

11. ROAD NETWORK DEVELOPMENT PLAN

11.1 Planning Approach

11.1.1 Overview of the Study Area

As explained in Chapter 9, Regional Development Plan, the study area has a potential for agricultural industry; Kitgum would become a new development centre in the region while Gulu remains a main regional centre because of concentrations of administrative and commercial activities. Hence, the regional development would mainly be realized as the two cities develop.

In addition, South Sudan would have positive impacts on exportation from the area because of the geographical and distance advantages. South Sudan needs various materials and agricultural products from outside of the country and improvement and development of industries in South Sudan may take some time. Therefore, the Mombasa-Nairobi-Kampala-Gulu-Nimule-Juba route would become the most important and busiest corridor in terms of goods transported to/from South Sudan for the time being. To establish fast and reliable accesses to the route is expected to enhance the regional development.

In addition to the said South Sudan route, the Kitgum-Lira road would also become important which gives the shortest access to Kenya from the region. Kenya is one of the biggest countries importing agricultural products from Uganda and this trend will continue. Hence, when Kitgum is developed in terms of agriculture industry, Kenya can be focused on as a market in addition to Kampala.

The road network in the study area is formed in a radial pattern centered on Gulu and Kitgum and there are two main axes running north-south in the area which coincides with the above development direction. The strengthening of the existing road network is more effective and reasonable than introduction of new networks. The road planning is, therefore, carried out accordingly.

11.1.2 Functional Assignment

To determine and assign the road functions on the network is the starting point of the road planning and its consequences such as design, construction and O&M would be carried out accordingly.

In Japan, a road hierarchy composed of four road classes has been introduced to identify general functional assignment in the network.

Table 11.1-1 Functional Road Classification System in Japan

Road Class	Functional Assignment (Definition)
Primary Arterial Road	A road that forms the axis of a major urban and regional area and links mega commercial and administrative centres in the country. The road is of high standard design such as wider carriageway and high design speed and heavy traffic and long liner length.
Arterial Road	A road that forms the axis of an urban and regional area and links commercial and administrative centres in the region. The road is of high standard design such as dual carriageway and high design speed and moderate liner length.
Supplemental Arterial Road	A road that links Arterial Roads and Feeder Roads and it has the function of concentration and distribution of traffic in the area. The road is located in residential areas and used for daily activities by residents and of moderate design standard such as single carriageway.
Feeder Road	A road that accesses residential areas and is used for daily activities by residents. The road is of low standard design such as one lane road and low design speed and light traffic volume and short liner length.

Source: Japan Road Ordinance

In Uganda, there are two road manuals/design guidelines which are the Road Design Manual and the District Road Manual, and both were published by the Ministry of Works, Housing and Communications.

The Road Design Manual was prepared for national road planning and design while the District Road Manual was for district roads administrated by the Ministry of Local Governments.

In both manuals there were different explanations for functional road classification systems as follows.

Table 11.1-2 Functional Road Classification System for National Roads in Uganda

	Road Class	Function
A	International Trunk Roads	Roads that link International Important Centres. Connection between the national road system and those of neighbouring countries. Major function is to provide mobility
B	National Trunk Roads	Roads that link provincial capitals, main centres of population and nationally important centres. Major function is to provide mobility
C	Primary Roads	Roads linking provincially important centres to each other or to a higher class road (urban/rural centres). Linkage from districts, local centres of population and development areas to higher class roads. Major function is to provide both mobility and access
D	Secondary Roads	Roads linking locally important centres to each other, to more important centres, or to higher class roads (rural/market centres) and linkage between locally important traffic generators and their rural hinterland. Major function is to provide both mobility and access.
E	Minor Roads	Any road link to minor centre (market/local centre) and all other motorable roads. Major function is to provide access to land adjacent to the secondary road system.

Source: Road Design Manual, Vol.1 Geometric Design, Ministry of Works, Housing and Communications.

Table 11.1-3 Functional Road Classification System for District Roads in Uganda

Class	Definition
District Class I Roads	District Class I roads serve national interests in that they satisfy criteria established for secondary and/or tertiary road systems of MoWT's Trunk Road Network. District Class I roads will be candidates for eventual upgrading to the Trunk Road network after which they become the responsibility of UNRA for maintenance and further development. District I roads, to qualify for upgrading to MoWT jurisdiction, need to be engineered and constructed to Trunk Road standards.
District Class II Roads	District Class II roads provide the basic internal transport needs of the district. District Class II roads connect to UNRA secondary or tertiary road systems, interconnect the district capital and county administrative centres, and provide direct access for district population centres to district health, educational, marketing and administrative facilities. Such roads generally have a gravel surface and carry, on average, twenty or more motorized vehicles per day.
District Class III Roads	District Class III roads (including cul-de-sacs) are typically low motorized traffic volume roads extending into the districts' lightly populated peripheral regions. District Class III roads may, at times, serve as connectors to and/or between district class II roads, but generally do not provide direct routing to major public activity centres. Such roads generally have an earth/gravel surface and carry, on average, less than twenty motorized vehicles per day
Community Access Roads	In Uganda, the community access road (CARs) network comprises an extensive system of low motorized traffic volume, usually dry weather only, earth roads serving primarily pedestrians, bicycles and animal drawn carts. Neither inventory/condition surveys detailing the actual extent and condition of this network, nor any clear definition of design class or appropriate design standard exist at present. During implementation by district local government staff of their district road inventory and condition surveys (ADRICS), local authorities at sub-county level are provided the opportunity to identify those CARs considered most important for the survival and continued development of their communities. This process will, over time, enable identification of the most important CARs and result in the development works. For complete details of the ADRICS procedure, refer to District Road Manuals Manual B.

Source: District Road Works, Volume 1 Planning Manual, Manual A: Functional Road Classification System & Route Numbering.

Since the above two classification systems were prepared for different subject road systems (National and District), the previous JICA Study Amuru/Nwoya has tried to integrate the two systems into one so as to overview the road network regardless of the road system, and concluded and proposed an integrated functional road classification systems as follows.

Table 11.1-4 Proposed Method of Using Existing Two Systems of Functional Road Classification in an Integrated Manner

	Integrated Method of Using Existing Two Systems of Functional Road Classification	Functional Classification for Rural Roads	Functional Classification for District Roads
A	International Trunk Road	International Trunk Road [A]	
B	Inter-regional Trunk Road	National Trunk Road [B]	
C	Inter-district Road	Primary Road [C]	District Class I Road
D	District-level Arterial Road	Secondary Road [D]	District Class II Road
E	District-level Collector Road	Minor Road [E]	District Class III Road
F	Important Community Access Road		(Community Access Roads)
G	Other Community Access Road		(Community Access Roads)

Source: JICA Study Amuru/Nwoya

Table 11.1-5 Major Functions of Functional Road Classes in Integrated Method of Using Existing Two Systems of Functional Road Classification

	Integrated Method of Using Existing Two Systems of Functional Road Classification	Major Function	Rural Road System	District Road System
A	International Trunk Road	High mobility between neighbouring countries and Uganda	[A] International Trunk Road	
B	Inter-regional Trunk Road	High mobility between regional centres	[B] National Trunk Road	
C	Inter-district Road	High mobility between district centres (major routes connecting district centres)	[C] Primary Road	District Class I Road
D	District-level Arterial Road	Relatively high mobility between district centre and other important centres (sub-county centres and other centres, such as major trading centres) within the district	[D] Secondary Road	District Class II Road
E	District-level Collector Road	Middle mobility between sub-county centres and other centres High accessibility to village centres	[E] Minor Road	District Class III Road
F	Important Community Access Road	Access to village centres		(Important Community Access Roads)
G	Other Community Access Road	Access to local communities		(Other Community Access Roads)

Source: JICA Study Amru/Nwoya

The approach which the previous JICA Study Amuru/Nwoya took is generally applicable to this study as well. Since this study is expected to establish regional-wide road network development plans; the proposal for improvement/development of international, inter-region and inter-district traffic/transport is the primary objective, therefore, more overview/wider viewpoint are required as compared to that of the previous JICA Study Amuru/Nwoya.

Hence, the following functional road classification, without regard to the current road system (National/District), is proposed for planning purposes. This classification system makes it possible to identify road functions, simply and also makes it possible to interpret those of both Ugandan manuals.

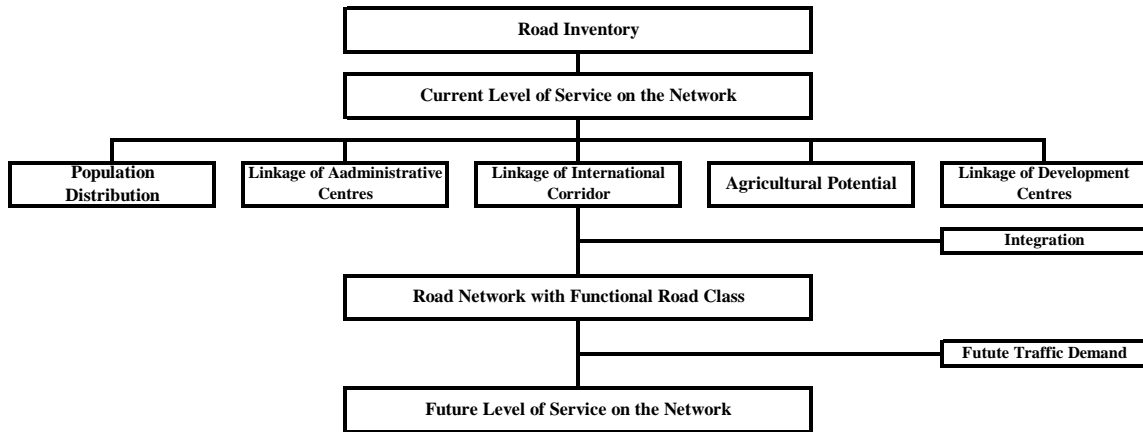
Table 11.1-6 Proposed Functional Road Classification

	Functional Road Classification	General Functional Assignment	Coincidence	
			National Road System	District Road System
1	International Trunk Road	Road that links major international cities and caters to international cargos and passengers	[A] International Trunk Road	N/A
2	Inter-Region Trunk Road	Road that links major regional centres and caters to domestic cargo and passengers.	[B] National Trunk Road	N/A
3	Inter-District Road	Road that links district centres and caters to regional cargos and passengers	[C] Primary Road, [D] Secondary Road	District Class I Road
4	City Road	Roads that are developed in the city centre and connect to upper class roads	N/A	Urban Road
5	Feeder Road	Roads that link villages and district centres and connect to upper class roads	[E] Minor Road	District Class II Road District Class III Road

Source: JICA Study Team

11.1.3 Level of Service (LOS)

Level of service (LOS) is a measure used by traffic analysis to determine the effectiveness of elements of transportation infrastructure. LOS is most commonly used to analyze highways by categorizing traffic flow with corresponding safe driving conditions.



Source: JICA Study Team

Figure 11.1-1 General Flow of Road Network Planning

The choice of LOS shall generally be based on economic considerations. The Ugandan Road Design Manuals states six levels of services which are varied from A to F.

The following table explains the definition of the LOS.

Table 11.1-7 Level of Service Characteristics by Road Type

Level of Service	Two Lane Rural	Multilane Rural without Access
A	Average travel speed of ≥ 93 km/hr. Most passing manoeuvres can be made with little or no delay. Service flow rate a total of 420 of PCU/hr for both directions and about 15% of capacity can be achieved.	Average travel speed of ≥ 93 km/hr Under ideal conditions, flow rate is limited to 720 PCU/lane/hr or 33% of capacity.
B	Average travel speed of ≥ 88 km/hr. Flow rate may reach 27% of capacity with continuous passing sight distance. Flow rate of 750 PCU/hr total for both directions.	Reasonably free flow. Volume at which actions of preceding vehicle will have some influence on following vehicles. Flow rates will not exceed 55% of capacity or 1,200 PCU/lane/hr at 96km/hr average travel speed under ideal conditions.
C	Flow still stable, average travel speed of ≥ 84 km/hr. Flow rates, two directions, at 64% of capacity with continuous passing opportunity, or a total of 1,800 PCU/hr for both directions.	Stable flow to a flow rate not exceeding 75% of capacity or 1,650 PCU/lane/hr, under ideal conditions maintaining at least a 95km/hr average travel speed.
D	Approaching travel speeds in neighbourhood of 80km/hr. Flow rates, two directions, at 64% of capacity with continuous passing sight distance or 1,200 PCU/hr total for both directions	Approaching unstable flow at flow rates up to 89% of capacity or 1,940 PCU/lane/hr at an average travel speed of about 92km/hr under ideal conditions.
E	Approaching travel speeds in neighbourhood of 72km/hr. Flow rates under ideal conditions, total two ways, equal to 2,800 PCU /hr. Level E may never be attained. Operation may go directly from D directly to Level F	Flow at 100% of capacity or 2,200 PCU/lane/hr under ideal conditions. Average travel speeds about 88km/hr.
F	Forced congested flow with unpredictable characteristics. Operating speed less than 72km/hr.	Forced flow congested condition with widely varying volume characteristics. Average travel speed of less than 50km/hr.

Source: Road Design Manual, Vol.1 Geometric Design, Ministry of Works, Housing and Communications

11.2 Development Goal

11.2.1 Mid Term

Mid term is set as the target year of 2018.

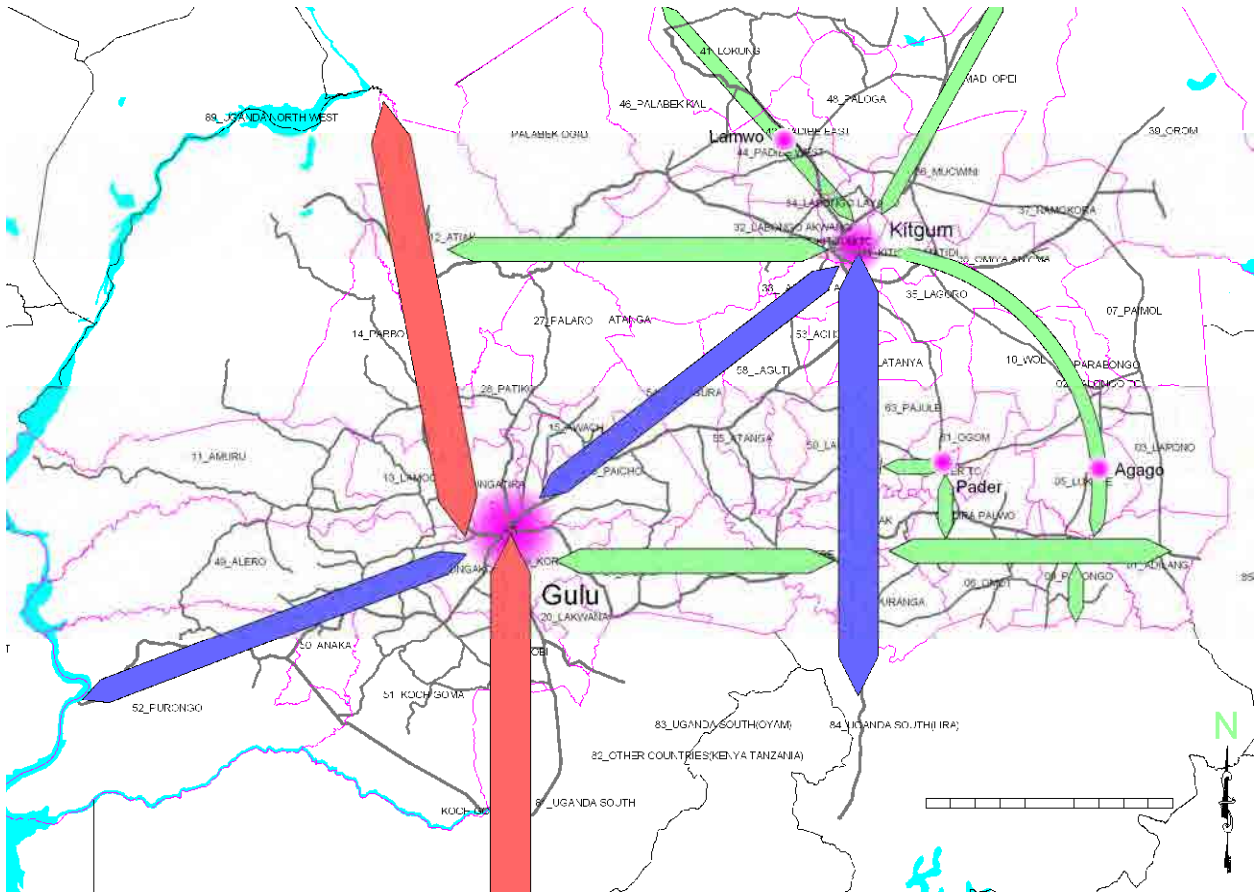
The existing road network will accommodate the future traffic volume in 2018 as shown in the future traffic demand forecast; however physical bottlenecks such as narrow width of the road and drainage problems were identified by the road inventory survey. The other bottlenecks identified are uncontrolled traffic behavior and ineffective bus terminal locations in Gulu Municipal.

As explained, the regional development depends on the improvement of access to the two main axes in the network and the improvements of the axes themselves are also a key. The creation and improvement of the development centres is essential.

Increasing the reliability on the International/ Intern-Regional Trunk Roads Network and securing of passability of the Inter-District Roads Network throughout the year is the primary objective in the mid -term. The city road improvement in Gulu is strategically considered at this stage for future urban planning.

Considering the above, the general targets by 2018 are set as follows.

- To improve accessibility to high agricultural potential areas and between trading centres,
- To improve accessibility for men and materials that move to food processing businesses near the agricultural production area; and,
- To improve accessibility to health care facilities, educational facilities and water sources.



Source: JICA Study Team

Figure 11.2-1 Road Network Development Concept in 2018

Concluding the above, the following development goals are established with the target year of 2018.

- International Trunk Roads: to meet international road standards by tarmac and widening, the design LOS is D,
- Inter –Regional Trunk Roads: to meet national trunk road standards by tarmac and widening, the design LOS is F,
- Inter District Roads: to secure passability throughout the year by bottleneck improvements such as for drainage systems,
- City Roads: to regulate and increase efficiency on traffic movements by improvement of road structure and pavement, and
- Feeder Roads: to remove bottlenecks so the road can provide access to the distinct roads.

11.2.2 Long Term

Long Term is set as the target year of 2030.

The existing road network will still be able to carry the traffic in 2030. Therefore, no additional roads are theoretically required.

The basic access on main roads and to main roads would be provided by 2018. The main objective by 2030 would be the improvement of inter-district roads and inner district traffic.

