MOWHC’s jurisdiction. Users of the information generated in the GIS Unit include firms implementing road projects, individuals officers in the Ministry and both local and national politicians.

The study team is of the opinion that the GIS Unit within the MOWHC can be enhanced to contribute to environmental management of road work activities.

8.2 The Relevance of GIS in Environmental Management of the Road Sector

8.2.1 Purpose of GIS

Digital GIS has been defined as a system for capturing, storing, integrating, manipulating, analysing and displaying data that are spatially referenced to the earth. The advantages of a system that can handle spatial data cannot be emphasised. But it is important to know that most human activities across the earth’s surface are spatial in nature and hence a map has been developed as a device for storing and complex spatial data.

Digital GIS, like any other information system, once introduced in an organisation may be a means of supporting better decision-making and reducing costs. Digital information systems, including GIS, allow easy and practical ways of storing, retrieving and collating large volumes of data in a user-friendly manner. The relevance of GIS technology to the FRSP is that it will facilitate interpretation of environmental data through visual illustration. One of the practical advantages of a digital GIS is that one can generate information for supporting decision making by integrating, manipulating and analysing spatial data of different scales, a task that is complicated if working with manual GIS. The information generated can be used by an organisation’s personnel at different management levels such as upper and middle managers, and technocrats. The diagram in Figure 8.1 illustrates the different information levels needed in a typical organisation to which GIS technology can greatly contribute.
8.2.2 Components of GIS

For a fully fledged GIS, one needs the following components:
- Digitisers necessary for converting analogue maps into digital data sets. Scanners do the same type of work too. Global Position System receivers are important for capturing new data (both point and line data) in the field;
- Colour plotters and printers capable of plotting A4 - A0 maps;
- Computer(s) for the capture, analysis and display of data;
- Computer GIS software for making the hardware function properly;
- Personnel for carrying out GIS activities such as data capture, analysis and out-putting the required information. Personnel is commonly given less attention; yet it is as vital as both the hard- and software GIS components.

8.2.3 Managing Road-Related Environmental Data Using GIS

As pointed out earlier, GIS is an ideal tool for managing large volumes of data referenced to the earth’s surface. This applies to all natural and man-made features such as forest reserves, agricultural areas, quarry sites, location of bridges, rivers and roads. The realisation that the design, construction, maintenance and operation of road networks influence environmental management beyond the road network itself is an incentive for the MOWHC to consider the use of GIS technology in the provision of information to support decision making machinery.
The cost of acquiring hardware and software for a GIS Unit is much lower than the cost of establishing a digital GIS database. However, a comprehensive digital GIS database has been created as part of the tasks required of the terms of reference of this study. Hence this presents an immense opportunity for the MOWHC to use the already established GIS database for managing road-related environmental issues with minimum investment in both hard- and software, and personnel. The database created is at national scale, most of the digitised maps being at a scale of 1:250,000. This scale is adequate for road-related environmental management issues. The digital database consists of the following data sets which are in ArcView 3.0a format (although they can be exported to other GIS formats):

1. Road Network (line data format)
2. Digital Elevation Model or DEM (raster data format)
3. Contours (line data)
4. Slope steepness (raster data format)
5. Soils (polygon and raster data formats)
6. Rainfall distribution (polygon and raster data formats)
7. Hydrology (line data)
8. Land use (polygon and raster data formats)
9. Agro-ecological (polygon and raster data formats)
10. Vegetation (polygon and raster data formats)
11. Protected areas (polygon and raster data formats)
12. Archaeological and historical sites (point data)
13. Population (polygon and raster data formats)
14. Ethnic distribution (polygon and raster data formats)

The GIS database can be queried and calculations performed on the stored data like any digital database using simple or compound queries and calculations. New information can easily be derived from the above listed data sets in a digital GIS. Some GIS programs also support SQL (Structured Query Language) queries to provide useful information for management purposes. Such queries and calculations take the form of phrase-like computer commands acting on specified fields of the database. The above GIS database can therefore be used to answer typical GIS questions such as those as briefly described below:

a) What is at or within a specified area?

The aim of such GIS queries is to find geographic features located at a specified point or within a given area on the earth’s surface. An example would be: what historical and archaeological sites are located within 50m either side of a road to be rehabilitated? If such a question is answered and the information reveals that there is no such historical or archaeological site within the specified distance, a decision may then be made to exclude an archaeologist from a team of experts needed to conduct an EIS hence reducing the cost of the feasibility study for that particular road project.

b) Where is the location of specified features?

This is relevant if information being sought must satisfy certain conditions. As an illustration, one may query the GIS database created for the MOWHC as follows:

- where are all steep areas (slope > 35%) in Uganda?
- where are the counties in Uganda with population density greater than 500 persons/km$^2$? 
- where are all the “accident blackspots” along Kampala-Jinja-Malaba Road in Uganda?
c) How large or how long is a specified geographic feature?

This GIS typical data querying seeks to find out quantitative information about a specified feature. One may be interested in knowing the length of a road segment that traverses an important agricultural area, or the length of a road segment that may require rehabilitation. Other questions may involve finding out the area (in km$^2$) covered by a category of a given road network in Uganda, or the area of agricultural hinterland served by a given road.

d) What has changed over a specified period of time?

There may be an interest in finding out the qualitative or quantitative changes that would have taken place over a given period of time. A simple example would be the total road coverage that had been rehabilitated by the Government of Uganda between 1986 and 1996. Secondly, one may be interested in knowing the decrease in vehicle accidents after implementing improvements on selected “blackspots” (e.g., better traffic signs) along a given road.

e) Which spatial patterns do exist?

It may be necessary to find the spatial correlation or patterns between one or more variables using an existing GIS database. Simple questions such as the relationship between road density network and different land use types can be formulated and information provided using a GIS database. Additional questions may be the relationship between major roads in Uganda and soil types or areas prone to soil erosion.

f) Deriving new information from exiting data

One of the practical advantages of applying GIS technology is that one can generate new information from existing data sets. The best examples are deriving continuous relief (digital elevation models) from existing digitised contour lines. The relief data can then be used for many applications such as isolating steep areas, soil erosion potential, and many other applications. Another example of deriving new information from existing GIS database is the calculation of a buffer area (i.e., a constant region around a point or a linear feature).

g) Modelling spatial data with GIS

Perhaps the most important advantage of acquiring GIS facilities in any organisation is the need to provide information to support decision making. GIS can provide this summarised information that may be needed by both upper and middle managers (figure 1). GIS modelling involves the integration of existing or newly derived data and formulating relevant questions to which answers are being sought to support decision making. The relevant questions may involve setting certain conditions that must be satisfied. A hypothetical example may take the following format: The MOWHC may wish to maximise and minimise the impacts of constructing a new road in the country. The conditions that should be satisfied may include the following:

- the new road to be constructed should provide good access to an existing road network from all the major agricultural and tourism regions of the country.
- the new road should be constructed in areas that do not have very serious environmental negative impacts as stipulated by NEMA such as environmentally sensitive areas (e.g., steep areas, fragile ecosystems like wetlands)
- while taking into consideration to the first two conditions, the cost of the new road project should be feasible.

GIS spatial data modelling can be used to provide a quick answer to such a proposed project.
High level application of GIS modelling may involve formulating different scenarios especially where alternative course of action is needed (for example where a new alignment may be required). When GIS is used to provide information for alternative course of action, this is normally referred to as an *allocation problem*. Provided that there is a GIS database already established, GIS modelling is quicker to implement by anybody with moderate GIS training.

In summary, information or results provided by the use of GIS technology can be used broadly for the following managerial activities and tasks:

i. supporting decision making by both middle and upper managers;
ii. implementing policies and government projects;
iii. finding alternative courses of action in the case of a controversial but socially and economically important road project;
iv. reducing the costs of conducting EIAs by the MOWHC.

### 8.2.4 Use of GIS in the FRSP Environmental Policy and Management Study

Among the tasks outlined in the terms of reference for this study was the identification of critical constraints to environmental management in the Uganda road sector. In terms of the physical, natural and social environment, these constraints are areas of rapidly decreasing habitats such as tropical forests, sensitive areas of wetlands and soils, the potential of soil erosion and the existence of historical and cultural sites in relation to road projects. For the study team to identify easily and practically the above mentioned environmental constraints from spatial data sets created at different map scales (1:50,000 - 1:900,000) and different periods (1960 - 1996), there was a need to use a tool like digital GIS. In digital GIS, there is flexibility in integrating data sets created at different spatial and temporal scales and produce new information. The alternative would have been to use manual GIS with traditional cartographers equipped with paper maps, drawing pens, planimeters and transparencies. Manual GIS is not a practical tool to provide the much needed spatial information especially being integrated or compared are of different scales. Another limitation of manual GIS is that deriving new information from existing data sets such as steep areas from contour lines is not practical. In summary digital GIS was used because of its convenience to integrate existing data sets and the ease of determining quantitative parameters such as areal extents of given geographical features.

### 8.3 Capacity for Using GIS in Uganda

There is extensive capacity to use GIS technology as an environmental analysis and management tool in Uganda, both in terms of man-power, equipment and software. GIS units are well established in organisations like Makerere University Institute of Environment and Natural Resources (MUIENR), the Faculty of Technology at Makerere University, the Lands and Survey Department, National Environment Management Authority (NEMA), National Biomass Study (NBS) and Uganda Wildlife Authority. Some projects such as Road Maintenance Unit in the MOWHC, the National Wetlands Conservation and Management Programme (NWCMP), Rural Water and Sanitation Programme (RUWASA) and CARE/DTC also have fully functional GIS units. In the private sector, there is one firm that undertakes GIS consultancy, and a cartographic company that produces and publishes maps (eg. for tourists).
There is also enough manpower to operate GIS units in Uganda. Most have been trained locally at MUIENR and at foreign universities (particularly the Netherlands and UK). GIS training has been mostly at postgraduate level (both masters and diplomas). In addition, MUIENR offers short courses in GIS as a planning tool.

With the continuous improvement in the information technology, personal computers are not only becoming cheaper, but are able to run powerful GIS software. Popular GIS software being used in Uganda includes ArcView, PC ArcInfo, IDRISI, TNTmips and ILWIS. Most GIS specialists in Uganda can operate more than one type of GIS software.

8.4 The GIS Unit at MOWHC

8.4.1 Capacity

The GIS Unit is equipped with a range of hardware and software. A summary is given in Table 8.1. From the table, it is clear that the GIS Unit at the MOWHC is rudimentary and small, both in terms of equipment and software.

8.4.2 Current GIS Activities

The GIS Unit uses Windows 95 as the Operating System. There was an attempt to establish a Local Area Network (LAN) in the GIS Unit. However, the LAN does not function properly.

It appears that there is little GIS activity except the retrieval of existing data, manipulating it to produce information required by administrators at the Ministry headquarters, District Engineers, staff involved on road projects, and politicians. The information requested range from a mere presence of a road network to maps showing different traffic counts for selected road segments. Requested information can be plotted in colour on A4 - A0 size paper.

With the help of a GPS, the unit has tried to affirm the existing road network data digitised by the National Biomass Study. An attempt to collect data on bridges has been made using a GPS. Field data collection has been hampered because of GPS lack of accuracy and very often the GPS’s failure to receive strong satellite signals essential for calculation of geographic position(s). The failure of GPS to function properly may be due to lack of experience to setting up the GPS receiver before it is used. However, this needs to be verified. Depending on the model of stand alone GPS used (especially the models manufactured before 1996), there is an off-set of about 300m in the y-coordinate (latitude) from the true geographic position.

GIS activities have been limited by lack of a laptop to download information from a GPS and the plotter which is in poor condition.

In-house computer and file maintenance are lacking. Computers are covered to keep them free from dust. Virus removal is done sporadically. Files are not customised.

Since the unit is not equipped with additional ArcView modules such as Spatial and Network Analysts, real GIS modelling is limited at the MOWHC.
Table 8.1: GIS Hardware and Software at MOWHC

<table>
<thead>
<tr>
<th>Hard/Software</th>
<th>Quantity</th>
<th>Capacity</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hardware</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Computers</td>
<td>3</td>
<td>Pentium (166); RAM of 32Mb and 21 inch monitor</td>
<td>Only one computer is dedicated to GIS activities. While the monitor is of the right size for graphical work, the computer is not fitted with a powerful graphic card that is essential to load a high resolution font such as 768 by 1024. The computer is extremely slow when running ArcView.</td>
</tr>
<tr>
<td>b) Plotters</td>
<td>1 (HP 250C)</td>
<td>Up to A0 size paper</td>
<td>The plotter is not in a good working condition.</td>
</tr>
<tr>
<td>c) Printers</td>
<td>1 (HP Laser 51)</td>
<td>A4 size paper</td>
<td>Requirements for A3 printer?</td>
</tr>
<tr>
<td>d) GPS</td>
<td>1 (Magellan Promark V)</td>
<td>Receives satellite signals from 5 channels</td>
<td>The GPS is not working properly</td>
</tr>
<tr>
<td>e) Data Backup Facilities</td>
<td>1 (40Mb tape)</td>
<td>-</td>
<td>Need more backing up facilities such as Zip drives and writable compact disks</td>
</tr>
<tr>
<td>f) Digitising tablets and scanners</td>
<td>-</td>
<td>-</td>
<td>Lack of a Digitizing tablet or scanner means that the unit can only input spatial data already in digital format</td>
</tr>
<tr>
<td>2. Software</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) ArcView 3.0a</td>
<td>1</td>
<td>This is only the basic ArcView GIS. It is a non-licensed version of ArcView</td>
<td>Lack of a licensed ArcView and additional modules of the software such as Spatial Analyst, Network Analyst and Data Automation Kit means that very little GIS modelling is possible at the MOWHC.</td>
</tr>
<tr>
<td>b) MapInfo 4.0</td>
<td>1</td>
<td>-</td>
<td>Not used by the unit</td>
</tr>
<tr>
<td>c) Microsoft Office (Access and Excel)</td>
<td>1</td>
<td>-</td>
<td>Microsoft Access and Excel are both used for database management</td>
</tr>
</tbody>
</table>
8.4.3 Training Needs

None of the staff at the GIS Unit have had any formal training in GIS technology. This is not surprising because GIS is a relatively recent technology, not only in developing but also in developed countries.

The two members of staff in the MOWHC GIS Unit received on-the-job training over a period of 6 weeks. Training was carried out by a foreign GIS expert working under the Road Maintenance Unit. The staff were trained in the use of ArcView 3.0.

The GIS Unit is now able to carry out a number of GIS operations including data manipulation, simple analysis, map design for printing and printing maps various paper sizes. The staff at the GIS Unit are able to integrate data stored in Database Management Systems (such as dBase) and Spread Sheets (Microsoft Excel) with GIS software. The GIS Unit at the MOWHC also has desktop mapping software (MapInfo), but neither of the staff have been trained to use this software application.

It was revealed that the first civil engineer to be trained to operate the GIS left the Ministry for better job prospects. Another on-the-job training course was then organised for the present staff. This may indicate that the MOWHC is not able to hold on to its skilled staff in circumstances where better paid jobs become available for some individuals. Unfortunately, this is a problem that is experienced in all government organisations, and it is not expected that the situation will change in the near future.

8.5 Recommendations for Enhancing the MOWHC GIS Unit

This section puts forward recommendations for enhancing GIS capability within the MOWHC if it is decided that existing GIS Unit should be strengthened so that GIS technology can be effectively applied to road-related activities.

8.5.1 Hardware

In addition to the existing GIS computer, there is need for extra two powerful desktop personal computers in terms of hard disk space (about 2.5 Gb), RAM of 64Mb and Speed of at least 200V). A CD-Writer is also essential especially to supplement backing-up files and future exchange of data with district staff. While CD-reader drives are now standard hardware for computers on market, there is need for extra backing-up facilities. A tape drive that is compatible with organisations with active GIS units such as the Makerere Institute of Environment and Natural Resources (MUIENR), National Biomass Study (NBS) and Uganda Wildlife Authority (UWA) Monitoring Unit is highly recommended for future exchange of data.

It will also be necessary to acquire 21-inch monitors with a capacity to attain at least 768 x 1024 screen resolution. This is important because most GIS software need such a screen resolution for better management of the various opened ‘windows’. While the GIS Unit currently has a 21-inch monitor, it appears that the Graphics Card is not powerful enough to allow the attainment of the desired screen resolution of at least 768 x 1024. The following is an estimation of what the above mentioned and some additional equipment will cost:
Table 8.2: Additional Equipment Requirements for the MOWHC GIS Unit and Associated Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Rate (US$)</th>
<th>Total Amount (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Upgrading existing computer in terms of memory and graphics card</td>
<td>1</td>
<td>lump sum</td>
<td>800</td>
</tr>
<tr>
<td>2. Digitizing tablet (A1 size)</td>
<td>1</td>
<td>lump sum</td>
<td>2,000</td>
</tr>
<tr>
<td>3. GPS (stand alone)</td>
<td>2</td>
<td>350 (including accessories)</td>
<td>700</td>
</tr>
<tr>
<td>4. Desktop computers (PCs), including 21-inch good colour monitors</td>
<td>2</td>
<td>2,500</td>
<td>5,000</td>
</tr>
<tr>
<td>5. Laptop (high performance)</td>
<td>1</td>
<td>lump sum</td>
<td>2,500</td>
</tr>
<tr>
<td>6. Colour printer (A4 size)</td>
<td>1</td>
<td>lump sum</td>
<td>600</td>
</tr>
<tr>
<td>7. Repairing existing A0 plotter</td>
<td>1</td>
<td>lump sum</td>
<td>500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>US$ 12,100</strong></td>
</tr>
</tbody>
</table>

8.5.2 GIS software

The GIS Unit at the MOWHC is already using a non-licensed version of ArcView GIS 3.0a. While this software is enough for basic GIS data manipulation and analysis, it may not be enough for additional GIS analytical functions. It is thus recommended that the MOWHC GIS Unit acquires at least 2 licenses of the newly released ArcView GIS 3.1 with the following additional modules:

i. ArcView Spatial Analyst
ii. ArcView Network Analyst
iii. ArcView Data Automation Kit
iv. ArcView 3D Analyst.

ArcView Spatial Analyst will be important for GIS modelling in EIA studies since it allows easy integration of different map layers for analytical purposes using the grid (raster) data format.

ArcView Network Analyst will greatly enhance generation of information about the Ugandan road network such as traffic volume flows and accident-prone spots.

ArcView 3D Analyst greatly enhances the use of topographic data (digital elevation models)

The estimated cost of for each of the above software modules ranges from US$250 (for non-profit making organisations) to US$1000 for profit making organisations. Normally, an inquiry from ESRI in USA or its agents in Africa (GIMS in South Africa) may provide more information as to whether the MOWHC is a non profit making organisation.

A good supply of consumables will be required such as ink cartridges, special printing paper (A4 - A0), tapes and writable CDs. Between US$300 - 400 may be required on a monthly basis, depending on the amount of printing that is undertaken.
8.5.3 Recommendations for Training

It is recommended that 3-4 staff members from the Ministry should receive in depth training in the application of GIS for environmental analysis and management for a period of between 4 and 6 weeks. Current staff in the GIS Unit should participate in this training because as they carry out most GIS functions related to their project activities, they need a strong theoretical GIS foundation. A tailored GIS course developed with a bias to current and future road sector activities is recommended.

To avoid unnecessary training expenses abroad, the development of a short GIS course tailored to road sector needs should be carried out in Uganda. MUIENR GIS & Remote Sensing Laboratory has acquired experience in such courses and training. The GIS & Remote Sensing Laboratory is equipped with all the necessary GIS hardware and software and manned by three members of staff. An outline of one of the short GIS courses (for general participants) that has been offered in the last two years is presented in Annex IV.

Cost estimates for a GIS short course tailored specifically for MOWHC/RAFU/RA needs, and lasting 4 weeks for 3 to 4 participants are presented in the Table 8.3 below.

<table>
<thead>
<tr>
<th>Table 8.3: Cost Estimates for a Short GIS Course</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
</tr>
<tr>
<td>1. Developing GIS tailored short course materials</td>
</tr>
<tr>
<td>2. Consumables (ink cartridges, paper etc.)</td>
</tr>
<tr>
<td>3. Course fees</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
</tr>
<tr>
<td><strong>MUIENR overhead</strong></td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
</tr>
</tbody>
</table>

8.6 Management Aspects Related to the Location of the GIS Unit

In the preceding sections, the usefulness of GIS in road sector planning has been discussed. However, any GIS Unit can only continue to be useful if:

i) it is managed efficiently
ii) data is updated and/or acquired regularly, and
iii) hardware and software is maintained and updated regularly to ensure compatibility with other systems and new data, and to be able to cope with the ever-increasing volume of data to be stored.
Sustainability of the GIS Unit is the underlying factor in its future usefulness, and this is dependent on its location and ownership.

Under the current restructuring of the MOWHC, its GIS Unit is likely to remain within the Ministry. But the best location for the GIS Unit has to be established. There are two options: either the Unit should be based in the MOWHC or in RAFU (which will in due course become the road agency).

A location within the Ministry would allow the GIS Unit to serve all departments in the Ministry (aviation, railways, inland waterways and housing) in providing spatial information for national level transport sector planning. This would also mean that the database would be used to its full capacity.

On the other hand, most road project activities that will influence environmental management within the road sector will be based in RAFU. The GIS database will contain much of the information required by departments within RAFU, for example data required for the preparation of project briefs for EIAs, or for assessing traffic counts, internal rates of return, etc, for FRSP road projects. This means that there are focused activities in RAFU that will make a GIS Unit more viable than if it were placed in the MOWHC.

Other factors which may affect the efficiency and management capacity of the GIS Unit include the following:

i. Given that RAFU staff will receive better financial emoluments than the MOWHC staff, RAFU staff may have difficulty accessing information from a unit within the MOWHC. The notion that ‘information is power’ may apply in such circumstances, especially with specialised spatial information stored in a GIS.

ii. With the GIS Unit located in the Ministry, there is a danger that when better job opportunities arise, the MOWHC GIS Unit staff will leave, resulting in a high turn over in recreating new GIS Unit staff.

iii. RAFU will have the necessary financial resources for updating and maintaining the GIS database so that it will function efficiently.

While the MOWHC would seem the natural location for the GIS Unit, RAFU is the more sustainable choice. However, the Director of RAFU has indicated that, for the moment, the GIS Unit should not be housed in RAFU.

In light of this, a third option is proposed. The GIS database for the road sector can be managed and maintained by the GIS and Remote Sensing Laboratory at MUIENR. Ministry personnel, consulting engineers, EIA practitioners and any other individuals may then access/obtain road-related data (environmental, social and technical) from MUIENR at a fee. If so required, MUIENR GIS staff can be commissioned to carry out specified data manipulation and analysis. The MUIENR GIS Laboratory also has map printing facilities.

If this option is adopted, close collaboration between the MOWHC, RAFU and MUIENR will be fundamental in the use, exchange and updating of geo-information for the purposes of managing environmental issues related to the FRSP.

An inventory of the MOWHC’s sectoral activities that require use of geographic information may help in making the final decision as to where to locate the GIS Unit.
9. MONITORING NATIONAL LEVEL PERFORMANCE OF THE FRSP

9.1 Performance Monitoring

The ultimate aim of the Road Sector Development Programme, and thus of the FRSP, is to provide a road network that will meet the present and future demand for road transportation in Uganda. The primary purpose of developing the country’s road network is assumed to be that better roads and a more efficient road network will stimulate economic development, and consequently enhance social well-being throughout the land.

In order to determine whether these assumptions are correct, and to what extent improved roads and a better road network contribute towards improving social welfare and economic development, it will be necessary to monitor the performance of the FRSP at the national level. But in addition to these perceived socio-economic benefits, the impact of roads and the entire road network on the physical and natural environments should also be assessed.

This chapter addresses the requirements of conducting monitoring of the social, physical and natural environment of the FRSP at the national level, and identifies agencies who need to be responsible and/or involved in monitoring. The methodology can be extended to apply to ensuing projects under the Road Sector Development Programme.

Guidelines for environmental monitoring of specific road projects under the FRSP are presented in Volume III of this report (Environmental Guidelines for the Road Sector).

9.1.1 Objectives of Environmental & Social Performance Monitoring

Environmental and social performance monitoring of the road sector at national level will contribute substantially to developing sustainable road sector policies, as well as to the road sector planning process.

It gives an indication of whether improving the road network has resulted in benefits or disadvantages, in the social and environmental context, or whether including environmental management in road works is indeed beneficial.

In addition, the economic justification of incorporating environmental protection is often questioned. Environmental performance monitoring will be able to determine whether or not this is so.

The outcome of environmental performance monitoring should be to propose policies, standards and procedures which will result in improved environmental management in the road sector.

9.2 Identification of Indicators

The MOWHC would be no doubt be interested in determining the benefits of integrating environmental concerns in terms of its functions and operations. It has often been purported that environmental management reduces road maintenance costs and that roads which have included environmental protection measures need to be maintained less frequently. Although there is
evidence of this from studies undertaken in other Eastern African countries, this has to be demonstrated for Ugandan conditions and for both paved and unpaved roads.

Environmental/social performance monitoring of the FRSP should centre around the main environmental and social impacts, as perceived at the national level, that are expected to arise from its road sub-projects. These are:

- impacts on air quality (especially urban areas)
- impacts on protected areas, forests and wetlands that roads pass through
- impacts on value of land adjacent to the road
- impacts on road safety
- impacts on agricultural development
- impacts on education
- impacts on public health
- impacts on rural incomes
- impacts on settlement pattern
- impacts associated with compensation

The above can be converted into “performance targets”, i.e. intended or unintended outcomes of improving the road network by determining exactly what environmental and social performance monitoring is required to establish the following:

- does the inclusion of environmental mitigation measures affect the overall cost of road maintenance?
- is the frequency of road maintenance affected as a result of incorporating interventions for environmental protection?
- do improved roads result in more or less air pollution in urban areas?
- do improved roads have an effect on the value of adjacent land?
- has an expansion in the road network impacted on protected areas, wetlands and forests?
- have better roads contributed to enhancing road safety?
- has an improved road network led to changes in agricultural development?
- have better roads impacted on education levels?
- have better roads had an effect on public health?
- have improved roads led to an increase in rural incomes?
- has an improved road network led to changes in settlement patterns?
- are the procedures for paying compensation for rights of way/acquisition of road reserve acceptable?