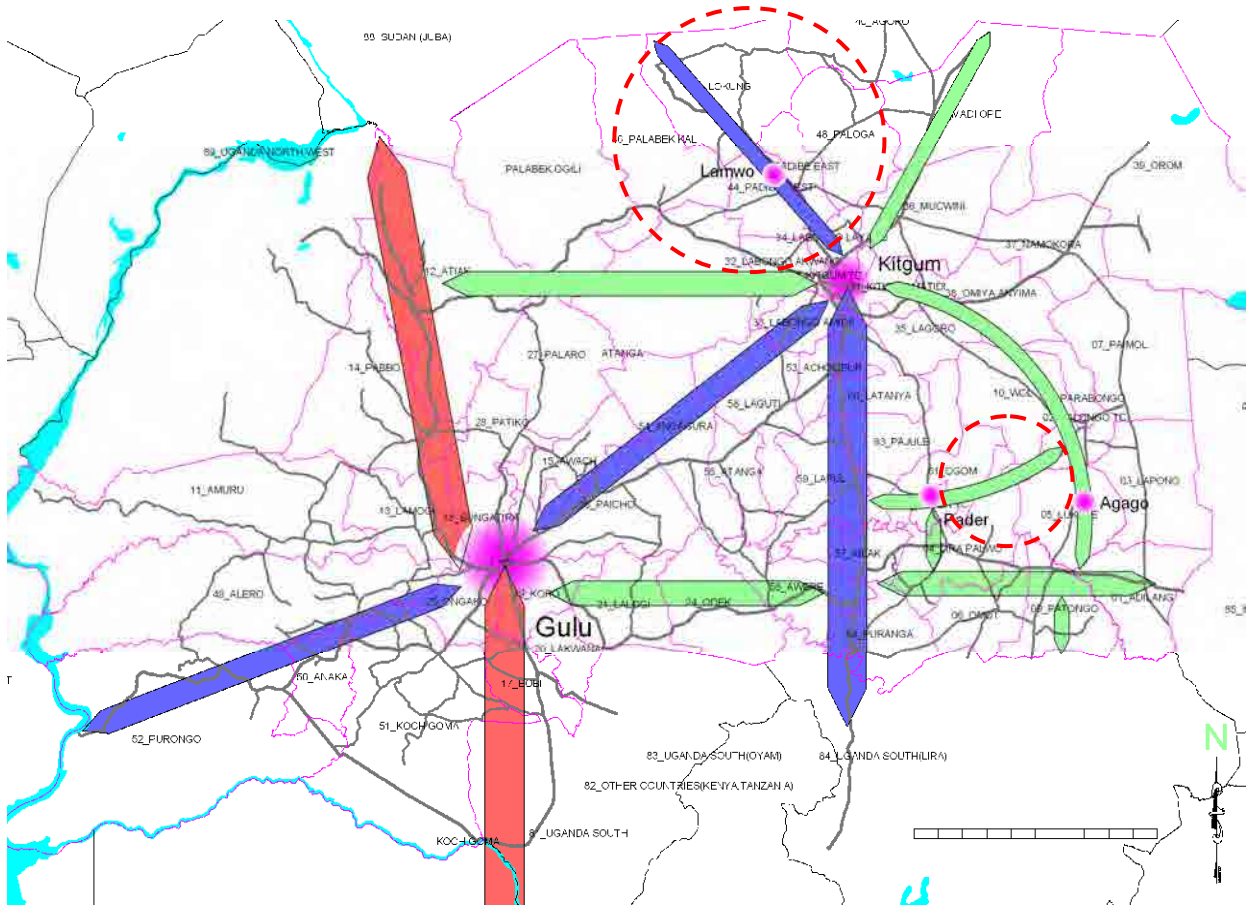
It is envisaged that the agricultural processing industry will launch by 2030 in the region and that it will need many employees from the area and the living activity space also will be expanded as the industry develops. To accommodate this perspective, the provision of a reliable road network in the district and inner district is essential by 2030.

To attain further development in the region, regional and international competitiveness will be required for the products. Hence, the high mobility of the road transport is expected to be provided by the network since the transportation cost reflects on the price of the product. To accommodate this, the international trunk roads need to be improved, one part of which is to provide bypasses at mid to large scale trading centres, villages and towns.

Although the Gulu-Atiak-Nimule-Juba road will still be adequate to handle the traffic in 2030, the introduction of another route linking between South Sudan and Uganda would be desirable in consideration of redundancy. The Ngomoromo (South Sudan Border)-Kitgum-Lira road shall be considered as the optional route.

Considering the above, the general targets for 2030 are set as follows.

- To realize high mobility for International Trunk Roads such as to provide bypasses at trading centres,
- To increase the total length of paved roads on the trunk road network, and,
- To improve the quality of CARs and public transportation.



Source: JICA Study Team

Figure 11.2-2 Road Network Development Concept in 2030

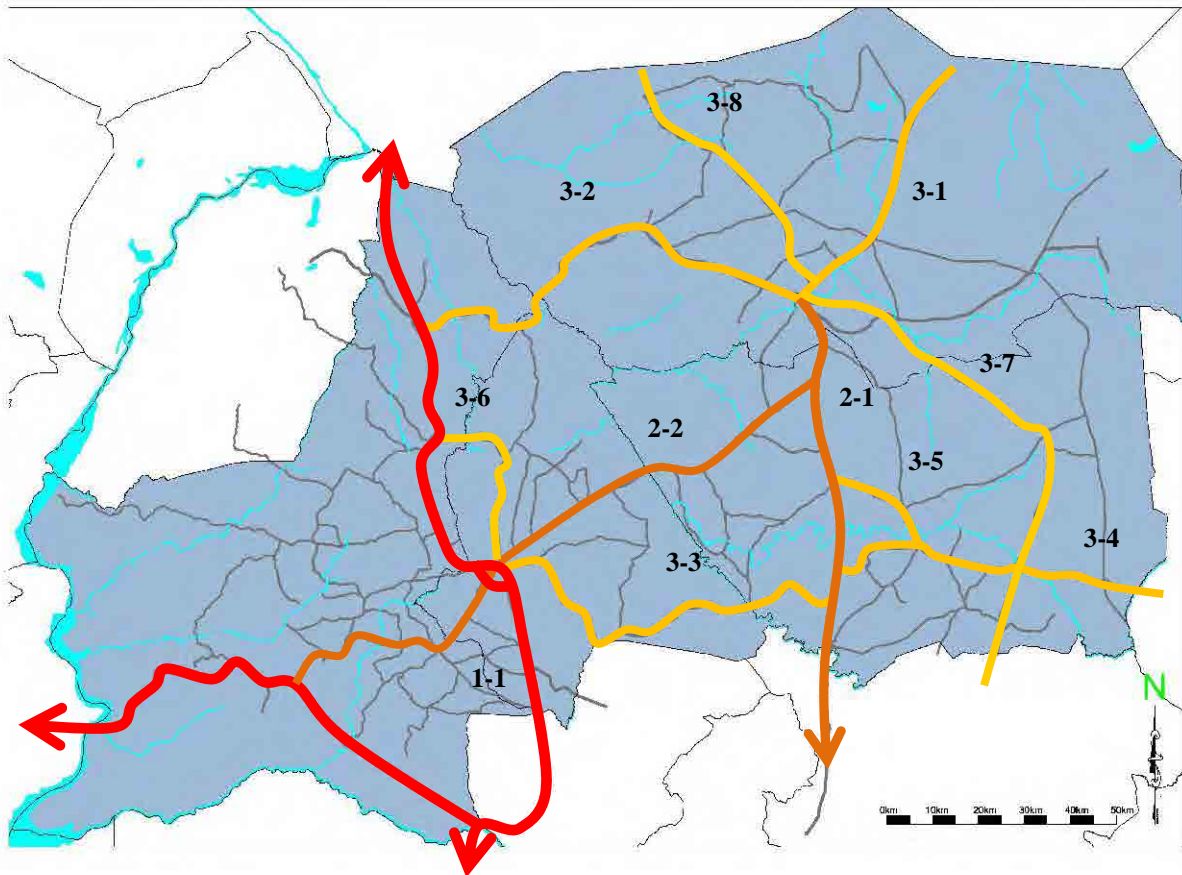
Concluding the above, the following development goals are established with the target year of 2030.

- International Trunk Roads: to provide high mobility by constructing bypasses, the design LOS is C,
- Inter –Regional Trunk Roads: to improve the roads so as to perform as international roads, and increase reliability, the design LOS is E, and
- Inter District Roads: to meet national trunk standards by tarmac and widening, the design LOS is F.

11.3 Proposed Road Network in Study Area

11.3.1 Mid Term





As explained, the general target by the year of 2018 is to improve the living standards to meet basic human needs. To reflect this development concept, the following road network is proposed.



Source: JICA Study Team

Figure 11.3-1 Proposed Road Network in 2018

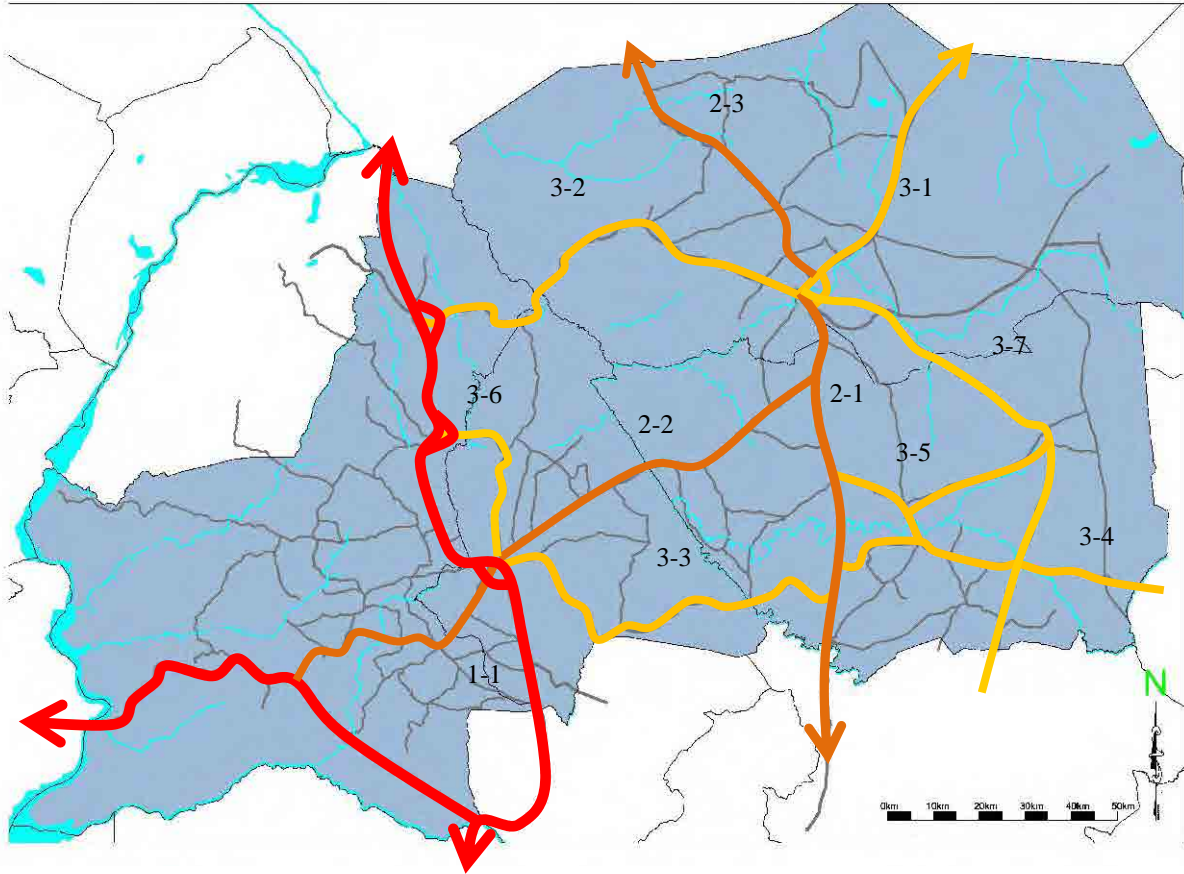
Table 11.3-1 Main Structure of Proposed Road Network in 2018

Functional Road		No.	Subjected Section
	1. International Trunk Rd.	1-1	Gulu/Amuru Dist. Border [Kali Kali] – Gulu - Gulu/Oyam Dist. Border [Karuma] (- Kampala)
	2. Inter-regional Trunk Rd.	2-1	Kitgum – Agago/Lira Dist. Border [Puranga] (- Lira – Kenya Border)
		2-2	Gulu – Acholibur [Pader Dist.]
	3. Inter-district Trunk Rd.	3-1	Kitgum – South Sudan Border [Musingo]
		3-2	Oroko [connect to Atiak] – Kitgum
		3-3	Gulu – Rackoko [Pader Dist.]
		3-4	Coner Kilak – Adilang [Agago/Abim Dist. Border]
		3-5	Pajule – Pader – Kwon Kic
		3-6	Gulu – Ajulu – Pabbo Border [Unyama]
		3-7	Kitgum – Kalongo – Patongo – [Agago/Lira Dist. Border]
		3-8	Kitgum [Pongdwongo] – Padibe [Lamwo] – South Sudan Border [Ngomoromo]
	4. Feeder Rd.		

Source: JICA Study Team

11.3.2 Long Term





The general target by 2030 is to provide high mobility on the truck road network and increase the reliability on the district road network. To reflect this development concept, the following road network is proposed.



Source: JICA Study Team

Figure 11.3-2 Proposed Road Network in 2030

Table 11.3-2 Main Structure of Proposed Road Network in 2030

Functional Road	No.	Subjected Section
	1. International Trunk Rd.	1-1 Gulu/Amuru Dist. Border [Kali Kali] – Gulu - Gulu/Oyam Dist. Border [Karuma] (– Kampala)
	2. Inter-regional Trunk Rd.	2-1 Kitgum – Agago/Lira Dist. Border [Puranga] (– Lira – Kenya Border)
		2-2 Gulu – Acholibur [Pader Dist.]
		2-3 Kitgum [Pongdwongo] – Padibe [Lamwo] – South Sudan Border [Ngomoromo]
	3. Inter-district Trunk Rd.	3-1 Kitgum – South Sudan Border [Musingo]
		3-2 Oroko [connect to Atiak] – Kitgum
		3-3 Gulu – Rackoko [Pader Dist.]
		3-4 Coner Kilak – Adilang [Agago/Abim Dist. Border]
		3-5 Pajule – Pader – Kwon Kic
		3-6 Gulu – Ajulu – Pabbo Border [Unyama]
		3-7 Kitgum – Kalongo – Patongo – [Agago/Lira Dist. Border]
	4. Feeder Rd.	

Source: JICA Study Team

12. STRATEGIC ENVIRONMENTAL ASSESSMENT

12.1 Outline of Strategic Environmental Assessment

In the Master Plan Study, the Strategic Environmental Assessment (SEA) was adopted following the “JICA Guidelines for Environmental and Social Considerations (April 2010)”, which describes that the SEA is an environmental assessment at an earlier study stage prior to the EIA at project level. Thus the SEA is normally conducted at the policy making level or planning and programming level before the project level.

Based on this definition, JICA Study Team (JST) adopted the following basic policies for the SEA.

Assessment of environmental impacts at an earlier study stage, namely in the policy making level, with:

- Priority evaluation with indicators for the socio-economy, social services and the environment
- Comparison and evaluation of the priority alternatives and
- Involvement of stakeholders.

Specifically, JST took the following steps.

- i) Study of the current social and environmental conditions
- ii) Target policy set-up for SEA
- iii) Indicator set-up through legal requirements, study of literature, site reconnaissance, and discussions with environmental officials
- iv) Comparison and evaluation of alternatives of the Regional Trunk Road Network Priorities with likely impacts on social and natural environments and pollution
- v) Involvement of stakeholders in the working group meetings

12.2 Institutions and Legislation

12.2.1 Institutional Framework

The National Environmental Management Agency (NEMA) takes the main role for environmental impact assessment in Uganda. Other major authorities for the environmental management in Uganda are the Uganda Wildlife Authority (UWA) on protected areas,

National Forest Authority (NFA) on Central Forest Reserves, Directorate of Water Resources Management (DWRM) and Directorate of Environmental Affairs (DEA) on water resources.

12.2.1.1 National Environmental Management Agency (NEMA)

NEMA, which was established in the National Environment Act, Cap. 153 in 1995 is responsible for environmental management in Uganda. NEMA coordinates, monitors and supervises all activities in the field of the environment, mainly with the following activities.

- to coordinate the implementation of Government policy and the decisions of the policy committee
- to ensure the integration of environmental concerns in overall national planning through coordination with the relevant Ministries, departments and agencies of the Government
- to liaise with the private sector, intergovernmental organizations, nongovernmental agencies and governmental agencies of other States on issues relating to the environment
- to propose environmental policies and strategies to the policy committee;
- to initiate legislative proposals, standards and guidelines on the environment in accordance with National Environment Act, Cap. 153
- to review and approve environmental impact assessments and environmental impact statements submitted in accordance with the National Environment Act, Cap. 153

The Policy Committee on the Environment (PCE) consists of the following departments and the Environmental Monitoring and Compliance Department (D/EMC) is responsible for the EIA evaluation.

- District Support Coordination and Public Education Department (D/DSCPE)
- Environmental Monitoring and Compliance Department (D/EMC)
- Policy, Planning and Information Department (D/PPI)
- Finance and Administration Department (D/F&A)

12.2.1.2 Uganda Wildlife Authority (UWA)

The Uganda Wildlife Act Cap 200 is the legal basis for the conservation of wildlife, implemented through a system of wildlife conservation areas and protected species. Uganda Wildlife Authority (UWA) is a statutory body established by the Uganda Wildlife Act 2000. It became operational in August 1996 after the merger of the Game Department with the Uganda National Parks. A main task of UWA is management and conservation of wildlife in Uganda, both in and outside the wildlife protected areas (PAs) i.e. National Parks, Wildlife Reserves and Wildlife Sanctuaries.

The wildlife conservation areas are organized into 4 categories:

- The national parks, which is the highest category of protection. The executive director of UWA is, however, authorized to enter into agreements with partners, such as communities, and concessionaires of tourism facilities, in order to manage all or part of a protected area.
- The wildlife reserve, which is equivalent to a game reserve as it was known before 1996 in Uganda. The use of wildlife resources for consumption is possible under permission by the UWA.
- The community wildlife area (CWA), which is equivalent to the formerly called the controlled hunting area (CHA). It is a gazetted area where communities manage wildlife

together with UWA. In these areas activities such as human settlement and agriculture are allowed but should be compatible with the conservation of wildlife. They belong to IUCN category IV of protected areas.

- The wildlife sanctuary, which is public land, where the protection of certain species is recognized by law.

12.2.1.3 National Forest Authority (NFA)

The National Forestry and Tree Planting Act of 2003 mandates NFA to manage and safeguard the forest biological diversity in Uganda and the environmental benefits from forests and trees. NFA manages the Central Forest Reserves (CFR) on a sustainable basis and supplies high quality forestry-related products and services to the Government, local communities and the private sector to contribute to a sufficiently forested, ecologically stable and economically prosperous Uganda. The first major task of NFA was to restore the physical and legal integrity of CFRs by addressing the massive encroachment and stabilizing the timber market that had been seriously eroded by illegal harvesting and trade.

12.2.1.4 Ministry of Water and Environment (MoWE)

(1) Directorate of Water Resources Management (DWRM)

The Directorate of Water Resources Management (DWRM) is responsible for developing and maintaining national water laws, policies and regulations; managing, monitoring and regulation of water resources through issuing water use, abstraction and wastewater discharge permits; Integrated Water Resources Management (IWRM) activities; coordinating Uganda's participation in joint management of transboundary water resources and peaceful cooperation with Nile Basin riparian countries. The directorate comprises three departments, namely, the Department of Water Resources Monitoring and Assessments, Department of Water Resources Regulation and Department of Water Quality Management.

(2) Directorate of Environmental Affairs (DEA)

The Directorate of Environmental Affairs (DEA) is responsible for environmental policy, regulation, coordination, inspection, supervision and monitoring of the environment and natural resources as well as the restoration of degraded ecosystems and mitigating and adapting to climate change. DEA comprised the four departments of Environmental Support Services (DESS), Forestry Sector Support Department (FSSD), Wetlands Management (WMD) and the Department of Meteorology (DOM). DEA works in collaboration with the National Environmental Management Authority (NEMA) and the National Forestry Authority (NFA).

12.2.2 Legal Framework

12.2.2.1 Legislation for Environmental and Social Considerations in Uganda

Table 12.2-1 summarizes the legal framework for environmental and social considerations in Uganda. The National Environment Act by NEMA legislated in 1995 is the fundamental law to implement environmental impact assessments (EIA). The Environmental Impact Assessment Regulations in 1997 and the Environmental Impact Assessment Regulations in 1998 were also legislated to stipulate the procedure for EIA, methods, screening criteria, scoping process, and public consultations as the baseline of EIA implementation.

Table 12.2-1 Legal Framework for Environmental and Social Considerations in Uganda

Category	Title	Year of Enforcement	Competent Body
Environmental Impact Assessment	National Environment Act	1995	NEMA
	Guidelines for Environmental Impact Assessment in Uganda	1997	NEMA
	Environmental Impact Assessment Regulations	1998	NEMA
	Environmental Impact Assessment Guidelines for Road Projects	2008	MoWT
	Environmental Guidelines for District Engineers	2003	MoWT
Protected Areas	Wildlife Act	1996	UWA
	National Forestry Policy	2001	NFA
	The National Forestry and Tree Planting Act	2003	NFA
Water Resource Management	The Water Act	1997	GOU
	The National Environment (Wetlands, Riverbanks and Lakeshores Management) Regulations	2000	NEMA
Land Acquisition and Resettlement	The Constitution of the Republic of Uganda	1995	GOU
	Land Act	1998	GOU
	Land Acquisition Act	1965	GOU
	Land Acquisition Management System	2009	UNRA

Source: JICA Study Team

12.2.2.2 EIA Procedure for Road Projects in Uganda

The procedure for environmental assessment for road projects in Uganda is explained as follows and in Figure 12.2-1. A project proponent should firstly prepare a project brief to describe project activities, environmental conditions of the project site, expected environmental and social impacts and mitigation measures, and submit it to NEMA.