To be able to measure the changes in any particular performance target, indicators must be identified. The number of indicators required to evaluate performance targets varies; some need several indicators, while for other targets, one indicator will suffice.

It is important to note here that roads are not necessarily the sole factor responsible for changes in the various performance targets; they are likely to be one of several contributing factors.

The table below gives performance targets and corresponding indicators for monitoring these targets.
Table 9.1: Possible Indicators for Given Performance Targets

<table>
<thead>
<tr>
<th>Performance Targets</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts on overall FRSP road maintenance costs</td>
<td>• quarterly expenditure on routine maintenance activities, as separate figures for paved and unpaved classified roads and rural roads</td>
</tr>
<tr>
<td></td>
<td>• quarterly expenditure on periodic maintenance activities, as separate figures for paved and unpaved classified roads and rural roads</td>
</tr>
<tr>
<td></td>
<td>• annual expenditure on urgent/emergency repairs and maintenance works, as separate figures for paved and unpaved classified roads and rural roads</td>
</tr>
<tr>
<td>Frequency of maintenance of FRSP roads</td>
<td>• number of times periodic maintenance is necessary</td>
</tr>
<tr>
<td>Changes in air quality along FRSP roads in Kampala</td>
<td>• concentrations of nitrogen oxides and sulphur oxides</td>
</tr>
<tr>
<td></td>
<td>• occurrence of smog in urban centres</td>
</tr>
<tr>
<td>Changes in value of land along FRSP roads</td>
<td>• price of land</td>
</tr>
<tr>
<td></td>
<td>• productivity (fertility, condition of land eg. overgrazed, eroded, yield)</td>
</tr>
<tr>
<td>Changes in forest cover in forests through which FRSP roads pass</td>
<td>• gazetted forest areas</td>
</tr>
<tr>
<td></td>
<td>• actual area under forest cover</td>
</tr>
<tr>
<td></td>
<td>• number of people entering forest reserves</td>
</tr>
<tr>
<td></td>
<td>• number of bird species</td>
</tr>
<tr>
<td>Changes in extent of wetlands through which FRSP roads pass</td>
<td>• total wetland area</td>
</tr>
<tr>
<td></td>
<td>• numbers of wetland bird species</td>
</tr>
<tr>
<td></td>
<td>• numbers of wetland animal species</td>
</tr>
<tr>
<td>Impact on protected areas (national parks, game reserves, sanctuaries, etc) through which FRSP roads pass</td>
<td>• total gazetted area of protected areas</td>
</tr>
<tr>
<td></td>
<td>• total actual area of protected areas</td>
</tr>
<tr>
<td></td>
<td>• total area of buffer zones</td>
</tr>
<tr>
<td></td>
<td>• number of visitors to parks/reserves</td>
</tr>
<tr>
<td></td>
<td>• number of visitor facilities in parks/reserves</td>
</tr>
<tr>
<td></td>
<td>• general condition of protected area (in terms of eg. litter, overgrazing)</td>
</tr>
<tr>
<td></td>
<td>• number of animal species</td>
</tr>
<tr>
<td></td>
<td>• number of bird species</td>
</tr>
<tr>
<td>Impact on road safety</td>
<td>• number of traffic accidents</td>
</tr>
<tr>
<td>Changes in agricultural development along roads in the FRSP</td>
<td>• annual crop yields</td>
</tr>
<tr>
<td></td>
<td>• annual crop sales</td>
</tr>
<tr>
<td></td>
<td>• use of agricultural inputs (fertilisers, pesticides, etc)</td>
</tr>
<tr>
<td></td>
<td>• agricultural extension services</td>
</tr>
<tr>
<td></td>
<td>• market destinations</td>
</tr>
<tr>
<td>Changes in education levels along roads in the FRSP</td>
<td>• school attendance</td>
</tr>
<tr>
<td></td>
<td>• literacy levels</td>
</tr>
<tr>
<td>Changes in public health status along FRSP roads</td>
<td>• number of patients treated in hospitals/health centres/clinics/dispensaries</td>
</tr>
<tr>
<td></td>
<td>• incidence of STDs</td>
</tr>
<tr>
<td>Changes in rural income levels along FRSP roads</td>
<td>• average household expenditure</td>
</tr>
<tr>
<td></td>
<td>• school attendance</td>
</tr>
<tr>
<td>Changes in settlement patterns along FRSP roads</td>
<td>• growth rates in urban and rural centres</td>
</tr>
<tr>
<td></td>
<td>• settlement growth along roads</td>
</tr>
<tr>
<td>Adequacy of compensation paid to people along FRSP roads</td>
<td>• changes in lifestyle of people who relinquished land for road reserve</td>
</tr>
<tr>
<td></td>
<td>• use of money received as compensation</td>
</tr>
</tbody>
</table>
9.3 Data

Data collection is the basis of all monitoring activities. It will therefore be necessary to conduct an initial baseline survey in order to establish benchmarks against which changes in any given indicator can be measured. Thereafter, such surveys should be carried out every 5 years.

All the data that is required for environmental performance monitoring of the road sector is routinely collected by various government agencies to be included in district and national development plans, profiles and reports. Consequently, the MOWHC would not be involved in data collection for most of the proposed indicators. The following agencies may be approached for information:

Table 9.2: Sources of Data

<table>
<thead>
<tr>
<th>Performance Targets</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts on maintenance costs</td>
<td>District Road Offices; Maintenance Sections of MOWHC/RAFU/road agency</td>
</tr>
<tr>
<td>Frequency of maintenance</td>
<td>District Road Offices; Maintenance Sections of MOWHC/RAFU/road agency</td>
</tr>
<tr>
<td>Changes in air quality</td>
<td>Ministry of Health, Department of Meteorology</td>
</tr>
<tr>
<td>Changes in land value</td>
<td>Ministry of Lands; Government Valuer; district councils</td>
</tr>
<tr>
<td>Changes in forest cover</td>
<td>Forestry Department; National Biomass Study; MUIENR</td>
</tr>
<tr>
<td>Changes in extent of wetlands</td>
<td>National Wetlands Conservation and Management Programme, IUCN, NEMA, MUIENR</td>
</tr>
<tr>
<td>Impact on protected areas (national parks, game reserves, sanctuaries, etc)</td>
<td>UWA, IUCN, WWF, MUIENR</td>
</tr>
<tr>
<td>Impact on road safety</td>
<td>National Road Safety Council; Department of Statistics, Police records</td>
</tr>
<tr>
<td>Changes in agricultural development</td>
<td>Ministry of Agriculture, Animal Industry and Food; National Agriculture Research Organisation; Bank of Uganda Agriculture Secretariat</td>
</tr>
<tr>
<td>Changes in education levels</td>
<td>Ministry of Education; Ministry of Gender, Labour and Social Development</td>
</tr>
<tr>
<td>Changes in public health status</td>
<td>Ministry of Health, District Health Offices, Uganda Medical Association, Development Network of Indigenous Voluntary Associations</td>
</tr>
<tr>
<td>Changes in rural income levels</td>
<td>Department of Statistics, Bank of Uganda Agriculture Secretariat</td>
</tr>
<tr>
<td>Changes in settlement patterns</td>
<td>Department of Statistics, Department of Physical Planning</td>
</tr>
<tr>
<td>Adequacy of compensation</td>
<td>Ministry of Gender, Labour and Social Development</td>
</tr>
</tbody>
</table>

It is therefore unlikely that special surveys or field investigations will need to be conducted to obtain much of the information relating to the indicators.

Environmental audits that are required to be conducted as part of the EIA process for road projects will be essential in providing information on the impacts of road works and road projects that will be required for the evaluation.
9.4 Assessing Environmental Performance

Environmental performance monitoring is designed to measure the overall environmental impact of a project or programme. The FRSP is now in its third year, but due to various delays in its implementation, only a small number of projects earmarked for the first phase have commenced or have been implemented. It is therefore suggested that evaluation of FRSP environmental performance is conducted at the end of the first phase (June 2002). For second (and subsequent) projects within the RSDP, it is recommended that such evaluations are carried out at the end of the project term (assuming a 5 year project duration).

The process of evaluation of environmental performance of the road sector will involve the collection of necessary data as described above, and an in-depth analysis of that data so as to be able to determine changes in performance indicators and establish trends. It is important that data is analysed from a national road network perspective, rather than a local or road-specific one. As mentioned earlier, the overall environmental and social impacts of the FRSP cannot be attributed to roads alone, because the performance targets may be affected by factors such as cost of agricultural inputs, fluctuations in market prices for agricultural produce, national budgets for education and health, etc.

The evaluation would also have to review and assess all environmental monitoring reports and audits carried out for each of the FRSP road sub-projects. The conclusion of the evaluation should decisively state the overall impact of road sector activities on the social, natural and physical environment.

It is unlikely that either the environmental liaison unit within the MOWHC or the environmental unit in RAFU/road agency will have the time or personnel resources to carry out such an evaluation. The evaluation should thus be carried out as an independent consultancy of about 5-6 person months, to be conducted over a period of approximately 2 months. However, the ELU and environmental unit should be closely involved in the evaluation.

Typically the evaluation team would comprise:
- an environmentalist or ecologist (team leader)
- a road engineer
- a sociologist
- an agricultural economist
- a transport economist
- a land valuer/surveyor.

9.5 Cost of the Environmental Performance Evaluation Exercise

An estimate of the costs incurred to conduct the first evaluation, based on current prices, is presented in Table 9.3 below. For the purposes of this estimate, rates for professional fees are averages; obviously these rates will vary depending whether local, regional or international experts, or a combination of these, are hired.
Table 9.3: Cost Estimate for the 1st Environmental Performance Evaluation

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate US$/day</th>
<th>Cost US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional fees</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>environmentalist/ecologist</td>
<td>30</td>
<td>days</td>
<td>400</td>
<td>12,000</td>
</tr>
<tr>
<td>transport economist</td>
<td>20</td>
<td>days</td>
<td>400</td>
<td>8,000</td>
</tr>
<tr>
<td>road engineer</td>
<td>18</td>
<td>days</td>
<td>400</td>
<td>7,200</td>
</tr>
<tr>
<td>sociologist</td>
<td>18</td>
<td>days</td>
<td>400</td>
<td>7,200</td>
</tr>
<tr>
<td>agricultural economist</td>
<td>18</td>
<td>days</td>
<td>400</td>
<td>7,200</td>
</tr>
<tr>
<td>land valuer/surveyor.</td>
<td>18</td>
<td>days</td>
<td>400</td>
<td>7,200</td>
</tr>
<tr>
<td>Per diems</td>
<td>75</td>
<td>days</td>
<td>120</td>
<td>9,000</td>
</tr>
<tr>
<td>Travel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>air fares</td>
<td></td>
<td>lump sum</td>
<td></td>
<td>2,000</td>
</tr>
<tr>
<td>local transport</td>
<td></td>
<td>lump sum</td>
<td></td>
<td>2,000</td>
</tr>
<tr>
<td>Reimbursables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTT</td>
<td></td>
<td>lump sum</td>
<td></td>
<td>500</td>
</tr>
<tr>
<td>Stationery, report production</td>
<td></td>
<td>lump sum</td>
<td></td>
<td>1,000</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td>lump sum</td>
<td></td>
<td>500</td>
</tr>
</tbody>
</table>

**TOTAL COST**

US$ 63,800

9.6 FRSP Environmental Performance Monitoring Plan

Table 9.4 presents a plan for monitoring environmental and social performance of the FRSP.
Table 9.4: Monitoring Plan for Evaluation of National Level Environmental Performance of the RSDP