- Submission of Project Brief to NEMA and to Lead Agencies
- Consultation on Project Brief by NEMA and Lead Agencies (screening 1: whether project is exempt from EIA), screening 2: whether project requires mandatory EIA, screening 3: whether adequate mitigation measures have been incorporated)
- Certificate of approval of EIA if EIA is not required through the screening
- If EIA is required through the screening, Terms of references (TORs) of EIA are created after scoping and Stakeholder Consultations on Scope
- TORs are reviewed with NEMA, Lead Agencies and Stakeholder Consultations
- Environment Impact Study (EIS), Collection of Information, and Public and Stakeholder Consultations
- NEMA reviews and comments on EIS with lead agency and public comments
- Approval of EIS, Certificate of Approval of the EIA
- Action by developer with the certificate
- Developer monitors the project using the monitoring plan in the EIS, NEMA and lead agencies monitor the developer's activities

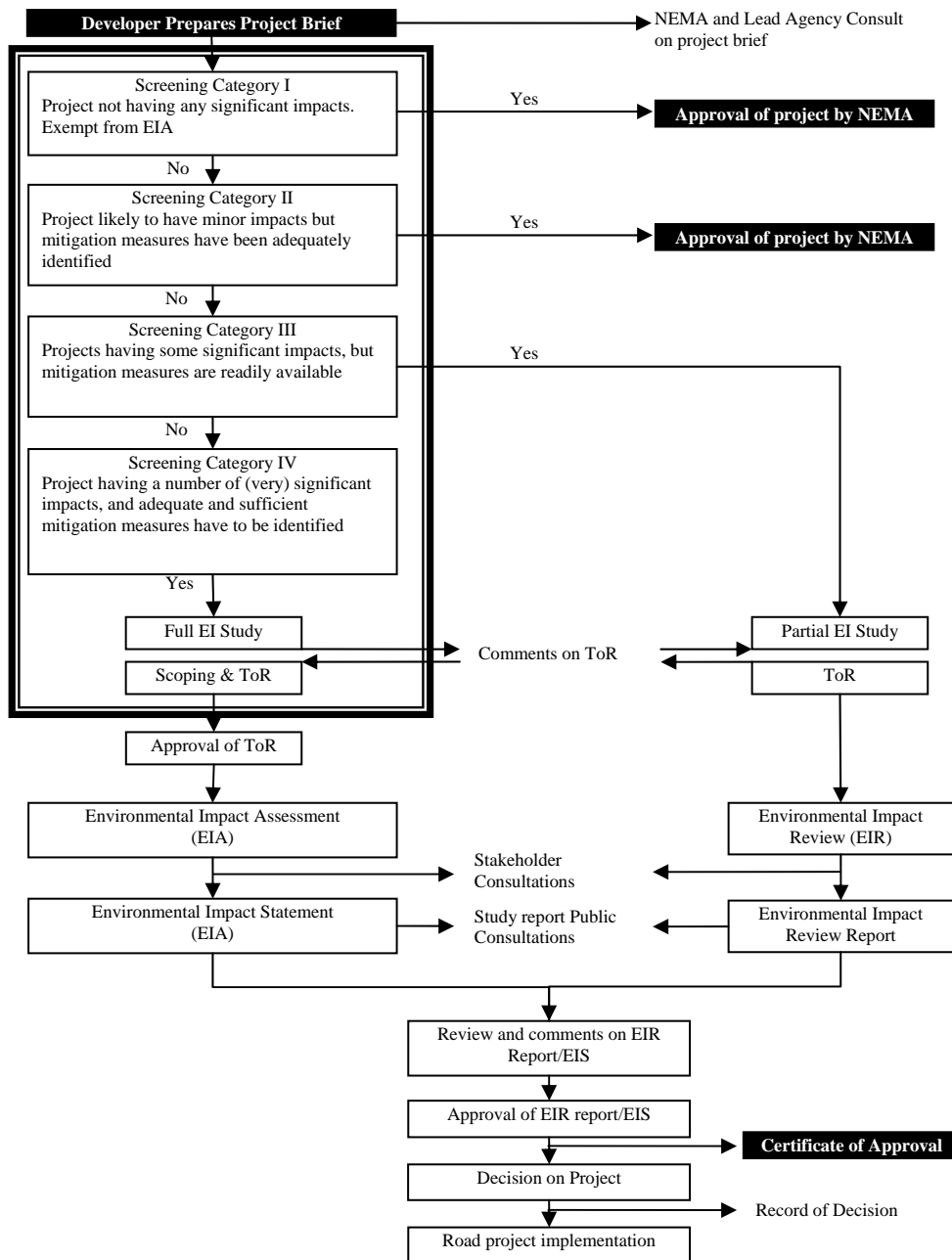
The Environmental Impact Assessment Guidelines for Road Projects provide detailed criteria regarding the EIA requirements in the road development sector. There are 4 basic criteria that guide the decisions about the EIA requirements for a project (Table 12.2-2), and these are:

- Case 1: Projects that certainly do not have any significant impact on the environment
- Case 2: Projects likely to have some minor impacts on the environment but for which adequate and sufficient mitigation measures have been identified
- Case 3: Projects that have some significant environmental impacts, where adequate mitigation measures are readily available
- Case 4: Projects having a number of (very) significant impacts on the environment (whether adequate mitigation measures can be identified or not)

Table 12.2-2 Conditions of EIA requirements

Class of project	EIA requirement	Approval of the project	Relevance for the project
Case 1	No further EIA processing	Certificate issued	NO
Case 2	No further EIA processing but an evaluation is done in the Project Brief with presentation of the measures	Certificate issued	YES
Case 3	A limited analysis is required	Environmental impact review (EIR) is required before issuance of certificate	YES
Case 4	A full environmental impact study is required	Full (EIA) or (EIS) is required before issuance of a certificate. The Project Brief step is not needed.	NO

Source: Summarized from the Environmental Impact Assessment Guidelines for Road Projects, 2008



Source: Environmental Impact Assessment Guidelines for Road Projects

Figure 12.2-1 EIA Process Flow for Road Projects

12.2.2.3 Strategic Environmental Assessment in Uganda

NEMA has been working to prepare guidelines for Strategic Environmental Assessment (SEA). The draft was made in 2006 and it consisted of two parts. The part 1 mainly described the general explanations of SEA and related legislation in Uganda. The Part 2 mainly explained policies of SEA, procedures, methodology and legal framework. However, the draft has not progressed since 2006 and the guidelines were not applied at the end of August 2011. NEMA reset the study and is going to start a new study for preparing the SEA guidelines.

12.3 Current Social and Environmental Conditions

12.3.1 Natural Environment

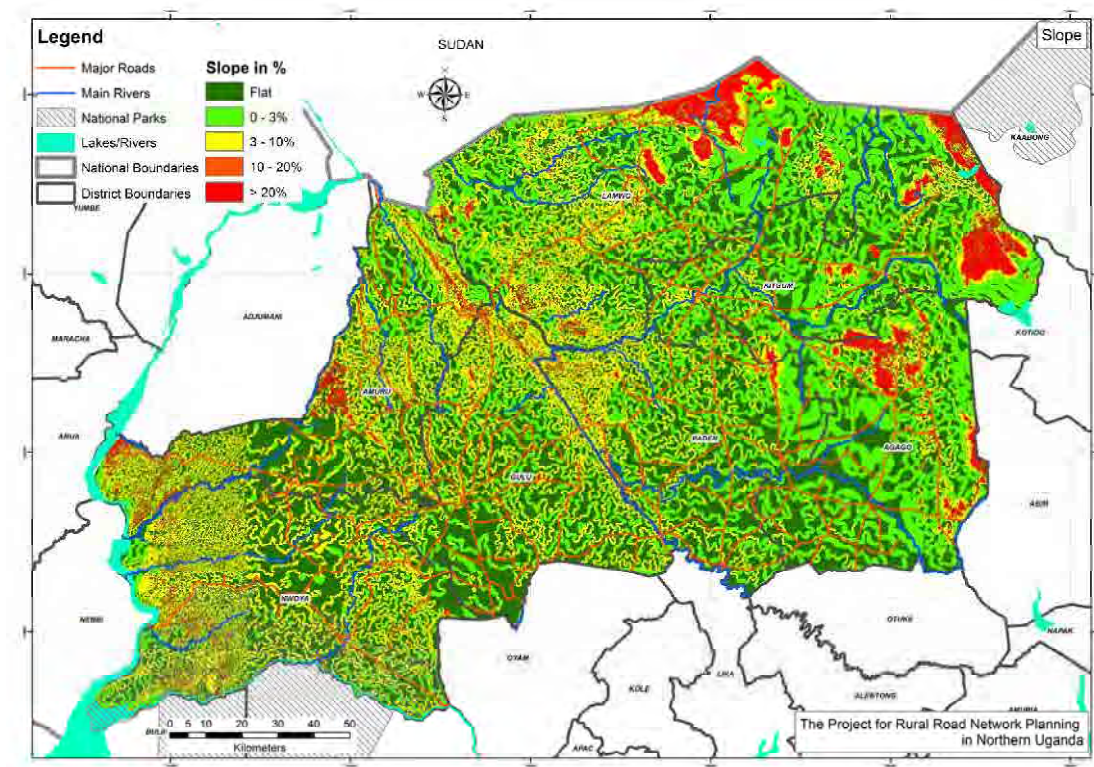
Topography and climate are mentioned in Chapter 3. Other environmental aspects are described in this section.

12.3.1.1 Geology

The soil of the region mainly consists of ferruginous soil with generally well-drained sandy, Clay, Loam and therefore is susceptible to erosion. The sandy soil has low water retention capacity and high rate of water infiltration. The major rock types are composed of remnants of low surfaces and scarps related to rift and sediments of the western rift valley. Tors and inselbergs can be seen in the region.

12.3.1.2 Slope

Figure 12.3-1 shows the slope condition in the Acholi Sub-region. There are few major roads which pass land over 10% slope angle. A western part of Atiak – Kitgum road runs through rather hilly land in the Sub-region.



Source: NFA, JICA Study Team

Figure 12.3-1 Slope Condition in the Study Area

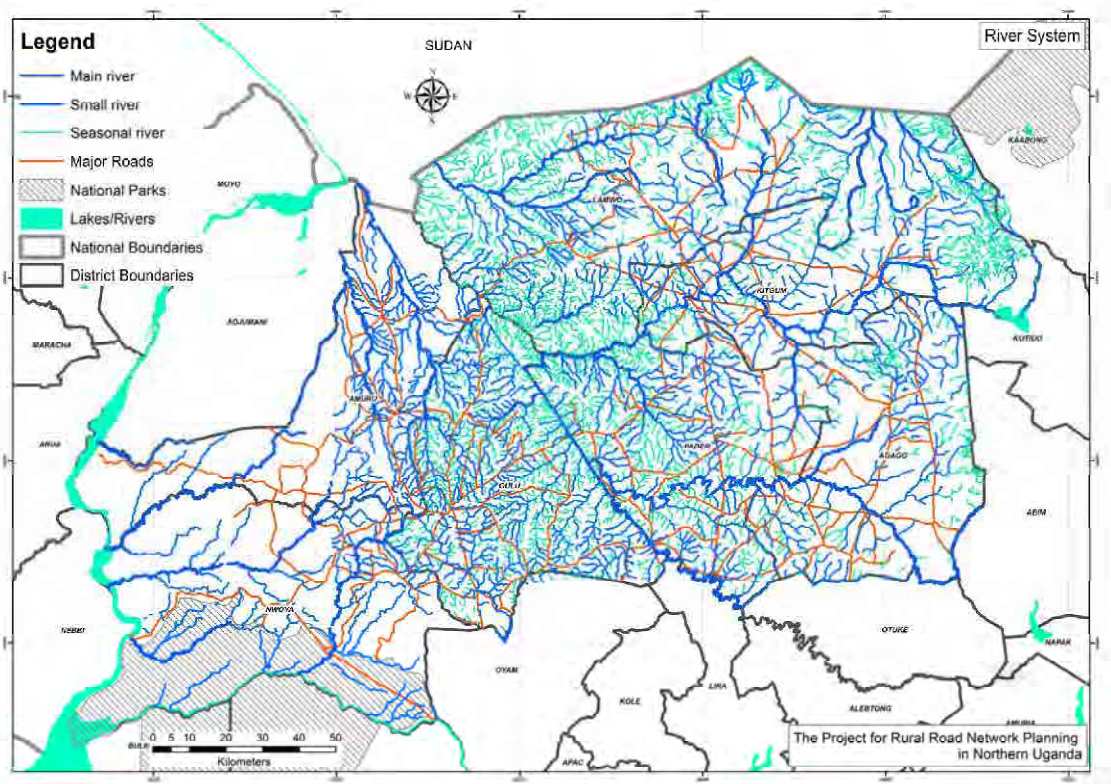
12.3.1.3 Hydrology

The crustal faulting, shearing and jointing influenced the drainage pattern in the region to form an arborescens hydrological pattern. Many rivers and streams form this hydrological pattern. Many rivers and streams are seasonal and dry in the dry season. The major river is Achwa River running along the district border of Gulu and Pader toward the White Nile. The other major rivers flow to Achwa River from the east and west. Agago River crosses Agago and

Pader districts to Achwa River. Aringa River and Nyimur River cross Kitgum and Nwoya districts.

There are two types of wetlands, permanent and seasonal ones, in the region. Permanent wetlands are mainly located along the major rivers. Papyrus is the typical vegetation of permanent wetlands. Considerable seasonal wetlands have been moderated for cultivation and grazing for live stock.

The Third Schedule of the National Environment (Wetlands, River Banks and Lake Shores Management) Regulations 2000 gives a list of 11 wetlands of international importance in Uganda and none of them are located in the region. Besides, there are no wetlands designated in the Ramsar convention and no legally defined wetlands are located in the region.



Source: NFA, WCS, JICA Study Team

Figure 12.3-2 River System in the Study Area

12.3.1.4 Flora, Fauna and Biodiversity

(1) Flora

Vegetation the region is intermediate savannah shrubs and grasslands which is found between the moist and the dry savannah. The typical tree species are Acacia, Focus Natalensis, Banasus, Aethicpum (Fanpalm). Common grasses are Imperate Cylindrica, Hypemaria Rufa, Digitria scalarum. However, human activities have interfered with the natural vegetation and consequently led to increase secondary vegetation like Eucalyptus, Jacaranda, Cupressus, Theruvaian, Pienes, Hibscus, Bougain Vilae.

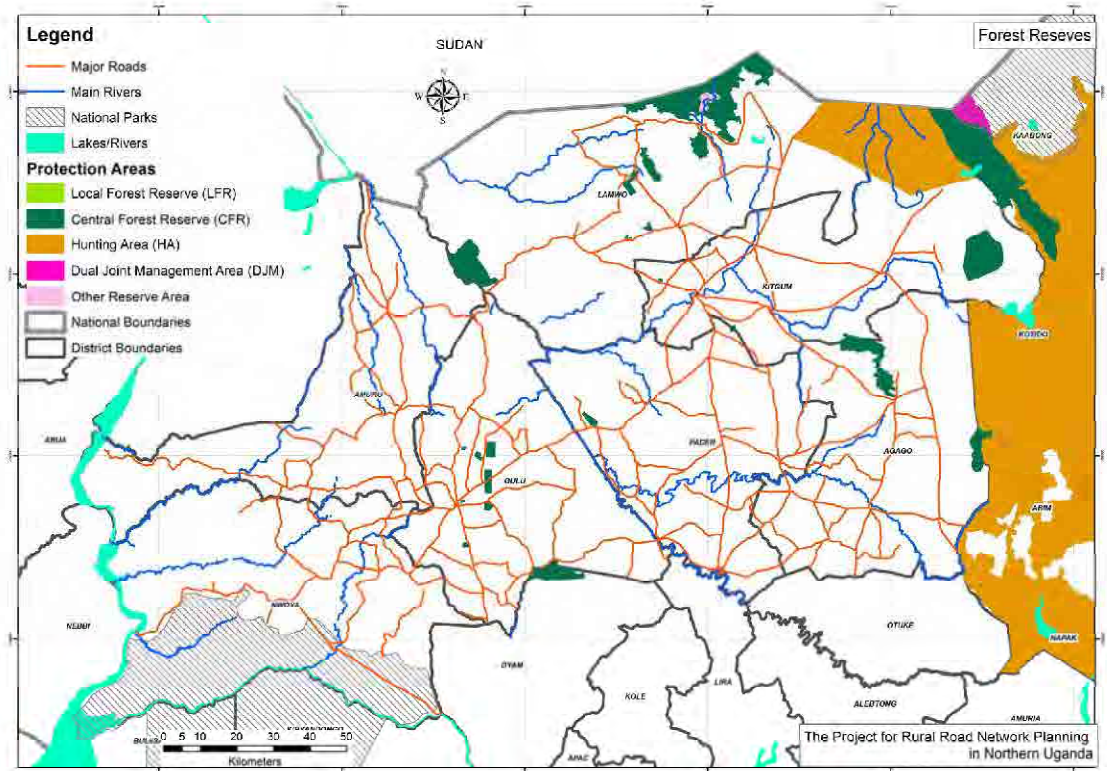
(2) Fauna

The region originally had considerable population of wild life animals such as Elephants, Buffaloes, Uganda Kobs, Duikers, Ostriches, and Guinea Fowls. However, the entire large

game herds have been seriously reduced due to human activities. Small animals still inhabit the bush and grassland.

(3) Wild Life Conservation Areas

There are no wild life conservation areas in the Study area. Two national parks, which are managed by UWA, are located in the neighbouring area. Murchison Falls National Park is located across Nwoya District in Acholi Sub-region, and Buliisa and Kiryandongo districts in Bunyoro Sub-region. The other is Kidepo Valley National Park, which is located in Kaabong District next to Lamwo District.



Source: NFA, WCS, JICA Study Team

Figure 12.3-3 Locations of Protected Areas in the Study Area

(4) Forest Reserves

The CFRs managed by NFA shown in Table 12.3-1 are located in the Study Area. NFA classified the CFRs into three functional types, 1) Ecological and Environmental Functions, 2) Industrial and Commercial Forest Plantations and 3) Local Fuel, Charcoal and Forestry Investments. Most CFRs along the major roads are classified for Industrial and Commercial Forest Plantations or Local Fuel, Charcoal and Forestry Investments. They tend to be encroached on by local people for cultivation.

- Ecological and Environmental Functions: i) Protection of fragile ecological landscapes which include steep hills, lakeshores, river banks and wetlands, ii) Conservation of biological diversity, iii) Maintenance of environmental health, iv) Protection of watersheds
- Industrial and Commercial Forest Plantations: i) Timber plantations, ii) Production of poles, iii) Production of fuelwood

- Local Fuel, Charcoal and Forestry Investments: smaller scale than the Industrial and Commercial Forest Plantations to supply local areas with forest products

Table 12.3-1 Forest Reserves in the Study Area

District	No.	Name	Sub-county	Area (ha)	Function
Gulu	1	Abera Major & Minor	Paicho	1,212	Industrial and Commercial Forest Plantations
	2	Abili	Koro	5	Local Fuel, Charcoal and Forestry Investments
	3	Amuka	Awach	1,101	Local Fuel, Charcoal and Forestry Investments
	4	Bobi	Bobi	5	Ecological and Environmental
	5	Lagute	Awach	332	Industrial and Commercial Forest Plantations
	6	Lukodi	Bungatira	163	Ecological and Environmental
	7	Opaka	Koro	210	Industrial and Commercial Forest Plantations
	8	Opit	Lalogi	5,102	Industrial and Commercial Forest Plantations
	9	Opok	Koro	536	Industrial and Commercial Forest Plantations
	10	Gulu Plantations	Laroo	94	-
Pader	11	Matidi	Acholibur	236	Local Fuel, Charcoal and Forestry Investments
	12	Ogom	Atanga	800	Local Fuel, Charcoal and Forestry Investments
Agago	13	Ogili	Omiya-Anyima/Wal	5,348	Local Fuel, Charcoal and Forestry Investments
	14	Parabongo	Parabongo	2,792	Local Fuel, Charcoal and Forestry Investments
	15	Napona	Napona	3,727	-
Lamwo	16	Achwa River	Ogili	8,459	Ecological and Environmental
	17	Agoro-agu	Agoro	26,508	Ecological and Environmental
	18	Aram	Padibe west	155	Local Fuel, Charcoal and Forestry Investments
	19	Aringa River	Agoro	44	Ecological and Environmental
	20	Lalak	Lukung/ Padibe East	2,212	Ecological and Environmental
	21	Lamwo	Lukung/ Padibe East	2,424	Ecological and Environmental
	22	Lukung	Lukung/ Padibe East	1,427	Ecological and Environmental
	23	Paonyeme	Padibe West/Palabek Gem	339	Ecological and Environmental
Kitgum	24	Kitgum A&B	Kitgum town Council	14	Ecological and Environmental
	25	Pajimu	Akwang	158	Local Fuel, Charcoal and Forestry Investments
	26	Rom	Orom	10,904	Ecological and Environmental
	27	Kitgum Matidi	Acholibur/Lagoro	236	-

Note: Amuru and Nwoya Districts are excluded

Source: NFA

12.3.2 Social Environment

The present conditions of the administrative system, demography, land use and social services are mentioned in Chapter 3. Other social environmental aspects are described in this section.

12.3.2.1 Economic Activities

(1) Gulu

Major food crops are maize, finger millet, sorghum, cassava, rice, sweet-potatoes, and beans. Rice, maize, finger millet, sorghum, peas and sesame are cash crops. Sunflower and groundnuts are oil crops. The average household production was also reduced due to their displacement. Traditional cash crops were cotton and tobacco, however, these productions have reduced drastically in the last 25 years due to decreasing prices and limited access to markets. Other cash crops have increased over the recent years.

Livestock (cattle) was a very important cash resource for school fees, security of family welfare and also as a source of protein for households. Cattle used to be used to plough the ground for cultivation. However, the cattle rustling which occurred between 1986 and 1988 worsened their economic activities. There are approximately 100 dairy farmers in the district. Before the displacement of people into the IDPs between 1997-2007, fish farming was a widespread economic activity, however, it is now limited.

Economic activity is basically agriculture and other related services like agro-marketing and agro-processing. There are also trade, tourism and limited services in transportation, education, and health. Major farming is under Cooperative Societies in dairy, SACCOS (Saving and Credit Cooperative Societies) and unions while the rest are Producer & Marketing societies of various crops like cotton and tobacco.

(2) Kitgum/Lamwo

The same as in the other districts in the Sub-region, over 90% of the farmers are engaged in crop production and a small percentage in livestock rearing, bee keeping and fish farming on small family holdings using family labour. They use primitive hand tools such as hoes mostly for home consumption and part of it is sold for basic domestic requirements. The major crops are sesame, upland rice, green Vegetables, fruit trees (Citrus/Mangoes), beans, groundnuts, sorghum, maize, millet, cassava, sweet potatoes, pigeon peas and sunflower. Cotton and tobacco are the major traditional cash crops. Domestic animals are also reared, which include cattle, goats, pigs, sheep and chickens.

Petty trading is also carried out in locally manufactured and imported goods. The industrial sector is still small-scale and mainly in agro processing industries for milling of grains (maize, sorghum, millet, rice) and cassava. There is a cotton ginnery in Kitgum Town.

(3) Pader/Agago

Around 90% of the populations are subsistence farmers whose labourers for cultivation are provided by the family and community on a rotational basis. The average land holding per household is 2 hectares.

The main food crops grown are finger millet, maize, sorghum, cassava, peas, beans, grams and vegetables. The traditional and non-traditional cash crops grown are cotton, tobacco, soya beans, sesame, rice, sunflower and groundnuts. Other activities of the primary industry are wild fish hunting, fish farming (aqua culture), bee keeping (apiculture), and livestock and poultry rearing. The districts intend to promote cultivation of new crops like coffee, bananas, pineapples, citrus fruits, mangoes and passion fruits.

Local peoples over fish the natural water bodies and this will affect future yields from them. It will eventually deplete fishes if not regulated. Fish farmers' skills are still at a low level and this can further degrade the infrastructure for fish farming.

Livestock activities were adversely affected by the insurgency and livestock was depleted by the rebels and the Karimojong cattle rustlers. As a result, the livestock sub-sector suffered a serious setback. However, as the security situation recovers, restocking activities have been facilitated and livestock populations have steadily increased.

12.3.2.2 Average Household Size

The average household size of the Northern Region was estimated at 5.2 persons, which was equivalent to the rural area in the country. It remained the same from 2005/06 to 2009/10.

Table 12.3-2 Average Household Size

Residence/Region		2002/03	2005/06	2009/10
Residence	Rural	5.3	5.3	5.2
	Urban	4.1	4.6	3.9
Region	Central	4.8	4.8	4.1
	Eastern	5.5	5.6	5.6
	Northern	5.1	5.2	5.2
	Western	5.2	5.3	5.1
Uganda		5.1	5.2	5.0

Source: Uganda National Household Survey 2009/10 (UBOS)

12.3.2.3 Household Income and Expenditures

(1) Average Monthly Household Income

According to the Uganda National Household Survey 2009/10, the average monthly household income of the Northern Region was 141,400 Ushs., and this was the lowest level in the country, which was about half of the national average. The increase in average monthly household income was more notable in the Northern Region at only 51% increase while the country showed 78% increase from 2005/06 to 2009/2010.

According to the classification of average monthly household income, the total share of classes below 200,000 Ushs. in the Northern Region was 84% while the national share was 68%, which was the highest level in the country.

Table 12.3-3 Average Monthly Household Income

Location	2005/06		(Ushs.)	2009/10			(Ushs.)
	Rural	Urban	Total	Rural	Urban	Total	
Kampala	-	347,900	347,900	-	959,400	959,400	
Central	192,600	320,200	209,300	336,800	603,800	389,600	
Eastern	144,100	261,700	155,500	151,400	361,000	171,500	
Northern	76,200	209,000	93,400	117,200	361,200	141,400	
Western	144,200	313,100	159,100	282,300	479,000	303,200	
Uganda	142,700	306,200	170,800	222,600	660,000	303,700	

Source: Uganda National Household Survey 2009/10 (UBOS)

Table 12.3-4 Household Income Classes 2009/10 (%)

Residence/Region		Income Classes (,000)						Total
		Up to 50	50-100	>100-200	>200-300	>300-500	>1,000	
Residence	Rural	25.4	22.1	25.7	10.4	8.4	8.0	100.0
	Urban	11.8	14.6	19.5	11.2	15.1	27.9	100.0
Region	Kampala	7.8	10.2	16.7	14.7	14.7	36.0	100.0
	Central	15.9	16.9	23.7	13.4	12.9	17.3	100.0
	Eastern	32.2	21.9	25.3	8.4	7.0	5.2	100.0
	Northern	36.4	29.9	17.9	6.5	4.8	4.5	100.0
	Western	13.3	19.0	32.1	12.1	11.7	11.8	100.0
Uganda		22.9	20.7	24.5	10.5	9.7	11.7	100.0

Source: Uganda National Household Survey 2009/10 (UBOS)

(2) Consumption Expenditures per Household

Consumption expenditures per household of the Northern Region were 152,200 Ushs. in 2009/10, and this was the lowest level in the country, which was about 65% of the national average. The increase in expenditures per household was more notable in the Northern Region at 34% increase while the country showed a 10% increase from 2005/06 to 2009/2010.

Table 12.3-5 Consumption Expenditures per Household (2005/06 prices)

Location	2005/06			2009/10		
	Rural	Urban	Total (Ushs.)	Rural	Urban	Total (Ushs.)
Kampala	-	462,550	462,550	-	475,500	475,500
Central	233,800	383,500	253,800	258,450	418,200	291,250
Eastern	166,500	294,200	178,900	187,000	251,950	193,400
Northern	97,200	208,850	111,700	136,850	271,500	150,200
Western	191,500	341,650	205,250	201,400	286,400	210,450
Uganda	176,600	372,500	210,750	197,500	384,350	232,700

Source: Uganda National Household Survey 2009/10 (UBOS)

12.3.2.4 Housing Conditions

(1) Household Cooking Fuel

A total of 87.6% of the households in the Northern Region used firewood as the main source of energy for cooking and this was the highest share in the nation while the national average was 73%. Charcoal was used in 10.5% of the households in the Northern Region, however, it was used more in urban areas such as Kampala or the Central Regions. Charcoal is still a common cooking fuel in urban areas (69.8%). In the Northern Region, both shares decreased from 2005/06 while other alternative fuels like kerosene, electricity or gas increased.

Table 12.3-6 Household Cooking Fuel (%)

Residence/Region		2009/10					
		Firewood	Charcoal	Kerosene	Electricity	Other	Total
Residence	Rural	86.3	10.4	1.7	0.3	1.3	100.0
	Urban	15.4	69.8	4.9	1.6	8.2	100.0
Region	Kampala	2.4	74.5	7.8	3.4	11.9	100.0
	Central	57.8	36.4	1.7	0.4	3.7	100.0
	Eastern	85.2	11.3	1.7	0.4	1.4	100.0
	Northern	87.6	10.5	0.8	0.2	1.0	100.0
	Western	84.2	10.8	3.1	0.4	1.5	100.0
	Uganda	73.0	21.5	2.3	0.6	2.6	100.0
		2005/06					
Residence	Rural	89.4	8.2	0.8	0.1	1.6	100.0
	Urban	22.9	66.1	3.5	0.8	6.8	100.0
Region	Kampala	5.8	77.7	5.2	1.4	9.9	100.0
	Central	70.2	24.5	2.0	0.2	3.2	100.0
	Eastern	86.1	11.4	0.7	0.1	1.7	100.0
	Northern	88.3	10.7	0.4	0.0	0.7	100.0
	Western	89.5	7.8	0.5	0.1	2.1	100.0
	Uganda	77.8	18.2	1.2	0.2	2.5	100.0

Source: Uganda National Household Survey 2009/10 (UBOS)

(2) Type of Toilet Facility

A pit latrine was the majority of the types of toilets in the Northern Region the same as in the rest of the country although the share was 72.9% which was lower than the national level at 85.5%. It is notable that the Northern Region had the largest number of households which did not use any toilet facilities at 25%. Furthermore, the rate increased from 21% in 2005/06.

Table 12.3-7 Type of Toilet Facilities of Households (%)

Residence/Region		2009/10				Total
		Pit Latrine	V.I.P*	Flush	Bush/No toilet	
Residence	Rural	86.8	2.5	0.3	10.3	100.0
	Urban	80.0	8.6	10.2	1.3	100.0
Region	Kampala	87.4	7.6	3.2	1.8	100.0
	Central	75.9	10.0	14.1	0.0	100.0
	Eastern	86.1	1.9	0.6	11.4	100.0
	Northern	72.9	1.9	0.3	24.9	100.0
	Western	95.7	1.2	0.8	2.3	100.0
	Uganda	85.5	3.7	2.2	8.7	100.0
2005/06						
Residence	Rural	85.7	1.9	0.2	12.2	100.0
	Urban	86.1	5.4	5.8	2.7	100.0
Region	Kampala	85.2	4.6	9.1	1.1	100.0
	Central	90.4	4.0	0.6	5.0	100.0
	Eastern	81.6	1.2	1.0	16.2	100.0
	Northern	75.4	3.2	0.1	21.2	100.0
	Western	93.5	0.9	0.4	5.2	100.0
	Uganda	85.8	2.5	1.1	10.6	100.0

Note: *V.I.P (Ventilated Improved Pit Latrine)

Source: Uganda National Household Survey 2009/10 (UBOS)

12.3.2.5 Cultural heritage

There are no prominent cultural heritage sites in the region. There is Baker's Fort in Gulu District (Patiko Sub-county), which is a historical asset. Regarding intangible cultural heritages, there are Kalkwaro which is a traditional administrative system headed by a paramount chef that conquered Acholi Sub-region, cultural dances/regalia, and spiritual rituals. There are also traditional cultural sites called "Shrines", burying grounds of chiefs and possibly graves on the road sides.

12.3.3 Major Environmental Problems and Issues

12.3.3.1 Urban Areas and Human Settlements

Population growth pressure with a higher annual population growth rate at 3.8%¹ in the average of the Sub-region without job/business opportunities except subsistence farming and lack of proper social services are the major reasons for the poverty and it tends to affect the regional environment. In the urban areas of district centres and trading centres, economic activities are more intense and social services are better than in the rural areas. However, they have higher population density with insufficient infrastructure systems and this causes poor conditions of hygiene and sanitation, especially due to lack of solid and liquid waste management and infrastructure.

¹ Annual growth rate 2001 – 2010 (UBOS)

Gulu town has a lower annual growth rate (2.8%), however, many South Sudan shoppers and trader have recently visited Gulu Town from the Nimule border and economic activities are being stimulated in Gulu. Kitgum Town, the second largest service centre in the Sub-region, has a higher annual growth rate (4.0%) and the built-up area is expanding. If their economic activities are accelerated without attention to the other areas, migration toward Kitgum can increase. Consequently, it will accelerate deterioration of hygiene and sanitation without any progress on the infrastructure improvement.

Table 12.3-8 Environmental Problems in Urban Areas

Problems	Consequences	Development Issues
<ul style="list-style-type: none"> • Waste water discharge without treatment • Litter (polythene bags, pet bottles, papers) • Burning of solid waste in town • Poor waste management • Lack of waste disposal sites • Lack of knowledge to reduce waste 	<ul style="list-style-type: none"> • Offensive odours • Poor condition of hygiene and sanitation • Obstruction of drainage and over flow of rain water • Deteriorated landscape • Worsening intestinal worm disease and diarrhoea 	<ul style="list-style-type: none"> • Develop sewage and drainage system • Develop solid waste management system (transportation system, dumping sites) • Provide discharging guidelines, distribution and promotion • Facilitate community participation for cleaning public spaces • Promote awareness on the solid waste management and the environment • Facilitate women's involvement in solid waste management

Source: Five Year District Development Plans (FY 2011/12-2015/16) of 5 districts, JICA Study Team

12.3.3.2 Socio-economy

As mentioned in the socio-economic activities above, subsistence agriculture dominates the regional economy. Small-scale agro processing industries, grinding mills, yogurt making and rice hullers, are the major manufacturing industries. Service industries are growing, especially in Gulu and Kitgum towns. There are no large-scale economic activities that affect the regional environment.

In the subsistence economic activities, the situations of household income and expenditures reveal that the local households are still in the poorest level in the country. Housing conditions are also poor and they consume firewood for cooking fuel with primitive three stones kitchen ranges. Charcoal is also commonly used, especially in urban areas, which is an immediate cash source for the households because they can produce it quickly without skill.

This situation causes great consumption of trees in the Sub-region and it is leading to deforestation and loss of vegetation. Charcoal is in high demand, especially for urban households and the service sectors, and consumption even in South Sudan. The firewood is also consumed to produce a fuel for burning. This poses a great threat to the natural environment that could lead to deforestation and loss of vegetation leading to soil erosion, reduction of soil fertility and land degradation.

The agricultural productivity level is still low because of the high cost of inputs for farming and inaccessibility to modern farming technologies. The current practices cannot maintain soil fertility and productivity. Meanwhile, the farmers are out of marketing measures. Market information and storage are not available and the farmers produce mostly the same crops in the same seasons. Besides, the farmers are depending on middlemen for selling the products. Low quality products and high competition without marketing measures reduces the product prices. The entire situation reduces the income level of the local households and it also accelerates felling trees and producing charcoal.

The national and district roads have low reliability and poor drainage facilities. Community access roads are also not maintained well. This reduces the mobility of farmers and merchants to markets.

Table 12.3-9 Environmental Issues from the Socio-economy perspective

Problems	Consequences	Development Issues
<ul style="list-style-type: none"> • Primitive traditional farming methods • Produce same crops at the same season • Lack of marketing for agricultural products • High dependence on middlemen • Poor physical access to local markets • High dependence on extraction of forest products for fuel wood and charcoal 	<ul style="list-style-type: none"> • Low price of agricultural products and low income for farmers • Low productivity • Deforestation • Loss of vegetation cover • Reduced soil fertility 	<ul style="list-style-type: none"> • Diversification of agricultural products • Develop agro-processing products • Improve farming technologies • Improve, maintain and rehabilitate the roads and the drainage structures to the markets (trading centres) • Develop/improve cooperative systems to obtain fair market information and management systems for shipping and storing products • Develop storage facilities to minimize post harvest losses and ensure household food security • Develop irrigation systems to ensure year round production • Improve micro finance systems
<ul style="list-style-type: none"> • Land degradation • Soil erosion 	<ul style="list-style-type: none"> • Reduced soil fertility • Deterioration of agricultural productivity 	
<ul style="list-style-type: none"> • Deforestation 	<ul style="list-style-type: none"> • Destruction of suitable habitat for beekeeping 	
<ul style="list-style-type: none"> • Drying of boreholes and rivers 	<ul style="list-style-type: none"> • Lack of clean water 	<ul style="list-style-type: none"> • Develop water sources
<ul style="list-style-type: none"> • Lack of latrines in households, schools and public places • Lack of medical services and drugs 	<ul style="list-style-type: none"> • Poor condition of hygiene and sanitation • Deteriorated health condition 	<ul style="list-style-type: none"> • Facilitate latrine construction • Improve medical services in equipment, facilities and human resources

Source: Five Year District Development Plans (FY 2011/12-2015/16) of 5 districts, JICA Study Team

12.3.3.3 Natural Environment

Natural resources around the former IDPs have especially been over-exploited due to increased demand for fuel wood and charcoal for both domestic and commercial purposes. Also due to the nature of residential houses in the former camps, the trees, grass and soil have been greatly used as construction materials. In addition, due to limited sources of revenue for the community many more fragile ecosystems around the wetlands and riverbanks among others have been encroached on and degraded.

The IDPs depleted trees in forest reserves for firewood and charcoal, which they sold to earn income in the course of struggling for survival. The percentage change in tree cover in forest reserves that were replanted by the NFA on average stands at 60%.

The main source of safe drinking water in the District is underground water obtained through drilling of boreholes, shallow wells and spring protection.

According to district health offices, Malaria is the most common disease for both out patients under five years old and five years old/above. ARI (acute respiratory illness) follows it and other diseases are Intestinal Worms, Skin diseases, Diarrhoea, Eye infections, Trauma (mental illness), and ENT conditions (ear, nose and throat). The most common cause of mortality is HIV/AIDS for all persons. Dust and water pollution can exacerbate respiratory diseases and water-related diseases.

Table 12.3-10 Environmental Issues in Nature

Problems	Consequences	Development Issues
<ul style="list-style-type: none"> • Indiscriminate tree cutting • Collection of fuel wood • Collection of wood for production of charcoal and building materials (timbers) • Bush clearing for cultivation • Farmers encroaching on forest reserve 	<ul style="list-style-type: none"> • Deforestation • Loss of vegetation cover 	<ul style="list-style-type: none"> • Diversification of agricultural products • Improve farming technologies • Develop alternative economic activities • Promote re-plantation programs • Sensitization for communities • Dissemination of the guidelines for the communities
<p>Wetlands reduction and degradation by:</p> <ul style="list-style-type: none"> • Cultivation • Settlement construction • Waste dumping • Siltation • Bush burning in dry season • Grazing 	<ul style="list-style-type: none"> • Reduced aquatic resources and products for the local people (mudfish, edible rats) • Reduced flora, fauna and biodiversity • Deteriorated natural drainage systems, flood protection and purification of wastewater 	
<ul style="list-style-type: none"> • Population pressure for cultivation (crop harvest for example, millet, maize, sorghum, cassava) • Brick production • Overstocking and over grazing of livestock • Bush burning 	<ul style="list-style-type: none"> • Land degradation • Reduced soil fertility and productivity 	
<p>Decrease of fishes in rivers, streams, and wetlands by:</p> <ul style="list-style-type: none"> • Wetland reclamation • Water siltation • Poisoning fishing method with herbs 	<ul style="list-style-type: none"> • Loss of livelihood • Devastated biodiversity 	
<ul style="list-style-type: none"> • Wetland degradation • Poor sanitation (construction of temporary latrines) • Poor waste management around the water sources • Poor maintenance of the existing water points • Grazing of animals around water sources • Poor drainage from and to the water sources • Lack of cooperation among the community and their leaders 	<ul style="list-style-type: none"> • Water pollution • Worsen water-related diseases (diarrhoea) • Congestion around limited safe water sources 	
<ul style="list-style-type: none"> • Climatic change • Deforestation • Wetland reclamation • Soil moisture lost 	<ul style="list-style-type: none"> • Drought 	
<ul style="list-style-type: none"> • Land degradation • Lack of agricultural technique • Loss of vegetation cover • Lack of maintenance of earth roads • Abandoned borrow pits 	<ul style="list-style-type: none"> • Soil erosion • Water siltation 	
<ul style="list-style-type: none"> • Dust from earth roads and abandoned borrow pits 	<ul style="list-style-type: none"> • Air pollution • Worsening respiratory diseases 	<ul style="list-style-type: none"> • Road improvement and maintenance
<ul style="list-style-type: none"> • Direct discharge of domestic waste water and night soil • Livestock excretion • Siltation • Flood 	<ul style="list-style-type: none"> • Surface water and ground water contamination 	<ul style="list-style-type: none"> • Develop sewage and drainage system

Source: Five Year District Development Plans (FY 2011/12-2015/16) of 5 districts, JICA Study Team

12.4 Strategic Environmental Assessment (SEA)

12.4.1 Target Policy for SEA

12.4.1.1 Outcomes of the Study

The overall goal of the Study is to accelerate IDPs return process and to improve the livelihood of the people who will/have return(ed) to their homeland areas and hence enhance regional development in Northern Uganda. In order to achieve this, the following outcomes of the Study are established. The targets of the outcomes in the mid-term of Study schedule are the rural road networks in Acholi Sub-region. The most important network is for the target year of 2018 leading to the high prioritized projects at the end of Study.