<table>
<thead>
<tr>
<th>PERFORMANCE MONITORING</th>
<th>Indicators</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Targets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Impacts on maintenance costs | • quarterly expenditure on routine maintenance activities, as separate figures for paved and unpaved classified roads and rural roads  
• quarterly expenditure on periodic maintenance activities, as separate figures for paved and unpaved classified roads and rural roads  
• annual expenditure on urgent/emergency repairs and maintenance works, as separate figures for paved and unpaved classified roads and rural roads | District Road Offices; Maintenance Sections of MOWHC/RAFU/ Road Agency |
| Frequency of maintenance | • number of times periodic maintenance is necessary | District Road Offices; Maintenance Sections of MOWHC/RAFU/ Road Agency |
| Changes in air quality | • concentrations of nitrogen oxides and sulphur oxides  
• occurrence of smog in urban centres | Ministry of Health, Department of Meteorology |
| Changes in land value | • price of land  
• productivity (fertility, condition of land eg. overgrazed, eroded, yield) | Ministry of Lands; Government Valuer; district councils |
| Changes in forest cover | • gazetted forest areas  
• area under forest cover  
• number of people entering forest reserves  
• number of bird species | Forestry Department; National Biomass Sdty; MUIENR |
| Changes in extent of wetlands | • total wetland area  
• numbers of wetland bird species  
• numbers of wetland animal species | National Wetlands Conservation and Management Programme, IUCN, NEMA, MUIENR |
<table>
<thead>
<tr>
<th>Performance Targets</th>
<th>Indicators</th>
<th>Data Sources</th>
</tr>
</thead>
</table>
| Impact on protected areas (national parks, game reserves, sanctuaries, etc) | • total gazetted area of protected areas  
• total actual area of protected areas  
• total area of buffer zones  
• number of visitors to parks/reserves  
• number of visitor facilities in parks/reserves  
• general condition of protected area (in terms of eg. litter, overgrazing)  
• number of animal species  
• number of bird species | UWA, IUCN, WWF, MUIENR  |
| Impact on road safety                                           | • number of traffic accidents                                                | Road Safety Council; Department of Statistics, Police records                  |
| Changes in agricultural development                             | • annual crop yields  
• annual crop sales  
• use of agricultural inputs (fertilisers, pesticides, etc)  
• market destinations | Ministry of Agriculture, Animal Industry and Food; National Agriculture Research Organisation; Bank of Uganda Agriculture Secretariat |
| Changes in education levels                                     | • school attendance  
• literacy levels                                                            | Ministry of Education; Ministry of Gender, Labour and Culture;                |
| Changes in public health status                                 | • number of patients treated in hospitals/ health centres/clinics/dispensaries  
• incidence of STDs                                                        | Ministry of Health, District Health Offices, Uganda Medical Association, Development Network of Indigenous Voluntary Associations |
| Changes in rural income levels                                  | • average household expenditure  
• school attendance                                                          | Department of Statistics; Bank of Uganda Agriculture Secretariat               |
| Changes in settlement patterns                                  | • growth rates in urban and rural centres  
• settlement growth along roads                                               | Department of Statistics                                                      |
| Adequacy of compensation paid to people along FRSP roads       | • changes in lifestyle of people who relinquished land for road reserve  
• use of money received as compensation                                       | Ministry of Gender, Labour and Culture;                                      |
<table>
<thead>
<tr>
<th>PERFORMANCE MONITORING</th>
</tr>
</thead>
<tbody>
<tr>
<td>METHOD OF EVALUATION</td>
</tr>
<tr>
<td>FREQUENCY OF EVALUATION</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>COST OF EVALUATION</td>
</tr>
</tbody>
</table>
10. IMPLEMENTATION PLAN

10.1 Purpose of this Chapter

Put in very simple terms, the four volumes (not counting the executive summary,) of this report: provide information, propose organisational changes, set out procedures, and propose training courses. Each of these items requires work to implement: information needs to be disseminated and maintained, staff have to be acquired and briefed to allow organisational changes to happen, staff have to be trained in new procedures, and training courses need to be arranged. All of this will require considerable effort and commitment by individuals and the process will at times feel like pulling oneself up by one’s own bootstraps since the process will be overseen by units that do not yet exist.

This implementation will take place against a background of institutional change in the Ministry. The changes are described earlier in this volume, but in summary they stem from the post-constitutional restructuring of the Ministry and the formation of RAFU. The implementation of environmental management matters as proposed here, needs to be incorporated with these institutional changes. The plans for institutional change are currently subject to intense review and revision. The intensity may reduce, but it can be anticipated that the review and revision process will continue for quite some time.

Therefore, although this Chapter sets out a detailed implementation plan, this must be subject to considerable change. The main purpose of this Chapter is to identify the both the tasks to be done, and the connections between them. This information can then be used by those responsible for the wider changes taking place in the Ministry as a planning and monitoring tool.

10.2 Implementation Tasks and Issues - Overview

The broad nature of the implementation tasks has been alluded to above. More specifically, the main tasks are:

Task 1 The dissemination and maintenance of information relating to FRSP itself, the regulatory framework for environmental management in Uganda, and the physical and social environment. Some of this information is in paper form, but in addition, this study has prepared GIS data in the form of CDs.

Task 2 The revision of various existing manuals/documents - the general specifications, the design standards, and the maintenance manual - already used by the Ministry to take into account environmental matters raised by this study.

Task 3 The establishment of a system of monitoring and evaluation of road sector activities from an environmental perspective.

Task 4 The establishment of an environmental liaison unit within the Ministry.

Task 5 The establishment of an environmental unit within RAFU

Task 6 The development and delivery of a training programme for RAFU and Ministry staff.
Task 7 The implementation of various proposals to increase the capacity to conduct EIAs within Uganda.

Task 8 The testing and dissemination of the EIA guidelines.

Task 9 Overall management and monitoring and securing financing

Overall supervision will be the responsibility of: the committee responsible for the post constitutional restructuring of the Ministry, the RSDP coordination office, the ELU, the Environmental Unit, and RAFU. Some of these entities do not exist yet. The next subsections describe the implementation tasks in the order 1-8 above, which is the order they appear in the study documents. However, the tables towards the end of this Chapter organise the tasks according to overall responsibility.

10.3 Task 1: The Dissemination and Maintenance of Information

Volume IV of this study provides, inter alia, information on:

- a brief summary of FRSP
- the regulatory framework for environmental management in Uganda. This is principally the relevant statutes, and the regulations concerning EIA gazetted as statutory instruments by NEMA.
- the physical and social environment of Uganda. This is provided in quite some detail and includes mapping at a scale that fits Uganda onto A3.

In addition, the mapping information is provided in the form of a CD that can be read by the appropriate GIS software, providing information at a scale of 1:250,000 of all the different aspects of the physical and social environment.

This information will need to be accessed by a number of different users:
1. The various units within the Ministry's Roads Department.
2. The various units within RAFU's Directorate of Engineering.
3. Consultants carrying out strategic studies, for example the Roads Master Plan.
4. EIA practitioners carrying out EIAs of specific road projects.

In the first instance, we suggest that the Ministry makes available, at a fee, copies of the whole of Volume IV of this study. In the longer term, we suggest that the ELU extracts the specific information referred to above, and publishes it as an 'Environmental Information Handbook for Road Sector Planners' in a convenient handbook.

The maintenance and operation of GIS information and systems is beyond the scope of this study although it makes a number of recommendations in this regard. The Ministry will need to examine options in light of cost effectiveness, possibly within the context of the propose MIS study. It should be noted that the Director of RAFU has indicated that the 'ownership' of the GIS data and systems should not be a responsibility of RAFU.
Table 10.1: Dissemination & Maintenance of Information

<table>
<thead>
<tr>
<th>Task 1</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Make copies of Volume IV available to Ministry and RAFU staff, and at a cost, to consultants and practitioners.</td>
<td>Chief Planning and Documentation Engineer</td>
<td>On acceptance of this study</td>
</tr>
<tr>
<td>1.2 Develop procedures for maintaining and updating paper information as appropriate. This might best be done in collaboration with NEMA, MUIENR etc.</td>
<td>ELU</td>
<td>After establishment of ELU. Timing would depend on availability of new data.</td>
</tr>
<tr>
<td>1.3 Prepare and make available sections on Legal Framework and Physical and Social Environment in Handbook form. Consideration should be given to whether the handbook might be made available outside the road and transport sectors.</td>
<td>ELU</td>
<td>After establishment of ELU. Timing would depend on demand already shown under task 1.</td>
</tr>
<tr>
<td>1.4 Develop procedures and operations for GIS in appropriate manner (including consideration of privatisation or contracting out.)</td>
<td>Matter to be further considered in MIS study.</td>
<td>As determined by MIS study.</td>
</tr>
</tbody>
</table>

10.4 Task 2: Revision of Ministry Manuals and Procedures

Volume IV of the report of this study details a number of suggested changes to Ministry manuals and procedures to introduce environmental management issues. The documents concerned are:
- The General Specifications
- The Road Design Manual
- The Maintenance Manual

The first two of these are used principally by consulting engineers, to whom they are available for sale and the Ministry’s Division of Planning, Design and Documentation.

The Maintenance Manual, which is still in draft, will have variety of users both within and outside the Ministry.

For the time being, we anticipate that the Maintenance Manual will continue to be the responsibility of the Ministry. We are not sure whether responsibility for the General Specifications and the Road Design Manual will be transferred to RAFU since this is part of the debate over the boundary between policy and implementation. Either way, it might be anticipated that the start of operations by RAFU might be an appropriate moment to review the contents of these documents.
Table 10.2: Revision of Ministry Manuals and Procedures

<table>
<thead>
<tr>
<th>Task 2:</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Formally approve the amendments to the General Specifications and Road Design Manual</td>
<td>Division of Planning, Design and Documentation</td>
<td>On acceptance of this report</td>
</tr>
<tr>
<td>2.2 Copy and make available to consulting engineers the amendments</td>
<td>Division of Planning, Design and Documentation</td>
<td>On approval, to all consulting engineers on new contracts.</td>
</tr>
<tr>
<td>2.3 Incorporate the proposed amendments to the Maintenance Manual</td>
<td>Maintenance Division, MOWHC</td>
<td>On acceptance of this report, as part of the manual finalisation process.</td>
</tr>
<tr>
<td>2.4 Produce revised versions of the General Specifications and Road Design Manual, incorporating the approved amendments</td>
<td>Division of Planning, Design and Documentation</td>
<td>Timing to be determined based on whether a wider revision of these documents is to be undertaken.</td>
</tr>
</tbody>
</table>

10.5 Task 3: Development of National Level Monitoring

The EIA Guidelines contained in Volume III of this report make provision for environmental audits of completed road works. In part these will be done during the normal monitoring of a new road as at the end of the defects liability period and during regular maintenance. However, other audits should be undertaken after a longer period - say three years - since environmental impacts may take time to build up. Such impacts should not be done by the consulting engineers responsible for the road design and construction because problems may stem from design weaknesses.

The implementation challenge is two-fold. Firstly to make sure that the audits are done periodically as they should, and to some extent report in a standardised format, and secondly to make sure that the lessons of such audits are consolidated in the form of an evaluation of the overall road sector programme. Such an evaluation might draw in lessons and reports from the affected sectors - forestry, agriculture, and so on - and may require the collection of additional data. Much of this work will be overseen by the ELU and the Environment Unit in RAFU.

Table 10.3: Development of National Level Monitoring

<table>
<thead>
<tr>
<th>Task 3</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Commission baseline survey of areas adjacent to proposed road developments</td>
<td>ELU</td>
<td>On formation of ELU</td>
</tr>
<tr>
<td>3.2 Develop and agree standardised format for environmental audits of road developments.</td>
<td>ELU in liaison with RAFU</td>
<td>On formation of ELU</td>
</tr>
<tr>
<td>3.3 Commission first environmental performance evaluation</td>
<td>ELU</td>
<td>End of FRSP - June 2002 or about 5 years after baseline survey</td>
</tr>
<tr>
<td>3.4 Commission second environmental performance evaluation</td>
<td>ELU</td>
<td>End of 2nd RSP - June 2007 or about five years after first performance evaluation</td>
</tr>
</tbody>
</table>
10.6 Task 4: Formation of a Ministry Environmental Liaison Unit

This report proposes the formation of a Ministry Environmental Liaison Unit. As noted, the ELU will have a much wider remit than just roads - it will cover all the operations of the Ministry. This takes it well beyond the scope and competence of this study. A number of factors outside this study will need to be brought into consideration and so of all the tasks considered here, the implementation plan for this one must be considered the most tentative.

The actual work of the ELU is described in earlier in this Volume and the implementation plan is intended to cover its creation not its operation.

The Ministry has indicated that it wishes to place the ELU in the Policy Analysis Unit and that is the working assumption here, although it could conceivably be revised as the Ministry further considers the post constitutional restructuring.

Table 10.4: Formation of Ministry ELU

<table>
<thead>
<tr>
<th>Task 4</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1. Complete the description of the role and operation of the ELU to incorporate items not related to the road sector (probably done as part of the review of the post constitutional restructuring)</td>
<td>PS/Ministry top management</td>
<td>In phase with the review of the post constitutional restructuring report.</td>
</tr>
<tr>
<td>4.2 Complete job descriptions/terms of reference for officers in the ELU</td>
<td>PS/Ministry top management</td>
<td>After 4.1</td>
</tr>
<tr>
<td>4.3 Prepare and secure budget for the ELU</td>
<td>PS/Ministry top management</td>
<td>As part of the Ministries annual budgeting cycle, with reference to the WB technical assistance project.</td>
</tr>
<tr>
<td>4.4 Appoint officers</td>
<td>Principal Personnel Officer</td>
<td>Once budgetary approval has been obtained.</td>
</tr>
<tr>
<td>4.5 Develop ELU’s own work and implementation programme</td>
<td>ELU</td>
<td>Once the ELU has been established.</td>
</tr>
</tbody>
</table>

10.7 Task 5: Formation of a RAFU Environment Unit

This report proposes the formation of a RAFU Environmental Unit. This has been generally agreed in discussions held during the conduct of the study. It has to be said that the creation and successful operation of this unit is the key to achieving sound environmental management in the road sector.