- The master plan for the rural road network in Acholi Sub-region, with the target year of 2018 as mid term
- The master plan for the rural road network in Acholi Sub-region, with the target year of 2030 as long term
- The high prioritized projects shall be identified, followed by applications for fund acquisition
- GIS data shall be developed and utilized to make visual and persuasive applications

12.4.1.2 Target Policy for SEA

The rural road networks in Acholi Sub-region have been given functional road classifications and are proposed mainly based on the traffic survey, the traffic demand forecast, and road condition survey. The regional development plan is also considered following the regional development strategies, the roles of nodes (service centres) and the road network.

Meanwhile, according to the results of the present traffic survey, traffic demand forecast and the road inventory;

- The existing road network can accommodate the future traffic demand, which means
- No new roads will be required,
- No expansion of traffic lanes will be required,
- Consequently, no drastic changes are expected from the present network, and
- No drastic environmental changes or serious negative impacts are expected by trunk road improvement activities.

In these conditions, no new road network patterns are necessary, and focusing on the identification of high prioritized projects in the final stage, the important policy of the rural road network is the prioritization of the networks in 2018. Considering the strategies of the Regional Development Plan, the regional trunk road networks to link the region internationally and intra-regionally should be focused on for the priorities. Thus, the priority of the regional trunk road networks in 2018 is intended as the subject of the Strategic Environmental Assessment (SEA).

12.4.2 Regional Trunk Road Network Policy Set-up




To prioritize the regional trunk road networks, the regional trunk road networks in 2018 were set up as follows. The networks were derived from the Regional Development Plan and the Road Network Development Plan.

12.4.2.1 Regional Trunk Road Network 2018

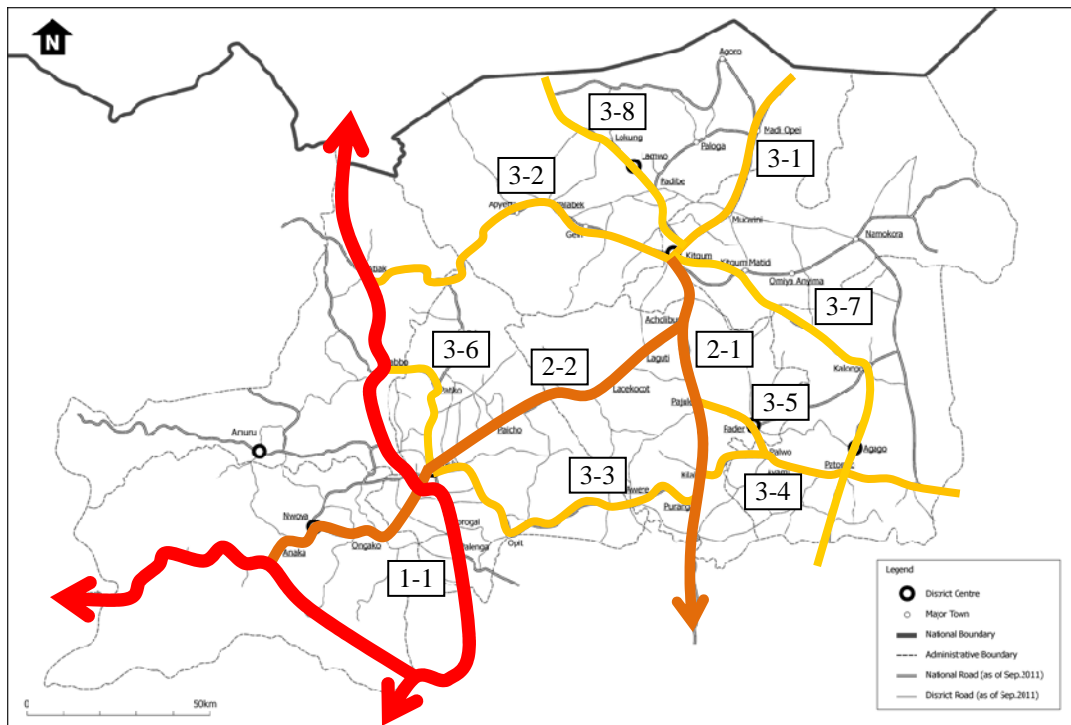
Network

The regional trunk road networks for 2018 are proposed as follows.

Table 12.4-1 List of Regional Trunk Road Network 2018

Functional Road	No.	Subject Section
	1-1	Gulu/Amuru Dist. Border [Kali Kali] – Gulu - Gulu/Oyam Dist. Border [Karuma] (- Kampala)
	2-1	Kitgum – Agago/Lira Dist. Border [Puranga] (- Lira – Kenya Border)
	2-2	Gulu – Acholibur [Pader Dist.]
	3-1	Kitgum – South Sudan Border [Musingo]
	3-2	Oroko [connect to Atiak] – Kitgum
	3-3	Gulu – Rackoko [Pader Dist.]
	3-4	Coner Kilak – Adilang [Agago/Abim Dist. Border]
	3-5	Pajule – Pader – Kwon Kic
	3-6	Gulu – Ajulu – Pabbo Border [Unyama]
	3-7	Kitgum – Kalongo – Patongo – [Agago/Lira Dist. Border]
	3-8	Kitgum [Pongdwongo] – Padibe [Lamwo] – South Sudan Border [Ngomoromo]

Source: JICA Study Team



Source: JICA Study Team

Figure 12.4-1 Regional Trunk Road Network 2018

Strategy

2018 Target: Improvement of Trunk Roads and Approaches to the District Centres to increase Year-round Accessibility and Reliability

- National Road Projects → Level I (Improvement): Tarmac paving, Partial widening, Embankments




- District Road Projects (resolution for bottlenecks) → Level II (Rehabilitation): Graveling, Culverts
- Urban Road Projects (Gulu, Kitgum, Pader), integration of bus terminals → Level I (Improvement): Tarmac paving
- CAR Projects → Level III (Maintenance): Grading, Pothole filling, Mowing

12.4.2.2 Regional Trunk Road Network 2030

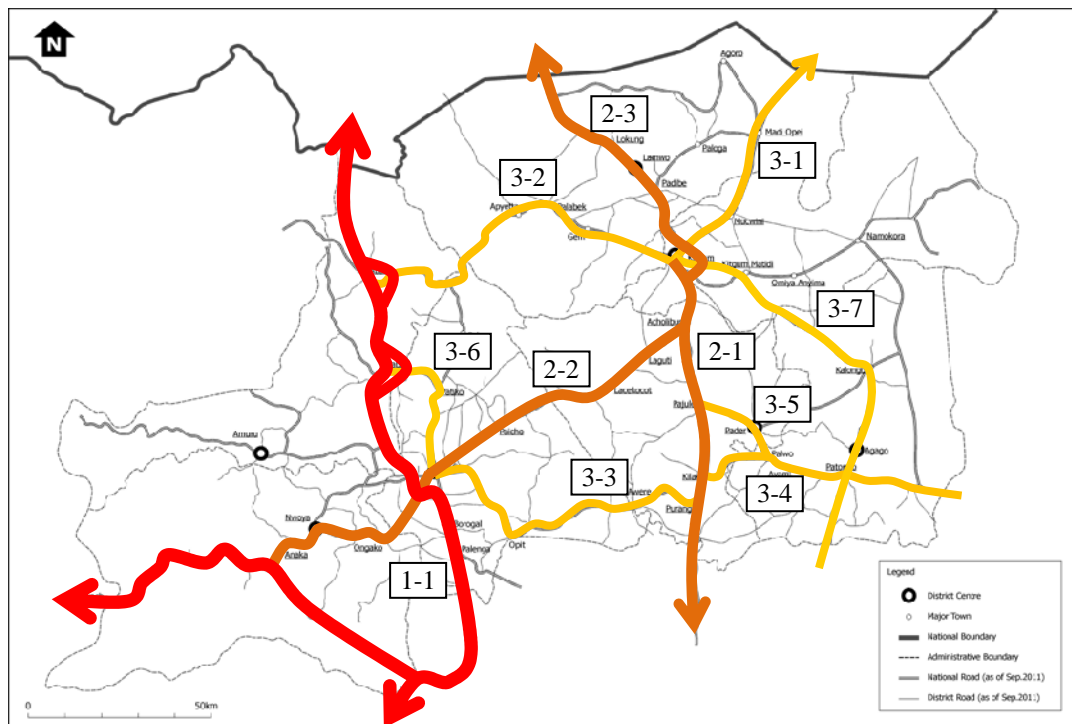
Network

The regional trunk road networks for 2030 are proposed as follows.

Table 12.4-2 List of Regional Trunk Road Network 2030

Functional Road	No.	Subjected Section
	1-1	Gulu/Amuru Dist. Border [Kali Kali] – Gulu - Gulu/Oyam Dist. Border [Karuma] (– Kampala)
	2-1	Kitgum – Agago/Lira Dist. Border [Puranga] (– Lira – Kenya Border)
	2-2	Gulu – Acholibur [Pader Dist.]
	2-3	Kitgum [Pongdwongo] – Padibe [Lamwo] – South Sudan Border [Ngomoromo]
	3-1	Kitgum – South Sudan Border [Musingo]
	3-2	Oroko [connect to Atiak] – Kitgum
	3-3	Gulu – Rackoko [Pader Dist.]
	3-4	Coner Kilak – Adilang [Agago/Abim Dist. Border]
	3-5	Pajule – Pader – Kwon Kic
	3-6	Gulu – Ajulu – Pabbo Border [Unyama]
	3-7	Kitgum – Kalongo – Patongo – [Agago/Lira Dist. Border]

Source: JICA Study Team



Source: JICA Study Team

Figure 12.4-2 Regional Trunk Road Network 2030

Strategy

2030 Target: Facilitation of High Mobility

- National Road Projects (Lira-Kitgum-South Sudan Border) → Level I (Improvement): Tarmac paving, Partial widening, Embankment
- Enhancement of the International Trunk Roads (High-standard Improvement of Gulu-Atiak-Nimule Road, Bypasses at Pabbo and Atiak → Level I (Improvement): Bypass
- District Road Projects (High-standard Improvement to strengthen the linkages among the districts) → Level I (Improvement): Tarmac paving, Partial widening, Embankment

12.4.3 Priority of the Regional Trunk Road Networks 2018

Based on the regional trunk road network for 2018, three alternatives were set up with quantification and scoring of the indicators for the trunk road network. Environmental indicators were also considered for SEA. In the discussions with the district officers in the working group meetings, visibility and explicitness were important and the scoring was appropriate to them. Data availability was also considered for quantification and scoring of the indicators to be evaluated evenly. For items of the environmental indicators, the present environmental issues and legal requirements were also considered.

12.4.3.1 Indicator Set-up for Priority Evaluation

(1) Socio-economic Indicators

For the prioritization of regional trunk road networks, indicators of economic and social service factors were set-up to follow the Regional Development Plan and Road Network Development Plan.

The socio-economic indicators were set-up as follows.

Economic indicators

- Traffic Volume: Intermediate value of traffic demand 2018 (forecast by the JICA Study Team)
- Population/km ratio: Populations in 2018 of the sub-counties that the trunk road section passes through (estimated by the JICA Study Team with UBOS data up to 2017)
- Agricultural productivity: The average grades of agricultural productivity of the sub-counties that the section passes through (the grading of sub-counties was studied by the JICA Study Team in Chapter 10)
- Land Suitability: Under study (studying in Chapter 10)

Social service indicators

- School number/km ratio: Number of schools located within 1km of the trunk road sections (data source: UNOCHA)
- Health Center Number/km ratio: Number of health centres located within 1km of the trunk road sections (data source: UNOCHA)

(2) Environmental Indicators

For the environmental factors, forests, wetlands, resettlement and slope were suggested as the indicators in the policy making level along with the legal requirements and the present environmental problems. JST also discussed the environmental indicators with NEMA, UNRA and district environmental officers.

The environmental indicators were set-up as follows.

- Wetland/River Length (%): The length of wetlands, rivers, and streams along the trunk road sections (surveyed by the JICA Study Team, the lengths of bridges and culverts from the road condition survey were included as they are regarded as the width of the rivers and streams along the trunk road sections)
- Forest Length (%): The length of forests (especially Central Forest Reserves) along the trunk road sections (surveyed by the JICA Study Team and based on NFA maps)
- Trading Centre (TC) Length (%): The lengths of TCs along the trunk road sections as a potential resettlement factor (surveyed by JICA Study Team)
- Slope: The existence of over 10% slope angle in the road sections (data source: NFA map); the slope angles are according to the NFA topography map

1) Legal Requirements

From the following environmental legal requirements, forests, wetlands, rivers and slopes are regarded as important indicators.

a) Protection of Forests

The National Forestry and Tree Planting Act of 2003 is the legal framework establishing the system of forest protected areas. The Act states methods to provide for the conservation, sustainable management and development of forests for the benefit of the people of Uganda; to provide for the declaration of forest reserves for purposes of protection and production of forests and forest produce; to provide for the sustainable use of forest resources and the enhancement of the productive capacity of forests; and to provide for the promotion of tree planting. There are central forest reserves managed under the NFA and local forest reserves managed under the district authority. The Uganda Wildlife Authority (UWA) is the authority which manages forests in the protected areas under its jurisdiction.

b) Protection of Wetlands

Wetlands are considered as ecologically sensitive areas regarding development projects. Wetlands are subject to permitting of activities with the exception of traditional uses of the wetland resources, as specified in the wetlands management regulations. However, there is no statutory regulation for the identification of wetland boundaries. The criteria used for the delimitation of wetlands in Uganda are the limits between dry land and seasonal or permanent water prone areas, and the natural conditions like the vegetation. In practice, it is NEMA and the Wetlands Management Department of the Ministry of Water and Environment which have jurisdiction for identifying the wetlands and their ecological importance.

c) Protection of River Banks, River Beds, and Lake Shores

Like wetlands, river banks (and lakes shores) are considered as ecologically sensitive areas regarding development projects. The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations 2000 stipulates that river banks shall have a protection zone measured from the highest water mark of the river. This protection zone is 100m wide in the case of the rivers specified in the Sixth Schedule to the regulations, and 30m in other cases. Lake shores have a protection zone of 100m from the low water mark. The Seventh Schedule is a list of lakes having a protection zone of 200m from the low water mark.

d) Mountainous and Hilly Areas

The National Environment (Mountainous and Hilly Areas Management) Regulations 2000 are the legal framework for the identification, registration, and management of areas sensitive to environmental degradation. The areas declared as mountainous and hilly areas are subject to

restriction rules about the use and occupation of soil, grazing and agricultural activities, and to protection rules for the soil and vegetation. The criteria used for establishing such areas are soil erosion, landslide occurrence, mud flows, lack of vegetation cover, and land use practice likely to cause environmental degradation.

The National Environment (Hilly and Mountainous Area Management) Regulations, 2000 states that an environmental impact assessment is required for any development activities in a mountainous or hilly area where the slope (gradient) exceeds 15%.

2) **The Present Environmental Problems**

Many present environmental problems are attributed to the deforestation and loss of vegetation cover due to tree felling for fire wood and charcoal products, and cultivation. Soil erosion, and wetlands reduction and degradation are also mostly caused by human activities. Poverty contributes significantly to the consequences of the present environmental problems.

3) **Suggestions from Environmental Officials**

Based on the site reconnaissance along the subject roads, most land was used for cultivation, settlements, schools or grass land, bush, commercial plantations but natural forests are very few. The subject roads traverse many rivers, streams and wetlands. Central Forest reserves managed by NFA and Community Forest Reserves are also observed along the roads.

In discussions with a director of Environmental Monitoring and Compliance in NEMA, an environmental specialist of UNRA and District Environment Officers, most of them concluded that forests, wetlands and resettlement should be considered in the Sub-region at the planning stage.

(3) Quantification of the Indicators

Table 12.4-3 and 12.4-4 show the indicators for the trunk road network for the priority evaluation.