The actual work of the Environment Unit is described in earlier in this Volume and the implementation plan is intended to cover its creation not its operation.

The inclusion of an environment unit in RAFU was not foreseen in the preliminary (ie. before RAFU’s creation) planning. However, now that the director is in place, and the process of recruitment of the next level of staff has been started, there is a convenient opportunity to incorporate the unit into RAFU. Its final form and creation can be incorporated into the overall efforts to set up RAFU.
RAFU is intended to be a temporary organisation, giving way to an eventual autonomous road agency. The exact nature of the road agency will be subject to a future study and so it is impossible at present to plan the future of the environment unit beyond RAFU but a working assumption is that the road agency will take a similar form to RAFU and the environmental unit can be transferred across at as part of the transition.

**Table 10.5: Formation of RAFU Environmental Unit**

<table>
<thead>
<tr>
<th>Task 5</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 Finalise the description</td>
<td>RAFU Directorate</td>
<td>As part of the overall development of RAFU.</td>
</tr>
<tr>
<td>and composition of the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment Unit, including</td>
<td></td>
<td></td>
</tr>
<tr>
<td>job descriptions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2 Prepare and secure a</td>
<td>RAFU Directorate</td>
<td>As part of the budget preparation of RAFU.</td>
</tr>
<tr>
<td>budget for the operation of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the environment unit.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.3 Recruit and induct Head of</td>
<td>RAFU Directorate</td>
<td>As part of the overall development of RAFU.</td>
</tr>
<tr>
<td>Unit.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4 Complete plan of units</td>
<td>Head of Environment</td>
<td>Once appointed.</td>
</tr>
<tr>
<td>operations and development.</td>
<td>Unit</td>
<td></td>
</tr>
<tr>
<td>Secure any necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>consultancy services.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5 Develop/revise code of</td>
<td>Head of Environment</td>
<td>Once appointed.</td>
</tr>
<tr>
<td>practice/other operating</td>
<td>Unit</td>
<td></td>
</tr>
<tr>
<td>procedures for the unit and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>agree them with other sub-unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>within (and without) RAFU.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.6 Plan the units transition</td>
<td>Road Agency Study under</td>
<td>At time of road agency</td>
</tr>
<tr>
<td>to the road agency.</td>
<td>PS</td>
<td>study.</td>
</tr>
</tbody>
</table>

**10.8 Task 6: Training of Ministry and RAFU Staff**

This report contains a number of proposals for training staff of the Ministry and RAFU. Training is proposed at various levels, and is intended to both raise general awareness, introduce specific new procedures, and train field staff in relevant operational matters.

The implementation of the training poses two particular problems. The first is a sequencing and time-tabling one. Environmental issues are outside the experience of the Ministry and they may require external assistance in identifying suitable training resources. Although a number of possibilities are identified in this report, there will still be work to do matching and tailoring resources to specific staff and needs. Ideally the ELU and RAFU Environment Unit should be involved in developing and delivering training programs, but they themselves may need some training and may take some time to get into place. The implementation plan below proceeds step by step and relies as much as possible on local capacity but is rather slow. An alternative option would be to contract out the whole training exercise.

The second problem concerns the fact that some courses as proposed will be common to both the Ministry and RAFU. However, RAFU should probably have control over its own human resource development activities and would want to choose the nature and timing of courses. Another factor here is that the training of (some) Ministry staff could probably proceed before that of RAFU staff. A solution to this may be to proceed as follows: the initial round of training will not be delivered to RAFU staff. However, the training materials will be provided to RAFU for RAFU to adapt and incorporate into their overall training programme as appropriate. As with the creation of the Environmental Unit within RAFU, the implementation of the environmental training programme needs to be fully incorporated into RAFU’s overall development plans.
Table 10.6: Training of Ministry and RAFU Staff

<table>
<thead>
<tr>
<th>Task 6</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1 Provide necessary training to ELU</td>
<td>Ministry training unit with Policy Analysis Unit</td>
<td>Once the ELU members have been appointed.</td>
</tr>
<tr>
<td>unit members</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2 Incorporate training of other Ministry</td>
<td>Ministry training unit with ELU</td>
<td>As part of the Ministry’s training planning cycle.</td>
</tr>
<tr>
<td>staff into training plans.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.3 Secure budget for training of Ministry</td>
<td>Ministry training unit with ELU</td>
<td>As part of the Ministry’s budgeting cycle.</td>
</tr>
<tr>
<td>staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.4 Commission training programme development and delivery - for Ministry staff</td>
<td>Ministry training unit with ELU</td>
<td>Once the budget has been secured.</td>
</tr>
<tr>
<td>6.5 Training of Ministry staff</td>
<td>Ministry training unit with ELU and contracted</td>
<td>After steps 6.1 to 6.4 and in keeping with the Ministry’s overall training programme.</td>
</tr>
<tr>
<td></td>
<td>resources.</td>
<td></td>
</tr>
<tr>
<td>6.6 Development of RAFU’s environment</td>
<td>RA FU Directorate and Environment Unit</td>
<td>As part of RAFU’s overall development plans</td>
</tr>
<tr>
<td>training programme</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.7 Commission RA FU’s environment training</td>
<td>RA FU Directorate and Environment Unit</td>
<td>As part of RA FU’s overall development plans</td>
</tr>
<tr>
<td>programme development and delivery.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.8 RA FU’s training delivery</td>
<td>RA FU Directorate and Environment Unit and contracted resources</td>
<td>As part of RA FU’s overall development plans</td>
</tr>
</tbody>
</table>

10.9 Task 7: Development of Local Capacity to do EIAs

This report contains recommendations to develop capacity to do EIAs in Uganda. The three recommendations cover:

- A top management seminar aimed at all engineering consulting firms working in Uganda to enable them to understand the requirements for EIAs. Since most or all of the work by consulting engineers which this seminar is aimed at will be commissioned by RAFU, RAFU should be responsible for this work. It might be combined with other exercises conducted by RAFU to apprise the industry of its working methods and plans.

- Cross training for Ugandan EIA practitioners to apprise them of issues specific to the road sector. Since the development of Ugandan practitioners is largely a matter of policy in developing local capacity, we have placed responsibility for its implementation with the Ministry’s ELU.

- Development and dissemination of lists of local practitioners who might be used on a sub-contracted basis. The responsibility for these databases would be with bodies such as NEMA and the association of consulting engineers.
Table 10.7: Development of Local Capacity to do EIAs

<table>
<thead>
<tr>
<th>Task 7</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 Develop and deliver top management seminar for consulting engineers operating in Uganda</td>
<td>RAFU Environmental Unit</td>
<td>As soon as possible after the initial setting-up of RAFU but incorporated with other industry briefing activities.</td>
</tr>
<tr>
<td>7.2 Secure budget for cross training for practitioners</td>
<td>ELU</td>
<td>As part of Ministry’s planning and budgeting cycle.</td>
</tr>
<tr>
<td>7.3 Commission training programme development and delivery</td>
<td>ELU and Ministry training unit</td>
<td>Once funding has been approved.</td>
</tr>
<tr>
<td>7.4 Select participants and deliver training</td>
<td>ELU and Ministry training Unit</td>
<td></td>
</tr>
<tr>
<td>7.5 Promote database development and dissemination</td>
<td>ELU</td>
<td>As convenient</td>
</tr>
</tbody>
</table>

10.10 Task 8: Implementation of EIA guidelines

The whole of Volume III of this study sets out guidelines for the conduct of EIAs on road sector activities. Although they are termed ‘guidelines’, since they interpret the relevant environmental law and regulations from an environmental perspective, compliance with their essential elements is mandatory.

Much of the work required to enable staff to develop a working knowledge of the guidelines is provided for under task 6, training of Ministry and ELU staff. In addition it will be important that the guidelines are tested and to a greater or lesser extent ‘internalised’ by those responsible for their implementation. We envisage that this will involve, after testing, the reproduction and distribution of the guidelines in the form a convenient manual or manuals that can be carried around by those responsible for their use in the field.

Users will include Ministry and RAFU staff and consulting engineers and EIA practitioners.

An issue will be the ‘ownership’ of the guidelines. In a sense, compliance with the guidelines is a policy matter and therefore in the realm of the Ministry. However, they do affect a number of detailed operational matters that are in the realm of RAFU. Other operational matters - mainly maintenance - will not affect RAFU in the short term (except during the defect liability period). In the long run, RAFU will evolve into the exclusive lead agency and responsibility for the guidelines will pass to it. To resolve this issue we suggest that until the road agency is formed, the guidelines are owned by the ELU. However, RAFU should be allowed to adapt and publish the relevant parts of the guidelines in a format consistent with its codes of conduct and other internal operating procedures. These adapted guidelines would be subject to approval by the ELU.
Table 10.8: Implementation of EIA Guidelines

<table>
<thead>
<tr>
<th>Task 8</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1 Formally approve guidelines and declare them mandatory for new projects.</td>
<td>Division of Planning, Design and Documentation</td>
<td>On acceptance of this report</td>
</tr>
<tr>
<td>8.2 Advise relevant Ministry staff and EIA practitioners of the guidelines</td>
<td>Division of Planning, Design and Documentation</td>
<td></td>
</tr>
<tr>
<td>8.3 Review and revise the guidelines</td>
<td>ELU</td>
<td>Once the ELU is in place and when there is sufficient experience.</td>
</tr>
<tr>
<td>8.4 Publish the guidelines as a manual or manuals for internal use by the Ministry</td>
<td>ELU</td>
<td>After revision</td>
</tr>
<tr>
<td>8.5 Adapt and publish the guidelines in a format for use by RAFU and RAFU’s contractors</td>
<td>RAFU’s Environment Unit</td>
<td>After revision</td>
</tr>
</tbody>
</table>

10.11 Task 9: Overall Management and Financing

The preceding tables set out the tasks to be done and assign responsibilities for specific actions. However, all of this is taking place in a fluid institutional environment. Responsibility needs to be given to the overall tracking and management of the implementation process. This is complicated by the fact that:

1) at least two rather separate institutions - the Ministry and RAFU are involved.
2) some of the supervision is most appropriately undertaken by a unit which does not yet exist - the environmental liaison unit
3) the creation of the environmental liaison unit depends on factors outside the scope of this study.

To get round this problem, we suggest that the responsibility for Ministry matters should be taken by the RSDP coordination committee - if it is formed - or else the Permanent Secretary. Although the formation of the ELU is outside its authority, it can advise Ministry top management of the issues affecting the formation of the ELU arising from this study. Once the ELU has been formed, it would be convenient if its senior officer were represented on the RSDP coordination committee or equivalent top level Ministry body.

The matters under the responsibility of RAFU should be monitored by the Director of RAFU.

As far as possible, the monitoring of the environmental matters set out here should be integrated with the overall monitoring programme undertaken as a matter of normal management.