Table 12.4-3 Indicators for Priority Evaluation-1

Functional Road	No.	Subject Section	Length (km)	1) Traffic Volume (PCU/day)			2) Bridge/Culvert*		3) Population				4) Agricultural productivity
				2018 Min	2018 Max	2018 Med	Number	Total Length (m)	2010	Ratio (Pop/km)	2018	Ratio (Pop/km)	Grading
International Trunk Rd.	1-1	Gulu/Amuru Dist. Border [Kali Kali] – Gulu - Gulu/Oyam Dist. Border [Karuma] (– Kampala)	44.4	1,140	2,390	1,765	9	105	210,500	4,737	260,300	5,857	5
Inter-regional Trunk Rd.	2-1	Kitgum – Agago/Lira Dist. Border [Puranga] (– Lira – Kenya Border)	81.2	280	1,190	735	20	269	192,850	2,376	274,150	3,377	15
	2-2	Gulu – Acholibur [Pader Dist.]	85.0	820	1,610	1,215	80	736	148,700	1,749	193,600	2,278	12
Inter-district Trunk Rd.	3-1	Kitgum – South Sudan Border [Musingo]	53.7	110	470	290	41	371	104,100	1,939	140,400	2,615	14
	3-2	Oroko [connect to Atiak] – Kitgum	104.0	120	220	170	76	507	140,300	1,349	187,600	1,804	13
	3-3	Gulu – Rackoko [Pader Dist.]	90.8	200	500	350	13	173	176,700	1,946	224,600	2,474	13
	3-4	Coner Kilak – Adilang [Agago/Abim Dist. Border]	70.2	60	400	230	46	419	117,800	1,678	172,400	2,456	19
	3-5	Pajule – Pader – Kwon Kic	27.6	240	580	410	14	119	51,500	1,866	75,200	2,725	13
	3-6	Gulu – Ajulu – Pabbo Border [Unyama]	35.5	270	400	335	14	93	75,650	2,131	93,150	2,624	9
	3-7	Kitgum – Kalongo – Patongo – [Agago/Lira Dist. Border]	116.9	150	720	435	117	1,070	204,700	1,752	289,500	2,477	16
	3-8	Kitgum [Pongdwongo] – Padibe [Lamwo] – South Sudan Border [Ngomoromo]	66.8	40	240	140	31	183	130,600	1,956	175,900	2,634	14

Note: * The lengths of bridges and culverts are regarded as the width of the rivers and streams along the trunk road sections

Source: JICA Study Team

Table 12.4-4 Indicators for Priority Evaluation-2

Functional Road	No.	Subject Section	5) School					6) Health Centre						7) Wetland/River*		8) Forest		9) Trading Centre	
			Primary	Secondary	Others	Total	Ratio (School/km)	Hospital	IV	III	II	Total	Ratio (HC/km)	Length (km)	Ratio (%/)	Length (km)	Ratio (%/)	Length (km)	Ratio (%/)
International Trunk Rd.	1-1	Gulu/Amuru Dist. Border [Kali Kali] – Gulu - Gulu/Oyam Dist. Border [Karuma] (– Kampala)	8	2		10	0.23			1	6	7	0.16	1.0	2.24	2.5	5.63%	2.0	4.50
Inter-regional Trunk Rd.	2-1	Kitgum – Agago/Lira Dist. Border [Puranga] (– Lira – Kenya Border)	10	5	1	16	0.20	1	1	6	4	12	0.15	0.6	0.76		0.00	1.5	1.79
	2-2	Gulu – Acholibur [Pader Dist.]	19	5		24	0.28	1		3	3	7	0.08	1.2	1.40	4.0	4.71	2.8	3.29
Inter-district Trunk Rd.	3-1	Kitgum – South Sudan Border [Musingo]	7	2		9	0.17	2	1	1		4	0.07	0.5	0.88		0.00	2.1	3.82
	3-2	Oroko [connect to Atiak] – Kitgum	19	3		22	0.21		1	4	2	7	0.07	0.6	0.54	2.4	2.31	3.3	3.13
	3-3	Gulu – Rackoko [Pader Dist.]	22	1	1	24	0.26		1	3	2	6	0.07	0.4	0.41	11.0	12.11	3.5	3.85
	3-4	Coner Kilak – Adilang [Agago/Abim Dist. Border]	16	5		21	0.30			3	3	6	0.09	0.9	1.24		0.00	3.2	4.56
	3-5	Pajule – Pader – Kwon Kic	6			6	0.22			1	1	2	0.07	0.5	1.88		0.00	1.6	5.80
	3-6	Gulu – Ajulu – Pabbo Border [Unyama]	8	4		12	0.34	1		3	2	6	0.17	0.1	0.26		0.00	0.9	2.54
	3-7	Kitgum – Kalongo – Patongo – [Agago/Lira Dist. Border]	19	1		20	0.17	1		3	5	9	0.08	1.6	1.34		0.00	2.8	2.40
	3-8	Kitgum [Pongdwongo] – Padibe [Lamwo] – South Sudan Border [Ngomoromo]	10	4		14	0.21		1	2	2	5	0.07	0.3	0.42		0.00	3.4	5.09

Note: * The lengths of bridges and culverts are included in 7) Wetland/River

Source: JICA Study Team

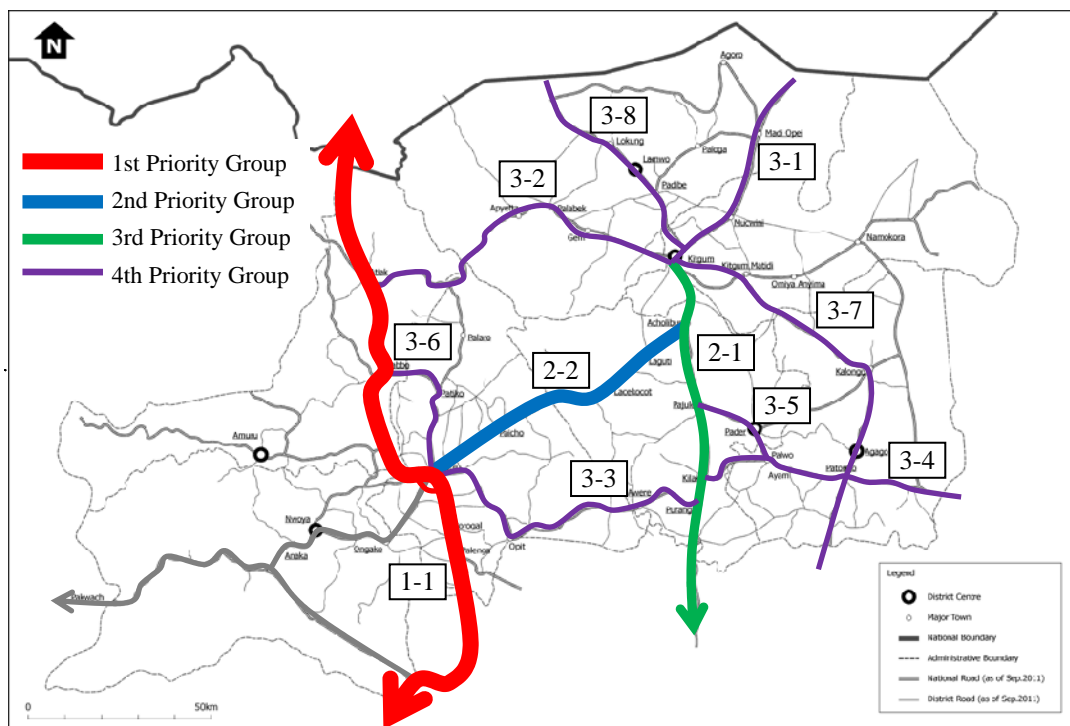
12.4.3.2 Scoring of the Indicators

Based on the quantities of the indicators, 10 equal ranges between the minimum and the maximum figures by indicator were calculated for scoring. The scores from 10 to 1 in descending order of the ranges were given for the economic and social service indicators (as positive indicators). In contrast, the scores from 1 to 10 in descending order were given for the environmental indicators (as negative indicators, the smaller figures have higher scores, meaning that the smaller figures have less negative impact). For the slope, only one section has a part of over 10% slope angle. Thus, the scores are 1 for the section with over 10% slope angle and 10 for the other sections. Weighting for each indicator was set-up according to the alternatives so that the total weight equals 10.

12.4.3.3 Alternatives

Alternative-1: Economy Focused Priority

The priority of 1-1 is emphasized as higher weight was given to the economic indicators and the total score differences are the most among the priority groups. The international trunk road 1-1 is the highest followed by the two inter regional trunk roads, 2-2 and 2-1, with a clear gap. The other inter-district trunk roads made the 4th group. This pattern of priority groups already corresponds to the “1st Alternative: Single Corridor Structure” of Figure 9.6-1.



Source: JICA Study Team

Figure 12.4-3 Alternative-1 of Priority Trunk Road Network: Economy Focused

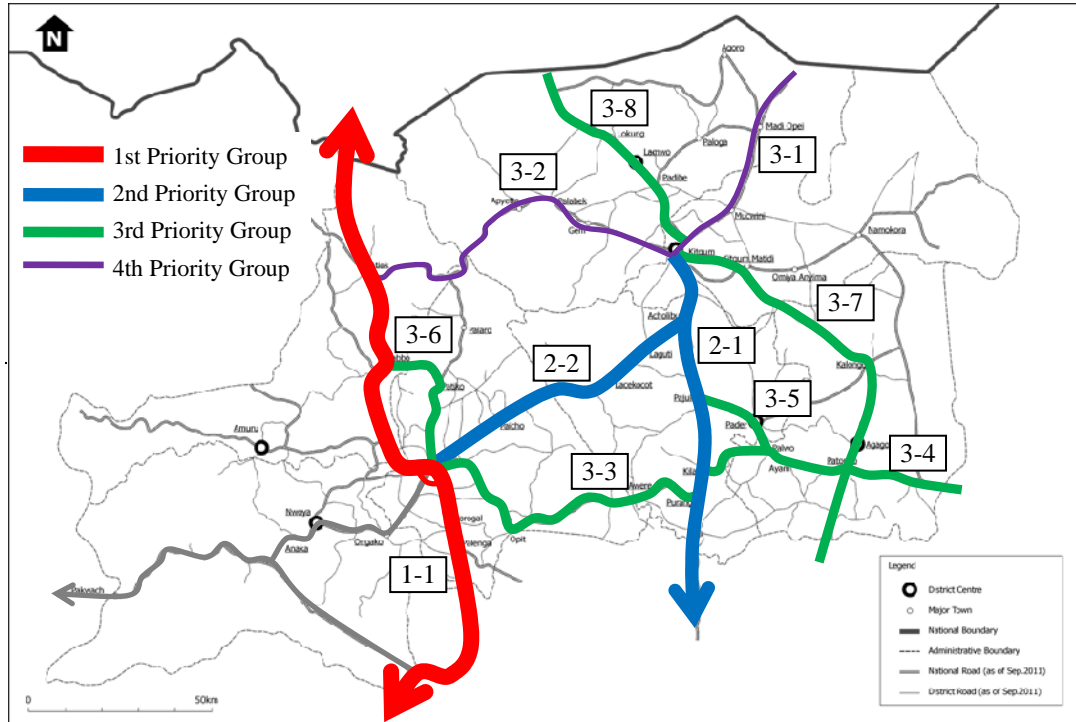
Table 12.4-5 Rating of Alternative-1

Functional Road	No.	Subject Section	Traffic Volume (PCU/day)	Population 2018	Agricultural Productivity	School	Health Centre	Wetland/ River/ Stream	Forest	Trading Centre	Slope	Total Score	Priority Group
			6.00	1.00	1.50	0.25	0.25	0.25	0.25	0.00	0.00	10.00	
International Trunk Rd.	1-1	Gulu/Amuru Dist. Border [Kali Kali] – Gulu - Gulu/Oyam Dist. Border [Karuma] (- Kampala)	10	10	1	4	9	1	5	3	10	76	1st
Inter-regional Trunk Rd.	2-1	Kitgum – Agago/Lira Dist. Border [Puranga] (- Lira – Kenya Border)	4	4	7	2	8	7	10	10	10	45	3rd
	2-2	Gulu – Acholibur [Pader Dist.]	7	2	6	7	2	4	6	6	10	58	2nd
Inter-district Trunk Rd.	3-1	Kitgum – South Sudan Border [Musingo]	1	2	7	1	1	6	10	4	10	23	4th
	3-2	Oroko [connect to Atiak] – Kitgum	1	1	6	3	1	9	9	6	1	22	
	3-3	Gulu – Rackoko [Pader Dist.]	2	2	6	6	1	10	1	4	10	28	
	3-4	Coner Kilak – Adilang [Agago/Abim Dist. Border]	1	2	10	8	2	5	10	3	10	29	
	3-5	Pajule – Pader – Kwon Kic	2	3	6	3	1	2	10	1	10	28	
	3-6	Gulu – Ajulu – Pabbo Border [Unyama]	2	3	3	10	10	10	10	9	10	30	
	3-7	Kitgum – Kalongo – Patongo – [Agago/Lira Dist. Border]	2	2	9	1	2	4	10	9	10	32	
	3-8	Kitgum [Pongdwongo] – Padibe [Lamwo] – South Sudan Border [Ngomoromo]	1	3	7	3	1	10	10	2	10	26	

Source: JICA Study Team

Alternative-2: Balance Focused Priority

The priority of 1-1 is also emphasized and the total score differences are moderate among the other priority groups. The two inter-regional trunk roads, 2-2 and 2-1, made up the 2nd priority group. The other inter-district trunk roads made the 3rd and 4th groups. This pattern of priority groups are already starting to show the “2nd Alternative: Double Corridor Structure” of Figure 9.6-1.



Source: JICA Study Team

Figure 12.4-4 Alternative-2 of Priority Trunk Road Network: Balance Focused

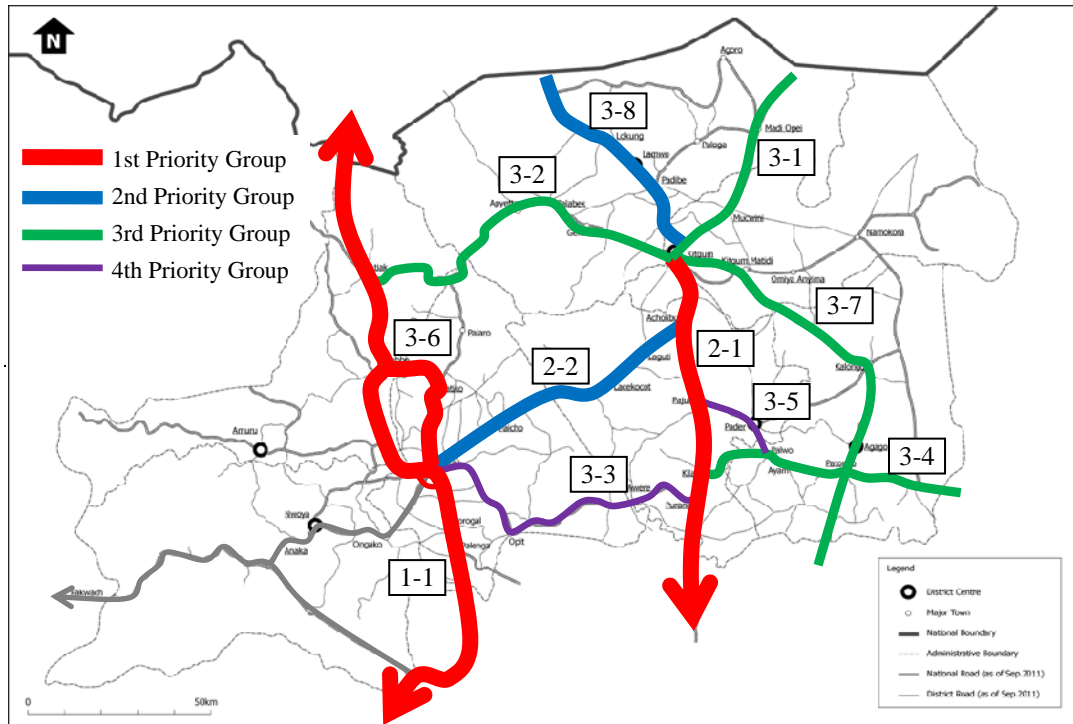
Table 12.4-6 Rating of Alternative-2

Functional Road	No.	Subject Section	Traffic Volume (PCU/day)	Population 2018	Agricultural Productivity	School	Health Centre	Wetland/ River/ Stream	Forest	Trading Centre	Slope	Total Score	Priority Group
			4.50	1.00	1.50	0.50	1.00	0.50	0.50	0.25	0.25	10.00	
International Trunk Rd.	1-1	Gulu/Amuru Dist. Border [Kali Kali] – Gulu - Gulu/Oyam Dist. Border [Karuma] (- Kampala)	10	10	1	4	9	1	5	3	10	74	1st
Inter-regional Trunk Rd.	2-1	Kitgum – Agago/Lira Dist. Border [Puranga] (- Lira - Kenya Border)	4	4	7	2	8	7	10	10	10	55	2nd
	2-2	Gulu – Acholibur [Pader Dist.]	7	2	6	7	2	4	6	6	10	57	
Inter-district Trunk Rd.	3-1	Kitgum – South Sudan Border [Musingo]	1	2	7	1	1	6	10	4	10	30	4th
	3-2	Oroko [connect to Atiak] – Kitgum	1	1	6	3	1	9	9	6	1	28	
	3-3	Gulu – Rackoko [Pader Dist.]	2	2	6	6	1	10	1	4	10	33	3rd
	3-4	Coner Kilak – Adilang [Agago/Abim Dist. Border]	1	2	10	8	2	5	10	3	10	38	
	3-5	Pajule – Pader – Kwon Kic	2	3	6	3	1	2	10	1	10	32	
	3-6	Gulu – Ajulu – Pabbo Border [Unyama]	2	3	3	10	10	10	10	9	10	46	
	3-7	Kitgum – Kalongo – Patongo – [Agago/Lira Dist. Border]	2	2	9	1	2	4	10	9	10	39	
	3-8	Kitgum [Pongdwongo] – Padibe [Lamwo] – South Sudan Border [Ngomoromo]	1	3	7	3	1	10	10	2	10	34	

Source: JICA Study Team

Alternative-3: Environmentally Focused Priority

The score gaps among the networks were reduced. An inter-district trunk road 3-6 was grouped into the 1st priority group along with the international trunk road 1-1 and the inter-regional trunk road 2-1 because 3-6 has the fewest forests, wetlands, and trading centres along the section. The other trunk road networks made the priority groups disordered. This pattern of priority groups already corresponds to the “2nd Alternative: Double Corridor Structure” of Figure 9.6-1.



Source: JICA Study Team

Figure 12.4-5 Alternative-3 of Priority Trunk Road Network: Environmentally Focused

Table 12.4-7 Rating of Alternative-3

Functional Road	No.	Subject Section	Traffic Volume (PCU/day)	Population 2018	Agricultural Productivity	School	Health Centre	Wetland/ River/ Stream	Forest	Trading Centre	Slope	Total Score	Priority Group
			Weight	3.00	0.50	0.50	0.50	1.00	2.00	2.00	0.25	0.25	
International Trunk Rd.	1-1	Gulu/Amuru Dist. Border [Kali Kali] – Gulu - Gulu/Oyam Dist. Border [Karuma] (- Kampala)	10	10	1	4	9	1	5	3	10	62	1st
		Kitgum – Agago/Lira Dist. Border [Puranga] (- Lira – Kenya Border)	4	4	7	2	8	7	10	10	10	66	
Inter-regional Trunk Rd.	2-2	Gulu – Acholibur [Pader Dist.]	7	2	6	7	2	4	6	6	10	55	2nd
		Kitgum – South Sudan Border [Musingo]	1	2	7	1	1	6	10	4	10	45	
Inter-district Trunk Rd.	3-2	Oroko [connect to Atiak] – Kitgum	1	1	6	3	1	9	9	6	1	47	3rd
		Gulu – Rackoko [Pader Dist.]	2	2	6	6	1	10	1	4	10	40	
	3-4	Coner Kilak – Adilang [Agago/Abim Dist. Border]	1	2	10	8	2	5	10	3	10	48	3rd
		Pajule – Pader – Kwon Kic	2	3	6	3	1	2	10	1	10	40	
	3-6	Gulu – Ajulu – Pabbo Border [Unyama]	2	3	3	10	10	10	10	9	10	69	1st
		Kitgum – Kalongo – Patongo – [Agago/Lira Dist. Border]	2	2	9	1	2	4	10	9	10	47	
3-8	Kitgum [Pongdwong] – Padibe [Lamwo] – South Sudan Border [Ngomoromo]	1	3	7	3	1	10	10	2	10	54	2nd	

Source: JICA Study Team

12.4.4 Comparison and Evaluation of Alternatives of Priority Trunk Road Network

Three alternatives were compared with “Zero Option”, Do Nothing Alternative in Table 12.4-8 and evaluated as follows.

12.4.4.1 Comparison and Evaluation

Alternative-1: Economy Focused Priority

One corridor is strongly focused on, the Nimule – Gulu (– Kampala) section in 2018, while lower priority is given to the trunk roads to approach the respective district centres. This pattern of priority groups already corresponds to the “1st Alternative: Single Corridor Structure” in 2018. If a few higher priority roads attract budget authorization and are realized, Alternative 1 could have the lowest risk to diffuse negative impacts out of all the alternatives. Those possible negative impacts could include resettlement or loss of properties due to the road improvement works and temporary negative impacts in construction phase, losses of forest/vegetation/wetland, deterioration of landscape due to borrow pits, noise/vibration by construction vehicles, declining quality of surface water by construction activities, and increase of waste and accidents. However, Alternative 1 could widen the gaps between the priority groups in economic growth and living standards in Gulu and the other districts. The other districts could be left out of the economic growth as it would be directed toward Gulu. Besides, this situation cannot eliminate the existing problems in the social and natural environments in the other districts and could possibly cause them to deteriorate. The environmental recovery cost will be high.

Alternative-2: Balance Focused Priority

Two corridors appear, Gulu - Nimule and Kitgum – Lira. This pattern of priority groups is already starting to show the “2nd Alternative: Double Corridor Structure” in 2018. It is suitable for the regional spatial strategy to formulate the “Double Corridor” structure in the future. Besides, higher priority is given to the trunk roads to approach the respective district centres. The gaps of priority groups in economic growth and living standard between Gulu and the other districts can be reduced. This Alternative is consistent with the strategies of the Regional Development Plan and Regional Trunk Road Network Plan 2018. This is the most recommended alternative. However, if several higher priority roads budget authorization, the risk of resettlement or losses of properties and temporary negative impacts in construction phase can be comparatively higher.

Alternative-3: Environmentally Focused Priority

Two corridors strongly appear, Gulu - Nimle and South Sudan - Kitgum – Lira. This pattern of priority groups already corresponds to the “2nd Alternative: Double Corridor Structure”, however, it is premature to formulate the corridors in 2018. Even if several higher priority roads were implemented, it could be over investment in 2018. The other trunk roads’ network pattern appears disordered. This Alternative is inconsistent with the strategies of the Regional Development Plan and Regional Trunk Road Network Plan 2018. Besides, the risk of resettlement or loss of properties and temporary negative impacts in the construction phase can be comparatively higher.

Zero Option”, Do Nothing Alternative

There are no strategies for the trunk road improvements. It cannot attract the Government or donors to authorize the budgets for trunk road improvements. The priority can be decided impromptu. It can lead to disordered improvements and formulate less functional trunk road networks. If few roads will be improved, the risk of resettlement or loss of properties and temporary negative impacts in the construction phase can be the least. However, the Zero Option cannot boost a local economy or eliminate the existing problems in the social and natural environments and could cause them to deteriorate in the Sub-region. Environmental recovery cost will be high.

Table 12.4-8 Comparison and Evaluation of the Alternatives

Likely Impacts	Alt-1: Economy focused Priority	Alt-2: Balance focused Priority	Alt-3: Environment focused Priority	Alt-4: Zero Option (Do Nothing Priority)
Priority Pattern 2018				
Budget Authorization	<ul style="list-style-type: none"> • The priority groups can facilitate the government and donors to allocate budgets. • However, Gulu – Nimule Corridor is focused the most and the other areas cannot attract the attention for them. 	<ul style="list-style-type: none"> • The priority groups following the regional development and trunk road network strategies can facilitate the government and donors to allocate budgets and invest it effectively. 	<ul style="list-style-type: none"> • The priority groups are further from the regional development and trunk road network strategies. • It cannot facilitate the government and donors to allocate budgets. 	<ul style="list-style-type: none"> • Attentions or interests by the government or donors can decrease to authorize the budgets without proper plan (priority) of the regional trunk road network. • There can be fewer opportunities to obtain the budgets for the regional trunk road improvements.
Socio-economy	<p>+Positive Impacts The Alt. can contribute to;</p> <ul style="list-style-type: none"> • facilitate efficient concentrated investment for infrastructure improvements • attract investors for industrial developments in Gulu town and in the Gulu – Nimule Corridor <p>-Negative impacts The Alt. can lead to;</p> <ul style="list-style-type: none"> • strongly depend on the Gulu – Nimule Corridor in the region • economy gap can be widen and it will be accelerated between Gulu and the other districts (Degrading household economies of poor people) • accelerate land speculation in the corridor 	<p>+Positive Impacts The Alt. can contribute to;</p> <ul style="list-style-type: none"> • facilitate investment for infrastructure improvements evenly over the region • attract investors for industrial developments over the region • enhance agricultural productivities and transportability <p>-Negative impacts The Alt. can lead to;</p> <ul style="list-style-type: none"> • less efficient investment impacts to improve economic developments 	<p>-Negative impacts The Alt. can lead to;</p> <ul style="list-style-type: none"> • The least efficient investment impacts to improve economic developments (over investment) 	<p>-Negative impacts</p> <ul style="list-style-type: none"> • Disordered regional trunk road network and few budget authorizations can reduce investment opportunities of industries and other infrastructure. • It can stagnate improvements on local economy and livelihoods

Likely Impacts	Alt-1: Economy focused Priority	Alt-2: Balance focused Priority	Alt-3: Environment focused Priority	Alt-4: Zero Option (Do Nothing Priority)
Living Environment	<p>+Positive Impacts The Alt. can contribute to;</p> <ul style="list-style-type: none"> • improve social services in quantity and quality • improve living standard in Gulu town and in the Gulu – Nimule Corridor <p>-Negative impacts The Alt. can lead to;</p> <ul style="list-style-type: none"> • living standard gap can be widen and it will be accelerated between Gulu and the other districts • acceleration of migration in the corridor and generate slum 	<p>+Positive Impacts The Alt. can contribute to;</p> <ul style="list-style-type: none"> • facilitate investment for infrastructure improvements to improve social services • improve living standard evenly over the region <p>-Negative impacts The Alt. can lead to;</p> <ul style="list-style-type: none"> • less efficient investment impacts to improve living environment 	<p>-Negative impacts The Alt. can lead to;</p> <ul style="list-style-type: none"> • the least efficient investment to improve living environment (over investment) 	<p>-Negative impacts Same impacts can be expected as the mentioned above.</p>
	<p>If a few higher priority roads attract attentions for the budget authorization, the risk of resettlement or losses of properties due to the road improvement works can be the lowest among the alternatives.</p>	<p>If several higher priority roads attract attentions for the budget authorization, the risk of resettlement or losses of properties can be comparatively larger.</p>	<p>If several higher priority roads attract attentions for the budget authorization, the risk of resettlement or losses of properties can be comparatively larger.</p>	<p>If few roads will be improved, the risk of resettlement or losses of properties can be the least.</p>

Likely Impacts	Alt-1: Economy focused Priority	Alt-2: Balance focused Priority	Alt-3: Environment focused Priority	Alt-4: Zero Option (Do Nothing Priority)
Natural Resources	<p>If few roads attract attentions for the budget authorization and few improvement/maintenance are implemented, consequently infrastructure and industrial improvement concentrate on the corridor;</p> <p>+Positive Impacts</p> <ul style="list-style-type: none"> Negative impacts on nature by developments can be limited in the corridor <p>-Negative impacts</p> <p>In the other districts, the Alt. can further;</p> <ul style="list-style-type: none"> the existing environmental problems caused by low income, primitive agricultural methods and high dependency on extraction of forest products can remain, accumulate and it will deteriorate the natural environment. Deforestation and loss of vegetation by Indiscriminate tree cutting, bush clearing for cultivation, farmers encroaching to forest reserve Reduce aquatic resources, Reduce flora, fauna and biodiversity, Deteriorate natural drainage system by loss of wetlands and degradation with cultivation Land degradation, reduce soil fertility and productivity by population pressure for cultivation, brick produce, overstocking and over grazing of livestock, bush burning Few improvement works can deteriorate soil erosion from earth road and abandoned borrow pits in rain season 	<p>If several trunk roads attract attentions for the budget authorization and improvement/maintenance are implemented, consequently infrastructure and industrial improvement are dispersed more even in the region;</p> <p>+Positive Impacts</p> <p>The Alt. can gradually improve the existing environmental problems mentioned in the Alt-1 as on the left.</p> <p>-Negative impacts</p> <p>Same impacts can be expected as the Alt-1 with certain extent.</p>	<p>-Negative impacts</p> <p>If the Alt. cannot facilitate the government and donors to allocate budgets although give priority for the roads with less environmental impacts, same impacts can be expected as the Alt-1.</p>	<p>-Negative impacts</p> <p>Same impacts can be expected as the Alt-1 but more.</p>
	<p>Temporary negative impacts: losses of forest/vegetation/wetland, deterioration of landscape by borrow pits in construction phase can be the lowest among the alternatives</p>	<p>Same impacts can be expected as the Alt-1 but it can be more.</p>	<p>Same impacts can be expected as the Alt-1 but it can be more.</p>	<p>Same impacts can be expected as the Alt-1 but it can be the least.</p>

Likely Impacts	Alt-1: Economy focused Priority	Alt-2: Balance focused Priority	Alt-3: Environment focused Priority	Alt-4: Zero Option (Do Nothing Priority)
Pollution	<p>-Negative impacts</p> <p>If few roads attract attentions for the budget authorization and few improvement and maintenance are implemented, the existing pollutions caused by earth roads in poor condition can remain and accumulate.</p> <ul style="list-style-type: none"> • Air pollution (respiratory diseases) cause by dust in dry season • Bottom sediment caused by eroded soil 	<p>+Positive Impacts</p> <p>If more attentions for the budget authorization and several improvement and maintenance works over the region are implemented, the present pollutions caused by earth roads in poor condition can reduce.</p> <p>-Negative impacts</p> <ul style="list-style-type: none"> • Traffic accidents can increase extensively 	<p>-Negative impacts</p> <p>Same impacts can be expected as the Alt-1.</p>	<p>-Negative impacts</p> <p>Same impacts can be expected as the Alt-1 but more.</p>
	<p>Temporary negative impacts: noise/vibration by construction vehicles, declining quality of surface water by construction activities, increase of waste and accidents in construction phase can be the lowest among the alternatives.</p>	<p>Same impacts can be expected as the Alt-1 but it can be more.</p>	<p>Same impacts can be expected as the Alt-1 but it can be more.</p>	<p>Same impacts can be expected as the Alt-1 but it can be the least.</p>
Evaluation (Suitability for Development Strategies)	<ul style="list-style-type: none"> • Strong attention on one corridor of Nimule – Gulu – Kampala in 2018 • Lower priority is given to the approach roads to the district centres • The gaps of socio-economic developments between Gulu and the other districts can widen. • In the other districts, this situation cannot prevent the existing negative impacts in social and natural environments or deteriorate it • Environmental recovery cost will be high 	<ul style="list-style-type: none"> • Two corridors become to appear on Gulu - Nimule and Kitgum – Lira so that it can formulate “Double Corridors” structure in the future • Higher priority is given to the approach roads to the district centres • Consistent with the Regional Development Strategy and Regional Trunk Road Network Strategy 2018 	<ul style="list-style-type: none"> • Two corridors strongly appear on Gulu - Nimle and South Sudan - Kitgum – Lira • It is premature to formulate “Double Corridors” structure in 2018 • The other trunk roads’ network pattern appears disorder • Inconsistent with the Regional Development Strategy and Regional Trunk Road Network Strategy 2018 	<ul style="list-style-type: none"> • No strategies for the trunk road improvements • Cannot attract the government or donors to authorize the budgets for trunk road improvements. • The priority can be decided impromptu • A risk leading to disordered improvements and formulate less functionable trunk road network • No boost of local economy • No prevention of the existing negative impacts in social and natural environments or deteriorate it in the Sub-region. • Environmental recovery cost will be high
	Less-recommended Alt.	Recommended Alt.	Un-recommended Alt.	Inappropriate Alt.

Source: JICA Study Team

12.4.4.2 Mitigation Measures

(1) Social Environment

Land acquisition and resettlement plans should be properly designed, implemented, and those activities monitored and evaluated in line with a guideline. For national roads, UNRA made a final draft of Land Acquisition Management System (LAMS) document for the land acquisition and compensation for the road reserves in June 2009. They are still finalizing the document and this document is the only existing guideline document to implement land acquisition and compensation for national roads projects.

In cases of district roads, there is no standard procedure for land acquisition and compensation for the road reserves. However, the same legal requirements for land acquisition and compensation for district roads are also required for district roads although the acquisition of land within the road reserves, which are commonly held in customary land tenure mostly depends on agreements with the local communities and peoples.

(2) Natural Environment

It is necessary to control and restrict the local peoples from falling trees and using wetlands, and also re-forestation is required to prevent deforestation and loss of vegetation. However, the charcoal making is still the easiest way to obtain cash in a very short time for the local peoples in the sub-region. Many packs of charcoals can be seen along the roads in any trading centre. The charcoal is also transported over the Sub-region to South Sudan or other regions. Year-round and certain access can stimulate the local economies and improve household livelihoods in commercial activities. However, the stimulated commercial activities can increase the demand for charcoal, consequently deforestation can expand. Re-plantation cannot overtake deforestation due to the charcoal making and use of fuel woods for cooking.

Therefore, efforts for improvement of agricultural productivity, diversification of agricultural products or other job creation should be started at the same time as improvement of the road networks. If only roads are improved, the charcoal making can increase and worsen the deforestation and loss of vegetation.

(3) Accidents and Pollution

Traffic accidents will be the most serious potential negative impact on the local peoples after the road improvements are completed. Increased traffic with high mobility will cause the traffic accidents to become a new risk for the local peoples. The local peoples should be sensitized about traffic rules and be aware of the speed and power of vehicles. Traffic signs should also be provided. The traffic accidents will be monitored and evaluated.

Potential pollutions caused by the increased traffic are air pollution, and noise and vibration, however, they will still be minimal in the Sub-region as the future traffic volume was not expected to be very high based on the forecast.

(4) Implementation of Road Projects

Implementation of road projects complies with the following environmental guidelines of MoWT. The guidelines state procedures and mitigation measures for the likely impacts and implementation phases (planning, during/after constructions).

- Environmental Impact Assessment Guidelines for Road Projects
- Environmental Guidelines for District Engineers, Volume 5B of the District Administrative and Operational Guidelines, 2003 (District Road Works Manuals series)

12.4.5 Involvement of Stakeholders in Working Group Meetings

12.4.5.1 Outline of the Working Group Meetings

(1) Purposes of the Meetings

JST conducted the working group meetings with the following purposes.

- Explain the outline of the Study, schedule and progress to promote the understanding of the participants
- Explain environmental and social impacts to promote the understanding of the participants at the policy level (the Regional Development Plan, the Regional Trunk Road Network Plan and Priority of the Regional Trunk Road Network)
- Obtain opinions from the participants and reflect them in the Study

(2) A point of view for the meeting

The region has no local government and no leading actors which study strategies, or who plan and promote their implementation in Acholi Sub-region. The districts are the actors to develop the region. Besides, according to the decentralization policy of Uganda, the districts tend to consider only themselves and never think of the regional development.

However, the districts cannot stand alone for the developments. They need relationships and linkages among them and between other regions. Where and how the districts will link up is a key issue for the regional development. Therefore, the areas which will link up are regarded as the “Region”, “Acholi Sub-region”. A way to facilitate the linkage is the regional trunk road network. This is the point of view to discuss in the meetings.

(3) Schedule

Three working group meetings were held as per the following schedule in September 2011.

- 22 Sep. (Thu) 9:00am – 12:00pm for Kitgum/Lamwo Districts
- 23 Sep. (Fri) 10:00am – 01:00pm for Pader/Agago Districts
- 27 Sep. (Tue) 9:00am – 12:00pm for Gulu District

(4) Contents

The working group meetings consisted of the following three contents.

- Regional Development Strategy
- Regional Trunk Road Network
- Environmental and Social Considerations (Strategic Environmental Assessment: SEA) for prioritizing the regional trunk road networks

(5) Participants

The following district officials were invited to the meetings.

- District Official Representatives from: the Engineering Department, Environmental/Forest Departments, Production Department, Planning Department, and Community Development Department

- Representatives from UNRA Gulu/Kitgum Offices
- Representatives from MoWT Gulu Office
- Representatives from NFA Gulu/Kitgum Offices

12.4.5.2 Opinions from the Participants

The following major opinions from the participants will be considered and fed back to the Study through further study in the regional development plan, the road network development plan and the SEA.

(1) For the Regional Development Plan

The participants prefer the proposed regional development plan (Double Corridors) to give broader attention, contribute extensive areas and involve more people to boost economic activities. It can effectively develop the areas with higher agricultural productivity potential. Besides, the strategy of the Double Corridors can contribute to the regional integration strategies of the East African Countries.

- More localization of project and program management (give the district offices more authority for them)
- Need local level (district) development strategies
- More attention to local opinions for development plans (political decisions tend to lack attention for the local situations and issues)
- Political interference is rampant on initiatives for development activities (Northern Uganda has been marginalized by the Central Government.)
- Ensure the responsibility of the Central Government to promote and implement the plan

(2) For the Regional Trunk Road Network

The participants agreed to the proposed regional trunk road network. However, they stated that more feeder roads and community access roads and their maintenance are necessary.

- Ensure consistency with the National Development Plan and the National Transportation Plan
- Consider the potential for oil excavation and refinery developments in Amuru District

(3) For Priority

The participants preferred the balanced alternatives that JST proposed. However, they suggested other priorities on a few sections with different qualitative reasons.

- Kitgum [Pongdwongo] – Padibe [Lamwo] – South Sudan Border [Ngomoromo] section is more important than the other section to the South Sudan border between Kitgum – Musingo because: Lamwo district plans to construct a border market at Ngomoromo and intends to use the Central Government Grant; There is a potential for tourist attractions; Electric distribution lines have been extended and this will attract investment especially in the mining sector.
- Consider the border land dispute between Uganda and South Sudan
- According to UNRA F/S Study, the Kitgum – Musingo section is a higher priority than the Kitgum – Ngomoromo section because the present road conditions are better, more

attention on remote poorer communities along the section, linkage to regional markets and an international connection to Kenya through South Sudan. An adjustment is necessary to the UNRA's F/S.

- Give more attention to population indicators to improve the of living standards
- Pader District regards a trunk road to link with Gulu – Pader – Kotido as the very most important network and the section should be given higher priority because it used to have heavy traffic for inter-regional trading (agricultural products and live stock). The main reason for the existing low traffic volume is the poor road condition. The section also has a strategic position for the national security to open the remote Karamoja (nomadic backward peoples) and tourism development.
- The Gulu – Ajulu – Pabbo Border [Unyama] section should be a higher priority because: it can support the traffic of the international trunk road, Gulu – Nimule; it has tourism development potential.
- The Gulu – Rackoko [Pader Dist.] section should be a higher priority as it passes through populated areas.

(4) For the Environment

The Double Corridors strategy has a higher priority because:

- The Single Corridor strategy can intensively affect the environment along it;
- Traffic volume can cause air/noise/vibration pollution;
- Population increase will be concentrated and accelerated along the Single Corridor;
- It can worsen deforestation and loss of vegetation due to cultivation, tree falling for fire wood, and charcoal making;
- More attention to community forests

With the improvement of the trunk road networks:

- It can accelerate the tree falling for fire wood, and charcoal making;
- Thus, environmental sensitization and alternative economic activities to the charcoal making are required;
- More attention to social impacts on the elderly and vulnerable peoples (compensation) should be paid although only limited impacts are expected in the improvement activities for the existing road networks

13. PRESENT ROAD MAINTENANCE AND OPERATION SYSTEM IN STUDY AREA

13.1 Present System of Road Administration

13.1.1 Roads in Uganda

13.1.1.1 Road Classification

At present, in Uganda, roads are administratively classified as follows:

- National roads
- District roads
- Urban roads
- Community access roads

National roads are administered by MoWT and UNRA. District roads are the jurisdiction of district local governments under technical guidance of MoWT. Urban roads are also the jurisdiction of local governments of urban councils under technical guidance of MoWT. Community access roads are supposed to be managed by sub-county local governments, while the development and maintenance are largely influenced by district local governments.

In Uganda, roads are also classified into trunk roads and feeder roads. This classification of trunk roads and feeder roads is more like a functional classification. It is considered that trunk roads are now national roads, and feeder roads are district roads. However, the current classification of national roads and district roads are more like an administrative classification.

On the other hand, in Uganda, a system of functional classification was established for all rural roads, while another system of functional classification was established for district roads. The rural roads are functionally classified into 1) international trunk roads, 2) national trunk roads, 3) primary roads, 4) secondary roads, 5) minor roads. The district roads are functionally classified into i) District Class I Roads, ii) District Class II Roads and iii) District Class III Roads.

13.1.1.2 National Roads and District Roads

The network of national roads has been gradually expanded in terms of length, from 9,300 km in 1996, 10,500 km in 2001 to 20,000 in 2010. See, Table 13.1-1. This expansion was made by reclassification of district roads and community access roads into national roads.

As recently as December 2008, about 9,000 km of district roads were reclassified into national roads. As a result, the total length of the national roads became about 20,000 km. See Table 13.1-3 for the length of newly reclassified national roads by UNRA. The road ratios (both road length per area and road length per population) vary among regions. The road ratios of national roads in Northern Region are low. After the reclassification of district roads to national roads

in December 2008, the low road ratios of national roads in the Northern region did not change much.

On the other hand, the road ratios of district roads in Northern Region are not so low compared to other regions.