A key additional task will be to incorporate all implementation and operating costs into the organisations’ budgets, and to agree with the financing agencies.
Table 10.9: Overall Management and Financing

<table>
<thead>
<tr>
<th>Task 9</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1 Incorporate all environmental management costs into Ministry budget and agree with financing agencies</td>
<td>PS</td>
<td>On acceptance of this report</td>
</tr>
<tr>
<td>9.2 Incorporate all environmental management costs into RAFU budget and agree with financing agencies</td>
<td>Dir RAFU</td>
<td>As part of present budgeting exercise</td>
</tr>
<tr>
<td>9.3 Review and monitor all implementation activities under the responsibility of the Ministry</td>
<td>PS/RSDP coordination committee</td>
<td>Continuously</td>
</tr>
<tr>
<td>9.4 Review and monitor all implementation activities under the responsibility of RAFU.</td>
<td>Director RAFU</td>
<td>Continuously</td>
</tr>
<tr>
<td>IMPLEMENTATION PLAN: MINISTRY TASKS</td>
<td>1999</td>
<td>2000</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>1.1 Distribute volume 2</td>
<td>ACP</td>
<td></td>
</tr>
<tr>
<td>1.2 Develop procedures for maintaining paper information</td>
<td></td>
<td>ELU</td>
</tr>
<tr>
<td>1.3 Publish Environment Handbook</td>
<td>ELU</td>
<td></td>
</tr>
<tr>
<td>1.4 Develop GIS systems if and as appropriate</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>2.1 Approve amendments to Specs and Design Standards</td>
<td>ACP</td>
<td></td>
</tr>
<tr>
<td>2.2 Distribute amendments to consulting engineers</td>
<td>ACP</td>
<td></td>
</tr>
<tr>
<td>2.3 Incorporate the amendments to the Maintenance Manual</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>2.4 Revise the General Specs and Design Standards</td>
<td>ACP</td>
<td></td>
</tr>
<tr>
<td>3.1 Commission baseline surveys</td>
<td>ELU</td>
<td></td>
</tr>
<tr>
<td>3.2 Develop standardised format for environmental audits</td>
<td>ELU</td>
<td>(RAFU)</td>
</tr>
<tr>
<td>3.3 Commission first environmental performance evaluation</td>
<td>ELU</td>
<td></td>
</tr>
<tr>
<td>3.4 Commission second environmental performance evaluation</td>
<td>ELU</td>
<td></td>
</tr>
<tr>
<td>4.1 Finalise the role and operation of the ELU</td>
<td>PS</td>
<td></td>
</tr>
<tr>
<td>4.2 Complete job descriptions for officers in the ELU</td>
<td>PS</td>
<td></td>
</tr>
<tr>
<td>4.3 Prepare and secure budget for the ELU</td>
<td>PS</td>
<td></td>
</tr>
<tr>
<td>4.4 Appoint officers</td>
<td>PPO</td>
<td></td>
</tr>
<tr>
<td>4.5 Develop ELU's own work and implementation programme</td>
<td>ELU</td>
<td></td>
</tr>
<tr>
<td>5.6 Plan RAFU's EU transition to the road agency.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.1 Provide necessary training to ELU unit members</td>
<td>ACT</td>
<td></td>
</tr>
<tr>
<td>6.2 Incorporate training of ministry staff into training plans</td>
<td>ACT/ELU</td>
<td></td>
</tr>
<tr>
<td>6.3 Secure budget for training of Ministry staff</td>
<td>ACT/ELU</td>
<td></td>
</tr>
<tr>
<td>6.4 Commission Ministry staff training programme</td>
<td>ACT/ELU</td>
<td></td>
</tr>
<tr>
<td>6.5 Training of Ministry staff</td>
<td>ACT/ELU</td>
<td></td>
</tr>
<tr>
<td>7.2 Secure budget for cross training for practitioners</td>
<td>ELU</td>
<td></td>
</tr>
<tr>
<td>7.3 Commission cross-training programme</td>
<td>ACT/ELU</td>
<td></td>
</tr>
<tr>
<td>7.4 Select participants and deliver training</td>
<td>ACT/ELU</td>
<td></td>
</tr>
<tr>
<td>7.5 Promote database development and dissemination</td>
<td>ELU</td>
<td></td>
</tr>
<tr>
<td>8.1 Formally approve guidelines</td>
<td>ACP</td>
<td></td>
</tr>
<tr>
<td>8.2 Advise staff and EIA practitioners of the guidelines</td>
<td>ACP</td>
<td></td>
</tr>
<tr>
<td>8.3 Review and revise the guidelines</td>
<td>ELU</td>
<td></td>
</tr>
<tr>
<td>8.4 Publish the guidelines as (ministry) manuals</td>
<td>ELU</td>
<td></td>
</tr>
<tr>
<td>9.1 Secure budget for Ministry Environmental Mgt</td>
<td>PS</td>
<td></td>
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<tr>
<td>9.3 Monitor Ministry implementation activities</td>
<td>PS</td>
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**KEY:**
- PS - Permanent Secretary
- ACP - Assistant Commissioner for Planning
- PPO - Principal Personnel Officer
- ACT - Assistant Commissioner for Training
<table>
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<tr>
<th>IMPLEMENTATION PLAN: RAFU TASKS</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>Later</th>
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<td>5.1 Finalise the role and composition of the Environment Unit</td>
<td>Dir Q1</td>
<td>Dir Q2</td>
<td>Dir Q3</td>
<td>Dir Q4</td>
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<td>5.2 Secure a budget for the environment unit.</td>
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<td>Dir Q2</td>
<td>Dir Q3</td>
<td>Dir Q4</td>
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<td>5.3 Recruit Head of Environment Unit</td>
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<td>Head EU Q2</td>
<td>Head EU Q3</td>
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<td>5.4 Plan environment unit and procure consultancies</td>
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<td>Head EU Q2</td>
<td>Head EU Q3</td>
<td>Head EU Q4</td>
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<tr>
<td>5.5 Develop RAFU's environmental code of practice</td>
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<td>Head EU Q2</td>
<td>Head EU Q3</td>
<td>Head EU Q4</td>
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</tr>
<tr>
<td>6.6 Development of RAFU's environment training programme</td>
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<td>Head EU Q2</td>
<td>Head EU Q3</td>
<td>Head EU Q4</td>
<td></td>
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<tr>
<td>6.7 Commission RAFU's environment training programme</td>
<td>Head EU Q1</td>
<td>Head EU Q2</td>
<td>Head EU Q3</td>
<td>Head EU Q4</td>
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<tr>
<td>6.8 RAFU's training delivery</td>
<td>Head EU Q1</td>
<td>Head EU Q2</td>
<td>Head EU Q3</td>
<td>Head EU Q4</td>
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</tr>
<tr>
<td>7.1 Top management seminar for consulting engineers</td>
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<td>Head EU Q2</td>
<td>Head EU Q3</td>
<td>Head EU Q4</td>
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<tr>
<td>8.5 Adapt and publish the guidelines as RAFU manuals</td>
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<td>Head EU Q2</td>
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<tr>
<td>9.2 Secure budget for RAFU environmental mgt</td>
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<td>Dir Q2</td>
<td>Dir Q3</td>
<td>Dir Q4</td>
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<td>9.4 Monitor RAFU implementation</td>
<td>Dir Q1</td>
<td>Dir Q2</td>
<td>Dir Q3</td>
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</tbody>
</table>
11. BUDGET

11.1 Budget Overview

This chapter presents a preliminary budget for the cost of implementing and complying with the measures laid out in this study. The estimated costs over 5 years shown in detail overleaf, but can be summarised as follows:

Table 11.1: 5 Year Budget for Implementation Plan

<table>
<thead>
<tr>
<th>Item</th>
<th>US$'000</th>
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<td>Disseminating Information</td>
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<td>Monitoring</td>
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<td>ELU</td>
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<td>RAFU Environment Unit</td>
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<tr>
<td>Training</td>
<td>172</td>
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<tr>
<td>Development of Local Capacity</td>
<td>17</td>
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<tr>
<td>EIA Guidelines</td>
<td>6</td>
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<tr>
<td>SUB-TOTAL Institutional Capacity Building</td>
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<tr>
<td>Conduct of EIAs</td>
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<tr>
<td>TOTAL</td>
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</table>

11.2 Comparisons

In considering the size of the budget, the following comparisons might be helpful.

The cost of setting up and running the ELU (not in RAFU) and the RAFU environment unit are approximately US$ 260,000 per annum. This compares with total estimated running costs of RAFU of US$ 4,700,000 thousand per annum. We have not attempted to separate capital and recurrent costs in this analysis, since all capital investments would need to be renewed after five years.

The total cost (which does not include any specific provision for the implementation of mitigation measures) is approximately $ 4.2 million. This compares with a total estimate for the 5 years of FRSP of $ 754 million. The cost of environmental management is therefore around 0.6% of project costs. This proportion is highly sensitive to the actual costs of EIAs which will only be known accurately when terms of reference have been prepared, but we consider that a proportion of 1% or so would still be reasonable.
11.3 Financing

All RAFU operating and formation expenditure will be met by a World Bank credit under the Road Sector Institution Technical Assistance Project. In addition, there is a provisional lump sum $500k credit for the establishment of the ELU. This amount was earmarked before it was clear that much of the responsibility for road sector environmental management would be placed in RAFU. We understand that RAFU is in the process of reviewing its budgetary arrangements.

The FRSP (and existing sources of funding) make provision for contract, study and supervision costs. The extent to which these amounts make provision for EIA and mitigation costs is unclear.

It is unlikely that additional sources of funding other than those indicated can be mobilised to cover the costs of environmental management - if indeed they are necessary.

The Ministry, RAFU and the World Bank now need to incorporate the estimates provided into their discussions.
## BUDGET

<table>
<thead>
<tr>
<th>US$</th>
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<td>500</td>
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<td>Misc expenses</td>
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<td><strong>RAFU EU Costs</strong></td>
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<td>Misc running costs</td>
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<tr>
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<td>1,279,950</td>
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<tr>
<td><strong>Conduct of EIAs</strong></td>
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<tr>
<td>Category 4</td>
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</tr>
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<td></td>
<td>2,890,000</td>
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<tr>
<td><strong>TOTAL - Institutional and EIA costs</strong></td>
<td></td>
<td></td>
<td></td>
<td>4,169,950</td>
</tr>
</tbody>
</table>
11.4 Budget Assumptions

The following assumptions were used in the preparation of the budget.

i. No provision has been made for the cost of mitigation measures. It is assumed that these are included in the estimated costs of construction. As a rule of thumb, thorough mitigation measures would normally increase the costs of construction by around 5%.

ii. The routine work of the ELU would cover developing procedures for maintaining and updating paper information, and no additional budget will be provided:

iii. No provision has been made for developing or implementing GIS systems.

iv. The ELU would be housed in existing Ministry accommodation using existing facilities. No provision has therefore been made for office equipment or furniture.

v. No offset has been provided for income from the sale of documents.

vi. No provision has been made for the overall revision of the Road Design Manual and General Specifications on the assumption that a revision will not be made until it is required for additional reasons.

vii. No provision has been made for the cost of producing the Maintenance Manual since this is still in draft.

viii. Operating costs for the RAFU Environment Unit are based on a proportion of salary costs and are roughly in line with the ratio of salary to non-salary costs anticipated for the whole of RAFU.

ix. Provision has been made for RAFU EU and ELU to spend 150 staff days in the field per annum at a subsistence allowance of $50.
12. CONCLUSIONS

This study has provided a foundation for incorporating environmental considerations into road sector activities by imparting an understanding of the types of environmental and social impacts that result from these activities, and means for mitigating and monitoring them. It has illustrated how these considerations can be integrated into road planning, construction, operation and maintenance through the use of guidelines that have been developed specifically for the road sector during the course of the study. The institutional framework within which environmental management can be undertaken by the MOWHC and RAFU (and the future Road Agency) has also been addressed.

Various tasks have been recommended to achieve sound environmental management within the road sector. In summary, these are:
- the dissemination and maintenance of environmental information pertinent to the road sector;
- the revision of current MOWHC manuals and documentation to include environmental considerations;
- the development of procedures for national level monitoring;
- the formation of environmental units with the MOWHC and RAFU;
- to train MOWHC and RAFU staff in environmental issues;
- to develop local capacity to conduct EIAs; and
- to ensure that the Road Sector EIA Guidelines are used.

It is imperative that environmental management within the road sector is taken seriously, and this can only be done by the express involvement of top level management within the MOWHC and RAFU/Road Agency. They must have the overall responsibility for ensuring that recommended measures for environmental protection and mitigation, and that other procedures put in place for facilitating environmental management are complied with. Finally, environmental management issues must also be assimilated into other activities within the MOWHC.
Sector Environmental Policy & Management
Assessment of First Road Sector Project

Volume III: Road Sector EIA Guidelines

Final report
March 1999
Annexes
ANNEX I: TERMS OF REFERENCE

1. Introduction

The purpose of this environmental assessment is to review the environmental aspects of the First Road Sector Programme (FRSP) with respect to (i) the adequacy of the current national system of environmental policies and regulations regarding environmental assessment, mitigation, monitoring and management of road work activities; (ii) the capability of the Ministry of Works, Transport and Communications (MOWTC) and the National Environment Management Authority (NEMA) to commission, facilitate and implement future environmental assessments of road rehabilitation project; (iii) identify programs and organise training courses in environmental assessment techniques for road projects for appropriate government staff and consultants; and (iv) assess local consultant capability and training needs to conduct relevant environmental assessments.

Given that (i) as of May 1995 it became mandatory national policy that environmental assessments are now required for any new development projects (i.e., the National Environment Statute) and (ii) the Government has proposed its First Road Sector Program, in which major road works are proposed which will be conducted throughout Uganda, there is an urgent need to review the country’s ability to comply with NEMA’s requirements that ELAs be carried out for all road work activities, including assessment of MOWTC need for assistance in developing procedures and staff capabilities for environmental assessments of road works.

With the current evolving regulatory system for conducting environmental management activities within all sectors in Uganda, including that of road works, an overall assessment of the road sector will help to ensure that the in-country capacity, regulatory framework, principles and procedures are established and will also serve as the basis for identifying institutional strengthening needs that should be carried out under the Sector Program.

2. Background

The national road network, i.e., Main Roads, Feeder Roads, and Community Roads, is essentially inadequate for the transportation needs of the country, as evidenced by the fact that: (i) about 30% of the gravel main roads and many rural feeder and community roads remain unusable in wet weather, which impacts agricultural production and undermines national security by isolating entire districts; (ii) 32% of the unpaved roads are in poor condition, producing excessive vehicle operating costs; (iii) several Kampala District roads are seriously congested and vehicle delays are increasingly causing complete gridlocks; (iv) illegal axle loads are common which has disruptive effects on the freight transport system; (v) there is a lack of operable equipment to maintain road infrastructure; and (vi) there are institutional inadequacies in staffing levels, including notable gaps in environmental management capabilities.

In response to the need to improve the transportation system, as a means to promote sustainable economic development for the country, the Government, through its Ministry of Works, Transport and Communications, has planned for a major Road Sector Development Program (RSDP), to rehabilitate, upgrade and extend the road...
network and technical capabilities to carry out road environmental management within the MOWTC. Through the international Development Association (IDA), the World Bank is considering the support of substantial components of the Program, the first of which includes the proposed rehabilitation and upgrading of four major trunk roads and related institutional strengthening of MOWTC in environmental management and road monitoring.

In accordance with the World Bank’s requirements for environmental assessment of all proposed road rehabilitation activities, both road-specific assessments and an overall Sector Environmental Impact Assessment (EIA) of the FRSP are required. The assessments will be needed to supplement the inadequate current proposed roads to comply with World Bank and the Ugandan National Environmental Management Authority standards for EIA reporting. The EIA work for FRSP will include two major components: (i) identifying the sectoral environmental impacts of the road program on the Ugandan environmental management system, on the planning process and on the policy, regulatory and institutional framework; and (ii) conducting site-specific impact assessments for each of the planned road sections and elaborating on activities that will mitigate these impacts and contribute to environmentally sound use of the land and its resources adjacent to the proposed road works. The following Terms of Reference describes the requirements for conducting the Sector Environmental Assessment.

3. Objectives

The overall objectives of the Sector Environmental Assessment are:

i) Assisting the Government of Uganda to identify the status of the country’s procedures for conducting environmental impact assessment of road sector projects by reviewing its system of policies, regulations, and institutional framework for EIA work and the gaps that remain in the system for carrying out road sector environmental assessments and ongoing monitoring of contractors to ensure they comply with environmental standards and practices;

ii) Identifying the most critical environmental issues constraining the environmental management of the road sector in Uganda and activities that are necessary for strengthening the institutions involved in road sector EIA work, including the need for further policies and regulations, studies and training of government staff;

iii) In conjunction with NEMA, developing environmental guidelines for environmental assessments of road projects; and

iv) Streamlining and standardising the EIA process for road works, including the incorporation of environmental considerations in all stages of a road project from the identification and selection of roads and alignments, through design, implementation, monitoring and the content of works contracts for engineering consultants.
4. **Tasks**

i) Assess the scope of the FRSP’s field of influence, activities and impacts on the environmental management system in the country;

ii) Describe the proposed sector program in terms of the environmental impacts of the work components;

iii) Define the study area, i.e. what constitutes the environmental habitats that will be included within the program’s influence and what constitutes the direct and secondary impacts that are anticipated;

iv) Describe the environmental situation in Uganda, including environmental and social/resettlement issues relevant to the Project such as (a) the presence of sensitive soil conditions, erosion, steep slopes, and the need for soil conservation and revegetation; (b) rapidly decreasing areas of natural habitats and the need for protection, including the Project’s potential influence on already protected areas; (c) the presence of likely resettlement issues, and the need for resettlement and/or compensation or other social assistance; and (d) the likelihood of positive impacts on women and/or local sustainable economic development as a result of environmental programs that would be implemented as part of the road impact mitigation process;

v) Describe and assess the country’s policy framework for environmental management of road sector activities. The Consultant will analyse (i) the national environmental policies and legislation relevant to the road sector, particularly the emerging framework for EIA work evolving through NEMA; (ii) transport sector policies relevant to environmental management, including road sector policies; and (iii) sector-specific laws and regulations that have environmental implications;

vi) Review the institutional tasks the project will entail, including the initiation, implementation, and approval process of EIAs and monitoring of the implementation of environmental mitigation plans;

vii) Assess the institutional capacity of both central and regional level authorities to implement future environmental assessments and monitoring of road works, as well as to facilitate this work by effectively commissioning outside firms;

viii) Identify needs for additional fields of expertise, training and funds for providing the institutional strengthening of road sector EIA capabilities, within MOWTC, NEMA and other relevant organisations;

ix) Propose a training approach for appropriate government staff, with the possibility of a study tour to draw upon foreign expertise in the area of road sector environmental review and regulatory framework development;

x) Assess local consultant capability to conduct environmental assessments, including both NGOs and private sector firms. From this assessment, determine the training needs for such consultants to enable them to become fully familiar with environmental assessments for the highway sector.
xi) Review the EIA process in Uganda and its harmonization with the World Bank's procedures and how these new procedures will impact on future EIA requirements under the Project;

xii) Formulate sector-specific environmental assessment guidelines and process that will cover: (i) environmental screening of sub-projects; (ii) categorization for standards of determining Category "A", "B" or "C" projects, in accordance with World Bank/NEMA definitions; (iii) environmental assessment of sub-projects; (iv) design of environmental mitigation and monitoring plans; and (v) standard operations, procedures and conditions for inclusion in road construction contracts; and (v) ways to analyze project alternatives where impacts are likely to be significant without such alternatives;

xiii) Develop national and sector level mitigation plan. This will include mitigation plans to (i) define institutional capacity and regulatory policy weaknesses and ways to minimize these sectoral deficiencies and (ii) establish a set of principles according to which the individual road components should be environmentally and socially assessed. The basis for such principles may be found in documents ratified by the Government and the World Bank Environmental Source book.

xiv) Identify environmental performance indicators for monitoring of project implementation and prepare a monitoring plan, including specifications for supervision expertise and costs during project implementation.
5. **Personnel**

The Team Leader is expected to be on the study full-time. He should (i) hold a masters degree or Ph.D in environmental management or a related field; (ii) have prior experience in carrying out sectoral assessments of environmental management capabilities and in formulating institutional and policy strengthening plans for environmental management activities within the road sector; and (iii) have at least 1 year of experience working on environmental management in Uganda. The rest of the study team will be proposed by the Consultant but should include a Road Engineer. Total staff-month input is estimated to be 28 (twenty-eight).

6. **Data, Local Services and Facilities to be Provided by the Government**

A. **Data**

The Government shall provide the consultants with all available relevant data and reports.

B. **Cooperation of Government Agencies and Counterparts**

The Government will provide for the cooperation of Government Ministries, departments and other agencies as required for carrying out the work, liaison as necessary for this purpose, and will give the consultants full access to all information required for the completion of the studies.

The Government will assign suitable counterparts to work with the key personnel of the consultants and for training purposes.

C. **Facilities and Supporting Staff**

The consultants will make their own arrangements for all necessary office and living accommodation, local transportation, supplies, etc., in connection with the services to be provided.

7. **Time Schedule for Consulting Services and Reports**

**Duration**

The time frame for the above assignment will be 4 months, which should commence prior to or concurrently to the road-specific EIA studies.
Reports

The Consultant’s report should be submitted to NEMA (3 copies) and MOWTC (7 copies), due two weeks from completion of the assignment, summarizing the findings on the above issues. Annexes to the report should include, inter alia: (i) a training program on environmental issues for MOWTC and other agencies’ staff and private consultants; (ii) an organisation chart of the institutional framework for conducting the EIA process; (iii) an outline of existing policies and regulations relevant to road sector EIA; and (iv) a list of local consulting firms and other organizations with capabilities to conduct EIAs for roads within Uganda.

Finally, 2 copies of each of the reports outlined above shall be submitted to the International Development Association for attention:

The Task Team Leader,
AFTTI, Eastern and Southern Africa Region,
World Bank,
1818 H Street, N W
Washington, D.C 20433

Fax: (202) 473 8326
ANNEX II: REFERENCES


Gibb; Comparative Feasibility Study between the Northern and Southern Bypasses to Kampala City, Final Report, Vol 2: Environmental Impact Assessment; Ministry of Works, Transport and Communications; February 1998.


Government of Uganda; Land Cover Stratification (Vegetation) Map; The National Biomass Study, Forest Department, Ministry of Natural Resources; 1996.

Lantran J M, J Baillon and J M Pagès; Road Maintenance and the Environment (Contracting out Road Maintenance Activities: Vol V); Road Maintenance Initiative, the World Bank, the Economic Commission for Africa and the Sahelian Operations Review Sub-Saharan Africa Transport Program; August 1994.


Republic of Uganda; Guidelines for Environmental Impact Assessment in Uganda; National Environment Management Authority; July 1997.
Republic of Uganda; *State of the Environment Report for Uganda*; National Environment Management Authority; 1996

Republic of Uganda; *Ten-Year Road Sector Development Programme (1996/7-2005/6)*, Vol 1 of 3: Executive Summary; Ministry of Works, Transport and Communications; October 1996.


Republic of Uganda; *Ten-Year Road Sector Development Programme (1996/7-2005/6)*, Vol 3 of 3: The First Road Sector Project; Ministry of Works, Transport and Communications; October 1996.

Republic of Uganda; *National Policy for the Conservation and Management of Wetland Resources*; Ministry of Natural Resources; 1995.


Sabbour Associates, in association with Mott MacDonald and Serefaco Consultants Ltd; *Supplementary Environmental Study; Katunguru-Kasese-Fort Portal Road, Kasese-Kilembe Link and Fort Portal-Bundibugyo*, Final Report; Studies for the Rehabilitation and Improvement of PTA Sponsored Roads, Package 2; Ministry of Works, Transport and Communications, Republic of Uganda; January 1996.


## ANNEX III: LIST OF PEOPLE CONSULTED

### Ministry of Works, Housing and Communications

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng J Mwedde</td>
<td>Engineer in Chief/Director Engineering</td>
</tr>
<tr>
<td>Eng A O Mugisa</td>
<td>Commissioner, Development</td>
</tr>
<tr>
<td>Eng L Lutaaya</td>
<td>Commissioner, Maintenance</td>
</tr>
<tr>
<td>Eng J B Mutabazi</td>
<td>Chief Training Engineer</td>
</tr>
<tr>
<td>Eng J Okior</td>
<td>Asst. Commissioner, Planning, Design and Documentation</td>
</tr>
<tr>
<td>Eng E Mubiru</td>
<td>Planning, Design and Documentation</td>
</tr>
<tr>
<td>Eng Alex Onem</td>
<td>Asst. Commissioner, Construction</td>
</tr>
<tr>
<td>Mr B Ssebbugga Kimeze</td>
<td>Principal Engineer, Road Maintenance and ELU Representative</td>
</tr>
<tr>
<td>Mr Odd Thorkildsen</td>
<td>Road Maintenance Coordination Unit</td>
</tr>
<tr>
<td>Mr S Asaja</td>
<td>District Engineer, Luwero</td>
</tr>
<tr>
<td>Mr G Kaka</td>
<td>Unit Manager, Luwero</td>
</tr>
<tr>
<td>Mr J Semakula</td>
<td>Supervisor, Feeder Roads</td>
</tr>
<tr>
<td>Mr Musoke</td>
<td>District Engineer, Mpigi</td>
</tr>
<tr>
<td>Mr J Lubisa Kato</td>
<td>Asst Officer in Charge, Mpigi District</td>
</tr>
<tr>
<td>Mr Sendibe</td>
<td>MOWHC, Mpigi</td>
</tr>
<tr>
<td>Mr Komakech</td>
<td>MOWHC, Mpigi</td>
</tr>
<tr>
<td>Mr C Munyambanza</td>
<td>District Engineer, Mbale</td>
</tr>
<tr>
<td>Mr P Ssesange</td>
<td>Asst District Engineer, Mbale</td>
</tr>
<tr>
<td>Mr R Mukombe</td>
<td>Engineering Assistant, Mbale</td>
</tr>
<tr>
<td>Mr F Kyenune</td>
<td>District Engineer, Kabale</td>
</tr>
<tr>
<td>Ms Barbara Birungi</td>
<td>GIS Section</td>
</tr>
</tbody>
</table>

### Ministry of Local Government

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Eng J Lukwago</td>
<td>Director of Technical Services and Works, Mpigi District</td>
</tr>
</tbody>
</table>

### Office of the Prime Minister

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr Birete Kagwa</td>
<td>Ag Commissioner, Disaster Management &amp; Refugees Department</td>
</tr>
<tr>
<td>Mrs Musoke</td>
<td>Senior Resettlement Officer</td>
</tr>
</tbody>
</table>

### Forestry Department

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Mr J R Kamugishe</td>
<td>Forest Department HQ</td>
</tr>
<tr>
<td>Mr Nsita Steve Amooti</td>
<td>Forest Department HQ</td>
</tr>
<tr>
<td>Mr David Duli</td>
<td>Forest Department HQ</td>
</tr>
<tr>
<td>Mr Birakwate Polly</td>
<td>District Forestry Officer, Mpigi</td>
</tr>
</tbody>
</table>

### Ministry of Water, Lands and Environment

<table>
<thead>
<tr>
<th>Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Mr Nsamba Gayiyya</td>
<td>Chief Government Valuer</td>
</tr>
<tr>
<td>Mr S A K Magezi</td>
<td>Asst Commissioner for Meteorology</td>
</tr>
</tbody>
</table>
Ministry of Tourism, Wildlife & Industry

Mr David Abura-Ogweny - PAMSU Project Coordinator

National Environment Management Authority

Prof J Okedi - Executive Director
Dr Aryamanya Mugisha - Deputy Executive Director
Mr Justin Ecaat - EIA Specialist
Mr Rwothumio Thomoko - EIA and Monitoring Officer
Mr Eugene Muramira - Coordinator, ELU Activities
Mr Charles Akol - District Coordination Unit

Uganda Wildlife Authority

Dr Y Moyini - Ag Director
Mr Bart Young - Planning Technical Advisor
Mr Arthur Mugisha - Ag Deputy Director, Field Operations

Donor Agencies

Dr Y Kamhi - World Bank, Washington DC
Eng V Ocaya - World Bank, Kampala
Ms Karen Menczer - USAID
Mr Trampendach - European Commission

IUCN

Alex Muhweezi - IUCN Country Office

The Engineering and Consulting Professions

Mr Peter Kikuyo - Chair, Environment Committee, Uganda Institute of Professional Engineers
Mr Justus Byagagaire - Development Consultants International Ltd
Mr Kagga - Kagga and Partners
Ms Harriet Naccabi - Carl Bro Consulting Engineers
ANNEX IV: SUGGESTED CURRICULA FOR TRAINING COURSES

EIA Training Course For Top Management- Group 1

Topics to be covered include the following:

- An overview of EIA
- Regulatory Framework for EIA in Uganda
- EIA Policies and Regulations of bi- and multi-lateral funding agencies, e.g. World Bank, African Development Bank, European Union, USAID, etc.
- The institutional arrangements for environmental management in Uganda
- The role and function of Ministry and RAFU in environmental matters
- Strategic Environmental Impact Assessment
- Environmental monitoring and audit of road projects
- The environment and future policy initiatives.
EIA Training for Middle Management - Group 2

Topic 1 Introduction to EIA
Objectives of EIA
Operating principles of EIA
Characteristics of impacts
Benefits of undertaking EIA
EIA stages
EIA and the project cycle
Strategic environmental assessment (SEA)

Topic 2 Regulatory Framework for EIA in Uganda
The National Environmental Action Planning Process (NEAP)
The National Environment Statute of 1995 and NEMA
EIA Policies and Regulations of bi- and multi-lateral funding agencies, e.g. World Bank,
African Development Bank, European Union, USAID, etc.
International Conventions.

Topic 3 Screening, Scoping and Setting Terms of Reference for Environmental Impact Studies
Screening methods
Provisions of the National Environmental Statute (Third Schedule)
Preparation of project briefs
Purposes of scoping
Steps in scoping
Identification of stakeholders to be involved in scoping
Determination of project boundaries and issues of concern
Preparation of terms of reference of an environmental impact study
Role playing - scoping session
Group exercise, presentation and discussion: Preparation of terms of reference for a
proposed road project in Uganda.

Topic 4 Public Involvement during EIA
Objectives of public involvement during an EIA
Levels of public involvement
Participatory approaches
Development of a public involvement programme
Stages at which the public is involved during an EIA
Factors affecting public involvement
Case study on public involvement

Topic 5 Assessment of Impacts
Description of baseline conditions
Impact identification methods
Analysis of impacts
Economic evaluation of impacts
Assessment of impact significance
Case study - Identification, analysis and assessment of impacts of a proposed road project.
Topic 6 Mitigation
Objectives of mitigation in EIA
Forms of mitigation
Design of mitigation measures for typical road impacts
Costing of mitigation measures
Case study - design and costing of mitigation measures of impacts of a proposed road project.

Topic 7 Environmental Monitoring
Objectives of environmental monitoring
Design of a monitoring programme
Implementation of a monitoring programme
Analysis and use of environmental monitoring data
Case study - design of an environmental monitoring programme for a proposed road project.

Topic 8 Reporting
Elements of an environmental impact study report
Common shortcomings of environmental impact study reports
Exercise - presentation of EIA findings.

Topic 9 Reviewing of EIA Reports
Objectives of reviewing EIA reports.
Roles of NEMA and lead agencies in reviewing
Steps in reviewing reports
Methods for reviewing EIA reports
EIA and decision-making
Exercise - reviewing EIA reports prepared for projects in Uganda

Topic 10 Managing the EIA Process and Decision-making
Composition of an EIA team
Time scheduling in an EIA
Roles of Lead Agencies
Integration of EIA results in decision-making

Topic 11 Ministry and RAFU arrangements
Role and composition of the ELU
Role and composition of the RAFU environment Unit
The Guidelines
Code of Practice
Training Programme For Staff in the ELU - Group 3

The proposed training programme for those who will be in the Ministry's environmental liaison unit, might cover elements given below. The precise training requirements will depend on those appointed to the ELU. It is anticipated that the training would be provided at a short university course (up to three months).

- Environmental Systems
- Ecosystems
- Human Ecology
- Geographical Information Systems
- Participatory Approaches
- Planning and Design of Roads
- Environmental Planning
- Environmental Economics
- Environmental Law
- Environmental Impact Assessment
- Environmental Management of Road Projects
- Policy
Training Course for Inspectors and Overseers - Group 4

Although this course contains background information on the theory of EIA and its application in Uganda, the emphasis will be on practical mitigation measures and working with small scale contractors to implement them.

**Topic 1 Introduction to Environmental Concepts**
- Elements of the environment
- Relationships between environmental elements
- Environmental issues in Uganda

**Topic 2 Basic Elements of Environmental Impact Assessment**
- Sources of impacts and their effects in road projects
- Impact identification and assessment

**Topic 3 Regulatory Framework for EIA in Uganda**
- National Environment Statute
- Environmental Impact Assessment Regulations

**Topic 4 Public Participation in EIA**
- Objectives of public participation during EIA
- Identification of stakeholders
- Forms of public involvement during EIA
- Problems encountered during public involvement during EIA

**Topic 5 Mitigation**
- Objectives of mitigation
- Forms of mitigation
- Design of mitigation measures for small scale road works
- Implementation of mitigation
- Case study - implementation of mitigation measures
- Environmental monitoring
- Implementation of environmental monitoring programme
- Case study - design of environmental monitoring programme for small scale road works.

**Topic 6 Environmental Monitoring**
- Objectives of environmental monitoring
- Basic elements of designing an environmental monitoring programme
- Implementation of environmental monitoring a programme
- Inter-agency cooperation in environmental monitoring
- Analysis and use of environmental monitoring data
- Case study - environmental monitoring of a proposed road project

**Topic 7 Working with Small Scale Contractors in Implementing Mitigation**
- Environmental measures in standard contracts
- Training Small Scale Contractors in Mitigation Measures
GIS SHORT COURSE STRUCTURE AND CONTENT

**Target Groups:** The GIS short course is designed for those who are, or will be involved in natural resource and environmental management and need to analyze geo-data to generate information for supporting managerial functions and activities.

**Objectives Of The Course Are:**
- Development, design and implementation of appropriate GIS applications.
- The manipulation, analysis and modeling of geo-data based on organizational requirements and limitations.

**BLOCK I:** Basic Principals of GIS [5 days]
- Definition of GIS
- Computer versus Manual GIS
- Map projections
- Components of Computer GIS
- Vector versus Raster GIS
- Spatial data acquisition for input into a GIS
- Typical questions answered by a GIS
- Cartographic visualization

**BLOCK III (continued)**
- Map algebra
- Tabular data queries and calculations
- Home range analysis
- Kriging
- Network Analysis
- Digital Elevation Modeling

**BLOCK IV:** Cartographic Outputs [4 days]
- Tables
- Charts
- Map compositions

**BLOCK II:** Spatial Models and Database Design [5 days]
- GIS database theory
- Database models (hierarchical, Network, Relational)
- Information System Analysis and Design
- GIS Database Queries (including Structural Query Language, SQL)

**BLOCK V:** GIS Modeling [7 days]
- Modeling Reality in GIS:
  - Allocation problems
  - Decision support using GIS
- GIS Case Studies in Uganda (Environmental Impact Assessment for hydro-electric power development at Bujagali; National Biodiversity Data Bank; Uganda Wildlife Authority Monitoring System)

**BLOCK VI:** PARTICIPANTS OWN GIS PROJECT [5]

**BLOCK III:** Common GIS Functions [14 days]

1. GIS Data Entry:
   - Digitizing (using digitizing tablets and scanning)
   - Key board (attributes)
   - Importing existing digital files (both spatial and attribute data)

2. GIS Data Manipulation and Analysis:
   - Database Management (editing, sorting,
   - Database query
   - Distance Operators
   Deriving new information from existing data sets
ANNEX V: PROPOSED ESTABLISHMENT OF THE MOWHC AND RAFU

The tables in the following pages show the proposed establishment in the post constitutional restructuring report, *Post Constitutional Restructuring of the Ministry of Works, Housing and Communications*, which was prepared by the Ministry of Public Service in May 1998 and in the Government Report on Transitional Institutional Reforms for the Establishment of Road Agency. These tables form the basis of proposed numbers requiring environmental training within the Ministry of Works, Housing and Communications and RAFU.
### Proposed Establishment for Ministry Headquarters Road Sector Staff

<table>
<thead>
<tr>
<th>Policy Analysis Director's Unit</th>
<th>Plan. Design Office</th>
<th>QA Com's Office</th>
<th>Dev Design &amp; Doc</th>
<th>Const</th>
<th>Trg</th>
<th>Road Maint</th>
<th>Dist &amp; Urban TOTAL</th>
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<tr>
<td>Director for Engineering</td>
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<tr>
<td>Commissioner</td>
<td>U1</td>
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<tr>
<td>Assistant Commissioner</td>
<td>U1</td>
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<tr>
<td>Principal Policy Analyst</td>
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<tr>
<td>Senior Policy Analyst</td>
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<tr>
<td>Principal Executive Engineer</td>
<td>U2</td>
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<tr>
<td>Principal Executive Engineer (P)</td>
<td>U2</td>
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<tr>
<td>Principal Executive Engineer (D&amp;D)</td>
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<tr>
<td>Principal Assistant Engineering Officer</td>
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<tr>
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<td>Principal Staff Surveyor</td>
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<td>Civil Engineers (P)</td>
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<tr>
<td>Senior Assistant Surveyor</td>
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<tr>
<td>Senior Surveying Assistant</td>
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</tbody>
</table>

Note: The table above includes the policy analysis unit and quality assurance unit, although both of these will have some responsibilities outside the road sector.
PROPOSED ESTABLISHMENT FOR DISTRICT STATIONS

| Position                                      | Mpg | Mub | Msk | Jin | Mba | Sor | Tor | Mor | Kot | FtP | Hoi | Msd | Mbr | Kab | Gul | Lir | Kit | Aru | Moy | Kla | Luw | TPU | Sub-Totals |
|-----------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Senior Engineer                               |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Principal Asst Engineering Officer           | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 12  |
| Senior Engineering Asst (Mech)               | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 12  |
| Senior Engineering Asst (Civil)              |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Senior Asst Engineering Officer (Mech)       | 1   | 1   | 2   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 10  |
| Senior Asst Engineering Officer (Civil)       | 1   | 1   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Engineers (Civil)                             | 1   |     | 1   | 1   | 1   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Mechanical Engineer                           |     | 1   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Engineering Assistant (Mech)                 | 1   | 2   |     |     | 1   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Engineering Assistant (Civil)                | 1   | 2   |     |     | 1   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Assistant Engineering Officer (Mech)         | 1   | 1   | 1   |     | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 17  |
| Assistant Engineering Officer (Civil)        | 4   |     | 1   | 2   | 1   | 1   | 2   | 1   | 2   | 1   | 1   | 2   | 2   | 2   | 1   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 1   | 1   | 1   | 1   | 1   | 20  |
| Senior Road Inspector                        |     |     | 1   |     |     | 1   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Road Inspectors                              | 2   | 2   | 2   | 2   | 3   | 2   |     | 1   | 3   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 1   | 2   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 36  |
| Road overseers                               | 2   | 3   | 3   | 4   | 2   | 2   | 1   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 4   | 2   | 2   | 1   | 1   | 1   | 1   | 1   | 51  |
| TOTAL                                        | 8   | 10  | 10  | 14  | 10  | 9   | 6   | 7   | 11  | 8   | 9   | 8   | 9   | 8   | 12  | 9   | 7   | 9   | 5   | 14  | 9   | 7   | 60  | 54  | 94  | 208 |

NOTE: This establishment has been drawn from the report of the Ministry of Public Service on the post constitutional restructuring of the ministry. The report does not always identify whether positions are for civil or mechanical engineers. For the purposes of developing estimates of training requirements we have made simplifying assumptions accordingly.
PROPOSED ESTABLISHMENT FOR RAFU

1. Full operation stage (2000)

<table>
<thead>
<tr>
<th>Division</th>
<th>Top Executives</th>
<th>Middle Managers</th>
<th>Project Engineers</th>
<th>Admin Employees</th>
<th>Support Consultants</th>
<th>Total</th>
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<tr>
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2. Initial operation stage (1998)

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Volume III: Road Sector EIA Guidelines

Final report
March 1999