Table 13.1-1 Road Length in Uganda

Unit: km

	1992 (1)	1996 (2)	1996 (3)	End of 2001 (4)	Jun. 2004 (5)	Early 2008 (6)	Dec. 2008 (7)
National Road		8,000	9,300	10,500		10,800	20,000
District Road	16,970	17,300	N/A	27,000	27,139	27,500	N/A
Urban Road		700	N/A	3,500		4,800	N/A
Community Access Roads			N/A	30,000		35,000	N/A
Total			9,300	71,000		78,100	

Source: (1) Strategy for Rural Feeder Roads, Rehabilitation and Maintenance, Ministry of Local Government (1992)

Source: (2) JICA Mission Report (1996)

Source: (3) National Transport Master Plan including a Transport Master Plan for the Greater Kampala Metropolitan Area (May 2009)

Source: (4) Table 1.1, Strategy for Sustainable Maintenance of District, Urban and Community Access Roads (2004)

Source: (5) Annex I, Strategy for Sustainable Maintenance of District, Urban and Community Access Roads (2004)

Source: (6) National Transport Master Plan including a Transport Master Plan for the Greater Kampala Metropolitan Area (May 2009)

Source: (7) Calculation based on the List of District Roads taken over by UNRA (Prepared by MoWT on December 2008)

Table 13.1-2 Road Ratio by Region in Uganda

Region	Area	Popu- lation	Road Length (km)			Road length/Area			Road length/Population		
			National roads as of June 2008	National Roads as of 2010	District roads as of June 2004	National roads as of June 2008	National Roads as of 2010	District Roads as of June 2004	National roads as of June 2008	National roads as of 2010	District roads as of June 2004
Central	61,403	7,751	2,596	4,346	7,028	0.042	0.071	0.114	0.335	0.561	0.907
Eastern	39,479	7,693	2,838	5,101	6,114	0.072	0.129	0.155	0.369	0.663	0.795
Northern	85,392	6,652	2,486	4,477	5,481	0.029	0.052	0.064	0.374	0.673	0.824
Western	55,277	7,497	3,045	5,928	8,516	0.055	0.107	0.154	0.406	0.791	1.136
Total	241,551	29,593	10,965	19,851	27,139	0.045	0.082	0.112	0.371	0.671	0.917

Source: Areas and Populations: Uganda Bureau of Statistics (Website, 2010), Road Length: MoWT

Table 13.1-3 Length of National Roads by UNRA's Administrative Area

Region and UNRA Area	Paved (km)	Unpaved (km)	Total as of June 2008 (km) (A)	District roads re-classified National roads (km) (B)	Total as of December 2008 (km) (C)=(A)+(B)	Increase rate (D)=(C)/(A)
Central Region	1,138	1,458	2,596	1,750	4,346	1.7
Kampala	466	247	713	350	1,063	1.5
Luwero	159	335	494	410	904	1.8
Masaka	239	294	533	528	1,061	2.0
Mpipi	151	349	500	111	611	1.2
Mubende	123	233	356	351	707	2.0
Eastern Region	615	2,223	2,828	2,263	5,101	1.8
Jijna	212	434	646	424	1,070	1.7
Kotido	N/A	440	440	420	860	2.0
Mbale	218	347	565	431	996	1.8
Moroto	1	346	347	269	616	1.8
Soroti	68	396	464	475	939	2.0
Tororo	116	260	376	244	620	1.6
Northern Region	409	2,077	2,486	1,991	4,477	1.8
Arua	130	416	546	267	813	1.5
Gulu	192	402	594	275	869	1.5
Kitgum	N/A	596	596	526	1,122	1.9
Lila	87	502	589	517	1,106	1.9
Moyo	0	161	161	406	567	3.5
Southern Region	588	1,025	1,613	1,646	3,259	2.0
Kabale	156	254	410	996	1,406	3.4
Kasese	138	203	341	124	465	1.4
Mbarara	294	568	862	526	1,388	1.6
Western Region	348	1,084	1,432	1,237	2,669	1.9
FprtPotal	162	390	552	564	1,116	1.9
HOima	96	309	405	493	898	2.0
Masindi	90	385	475	180	655	2.2
Special Access Roads				138	138	1.4
TOTAL	3,098	7,878	10,965	9,024	19,851	1.8

Source: UNRA, June 2008, MoWT, December 2008

13.1.1.3 Conditions of National Roads

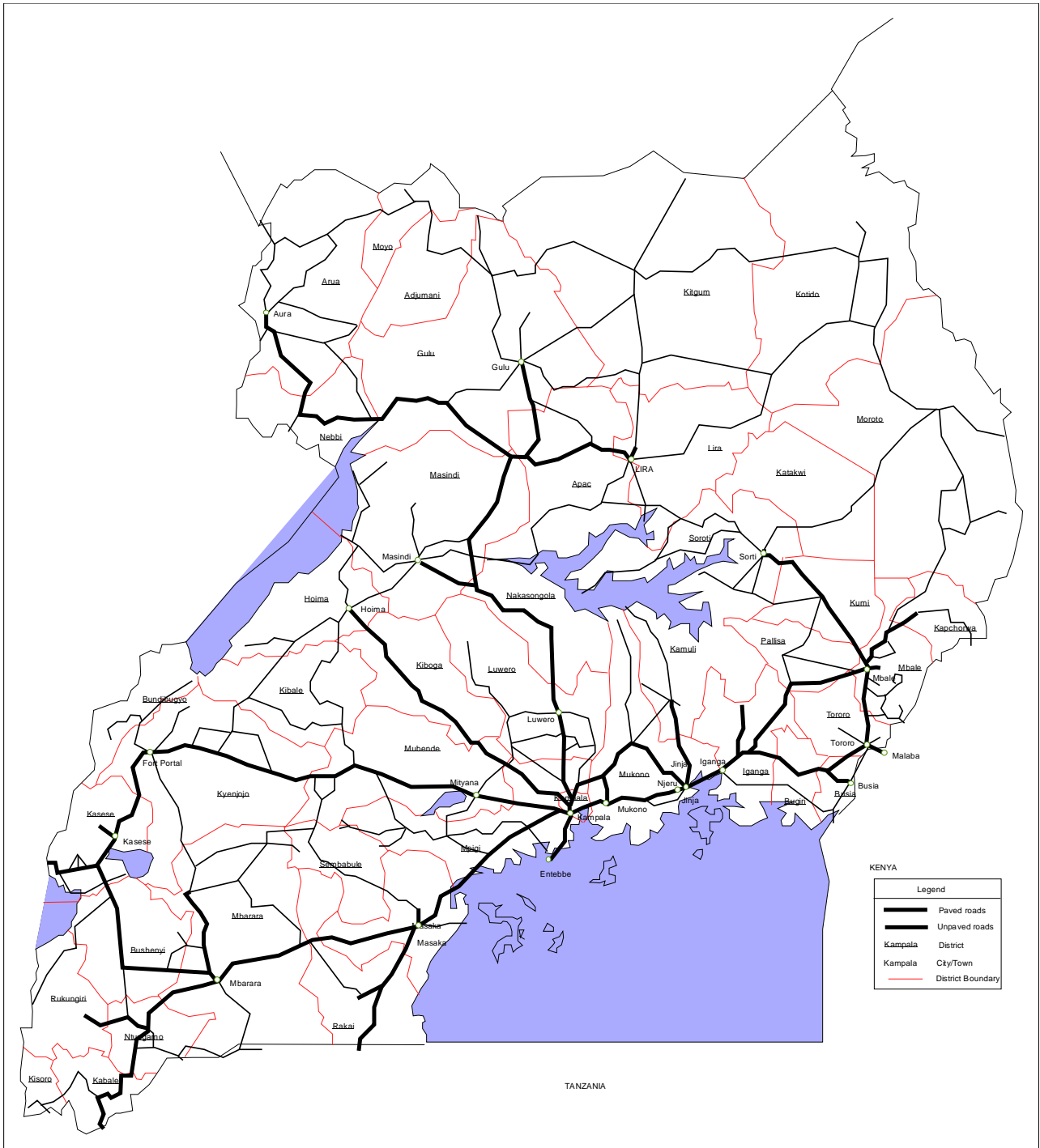
In 2003, the length of paved national roads was 2,650 km. By mid-2008, the length of paved national roads was extended to 3,051 km.

In 2003, 92% of paved national roads were in good or fair condition. A total of 81% of unpaved roads had good or fair condition. Since 2003, the overall conditions have deteriorated. It is estimated that only 60% of national roads are in good or fair condition. However, the Five-year National Development Plan (NDP 2010-2015) set a strategic objective to improve the current level (60%) of good or fair condition of national roads to the level of 85%.

Table 13.1-4 Length of District Roads by District and by Region

No.	Code	District Name	Region	Length of the district road (km)	No.	Code	District Name	Region	Length of the district road (km)
1	4	Adjumani	Northern	480	30	1	Kampala	Central	500
2	2	Apac	Northern	632	31	20	Kiboga	Central	349
3	3	Arua	Northern	819	32	27	Luwero	Central	619
4	9	Gulu	Northern	416	33	28	Masaka	Central	685
5	53	Pader	Northern	289	34	34	Mpipi	Central	626
6	22	Kitgum	Northern	352	35	35	Mubende	Central	1,001
7	23	Kotido	Northern	389	36	36	Mukono	Central	871
8	26	Lira	Northern	608	37	37	Makasongula	Central	665
9	32	Moroto	Northern	354	38	41	Rakai	Central	404
10	33	Movo	Northern	235	39	43	Sembalule	Central	362
11	38	Nebbi	Northern	585	40	55	Wakiso	Central	541
12	56	Yumbe	Northern	322	41	49	Kayunga	Central	405
Northern Region Sub Total				5,481	Central Region Sub-Total				7,028
13	7	Bugiri	Eastern	434	42	5	Bundinubugyo	Western	331
14	7	Busia	Eastern	404	43	6	Bushenyi	(S)Western	1,159
15	11	Iganga	Eastern	541	44	10	Hoima	Western	677
16	12	Jinja	Eastern	308	45	13	Kabale	(S)Western	680
17	16	Kamuli	Eastern	687	46	14	Kabarole	Western	329
18	17	Kapchorwa	Eastern	279	47	18	Kasese	Western	498
19	25	Katakwi	Eastern	461	48	19	Kibaale	Western	560
20	24	Kumi	Eastern	426	49	21	Kisoro	(S)Western	333
21	30	Mbale	Eastern	246	50	29	Masindi	Western	829
22	40	Pallisa	Eastern	450	51	31	Mbarara	(S)Western	1,210
23	44	Soroti	Eastern	341	52	39	Ntungoma	(S)Western	502
24	45	Tororo	Eastern	337	53	42	Rukungiri	(S)Western	313
25	54	Sironko	Eastern	138	54	50	Kyonjojo	Western	341
26	51	Mayuge	Eastern	336	55	47	Kanwenge	Western	390
27	46	Kaberoniaido	Eastern	152	56	48	Kanungu	(S)Western	364
28	52	Nakapiripirit	Eastern	415	Western Region Sub Total				8,516
29	15	Kalangala	Eastern	159	TOTAL				27,139
Eastern Region Sub Total				6,114					

Source: MoWT



Source: MoWT

Figure 13.1-1 National Road Network, as of 2007

13.1.2 Institutional Structure of Road Administration

13.1.2.1 Jurisdiction of Roads

Development and maintenance of national roads is under the jurisdiction of the recently established UNRA. That of district roads is under the jurisdiction of district local governments. The development and maintenance of urban roads is under the jurisdiction of urban councils while community access roads are under that of sub-counties.

13.1.2.2 Institutional Reform

The World Bank and other donor development partners have promoted institutional reforms of the road sub-sectors in Africa. Main points of the reform include 1) separation of policy and planning function from actual implementation of investment and maintenance, 2) more involvement of the private sector in road development and maintenance.

Up to the late 1990s, the ministry (MoWT or MoWHC) planned, administered and maintained national roads. From 1998, the planning responsibilities were increasingly shifted from the ministry to the Road Agency Formation Unit (RAFU), which eventually evolved into the Uganda National Roads Authority (UNRA) in July 2008. The UNRA now plans, administers and maintains national roads as a semi-autonomous agency under the MoWT.

13.1.2.3 Ministry of Works and Transport (MoWT)

Ministry of Works and Transport (MoWT) is the lead government agency in the national transport sector with the following responsibilities:

- Transport sector policy formulation within the framework of national and regional transport goals, objectives and strategies
- Provision of higher-level planning directives and guidelines to the transport sub-sectors
- Overall regulation of the transport sector
- Monitoring, evaluation and reporting of transport sector performance
- Transport sector database management

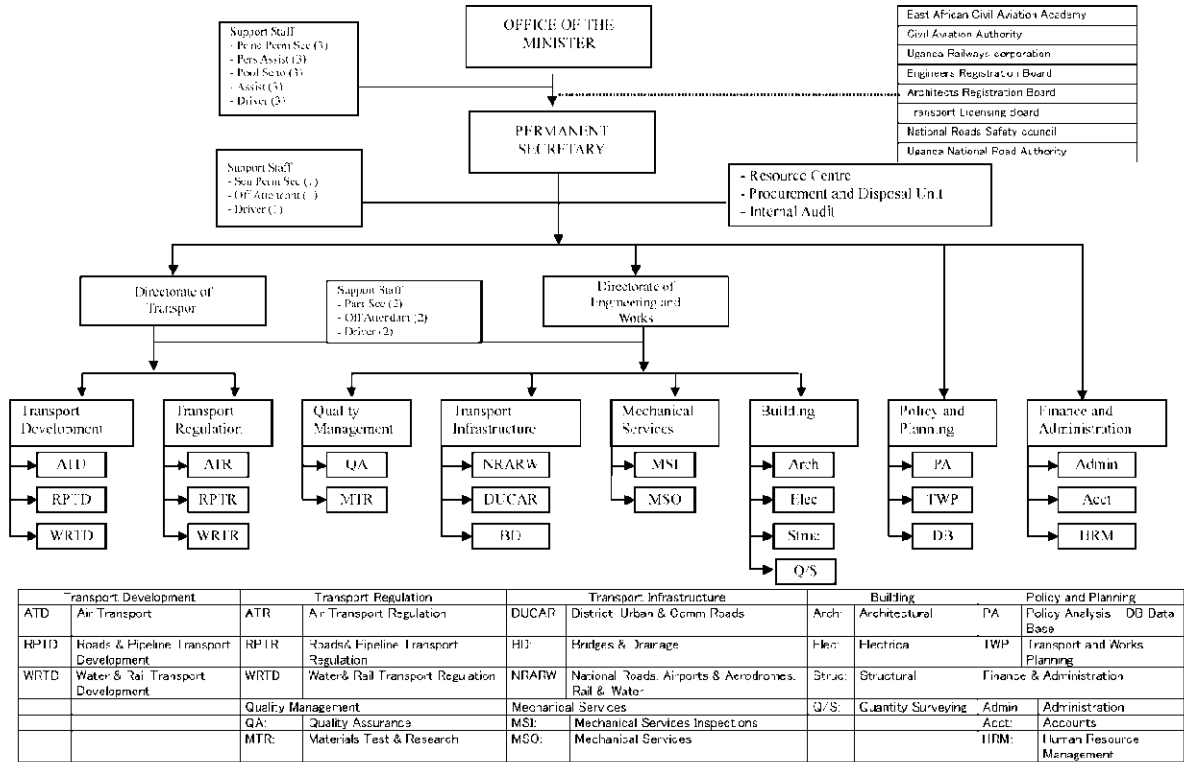
MoWT is composed of eight departments, under which 26 divisions are operational. See Figure 13.1-2. One of the divisions is the District and Community Access Roads Division, which is in charge of technical and financial guidance for district roads and community access roads. The division has 17 professional positions.

13.1.2.4 Uganda National Roads Authority (UNRA)

UNRA operates under an organizational structure as approved by the Board in 2008. The Authority is headed by an Executive Director, who is appointed by the Minister of Works and Transport. In the UNRA organizational structure, there are five directorates, namely (i) Planning, (ii) Projects, (iii) Operations, (iv) Finance and Administration, and (v) Internal Audit. Within each directorate, there are positions of managers, project engineers/officers, technicians and support staff. UNRA has 22 stations, which are in charge of management of actual maintenance work on national roads.

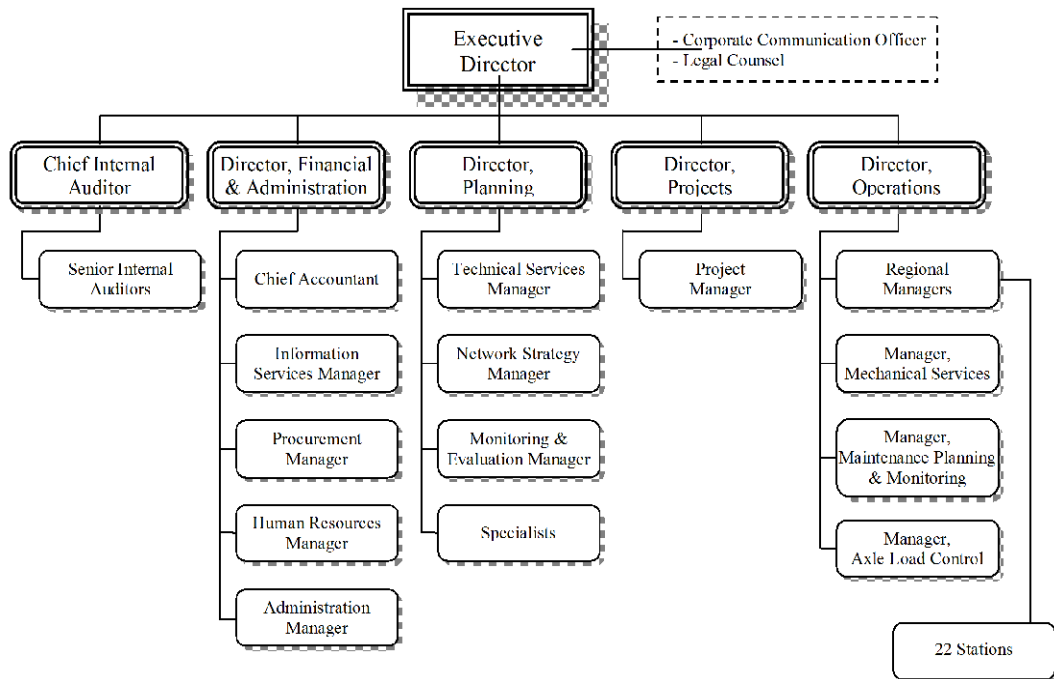
Gulu Station of UNRA is in charge of the districts of Gulu, Amuru and Nwoya. Kitugum Station of UNRA covers Kitugum, Lamwo, Pader and Agago Districts.

The Macro Structure of UNRA is shown in Figure 13.1-3.



Source: MoWT

Figure 13.1-2 Present Structure of MoWT



Source: UNRA

Figure 13.1-3 Present Organization of UNRA (HQ)

13.1.2.5 Ministry of Local Government (MoLG)

The MoLG is responsible for coordinating the financing and delivery of road services relating to the local road networks, which were established under the jurisdiction of local governments under the Local Government Act, 1997.

13.1.2.6 District Local Governments

The District Local Governments (Councils), including Kampala City Council, are responsible for the construction, rehabilitation and maintenance of roads, which are not under the responsibility of the central government, i.e. district roads, urban roads and community access roads.

These local government authorities are further required by the Local Government Act 1997, to prepare comprehensive and integrated development plans incorporating plans for lower-level local governments for submission to the National Planning Authority.

The district has typically nine departments, in addition to three units. One of the departments is the Works Department, which is in charge of road development and maintenance.

13.1.2.7 District Works Department

The organization structure and personnel of the District works department were as shown in Figure 13.3-5 - Figure 13.3-9. The district works department has seven positions of officers. The district works department is in charge not only of roads, but also of water supply and government buildings.

13.2 Road Funding

13.2.1 General

The funding for the Transport Sector is done by (1) Ministry of Finance, Planning and Economic Development (MoFPED) and (2) Uganda Road Fund.

MoFPED is responsible for mobilizing and making available the funding as per the approved transport sector investment plan and provides oversight to the Road Fund Management Board in accordance with the provisions of the Act establishing the fund.

Uganda Road Fund is a body corporate established by an Act of Parliament as part of the overall government strategy to commercialize the roads sub-sector by transferring the burden of maintaining roads from the general taxpayer to road users. The objectives of the Fund are as follows:

- To finance the routine and periodic maintenance of public roads in Uganda
- To ensure that public roads are maintained at all times
- To advise the Minister on (1) the preparation and efficient and effective implementation of the Annual Road Maintenance Programme and (2) the control of overloading of vehicles on public roads.

13.2.2 Government Budgets for Road Improvement and Maintenance

13.2.2.1 Budget for Upgrading/Improvement of National Roads and District Roads

The investment level for national roads was drastically increased in the last three years or so. The investment level in early 2000 was around 80 million USD per year. However, the current investment level for national roads is 150-200 million USD per year, in accordance with the budget policies of MoWT. See the following table.

Table 13.2-1 Road Sector Investment and Recurrent Expenditure, 2000/2001-2005/2006 and 2009/2010 & 2010/2011

Unit: Million USD

	2000/2001 Actual	2001/2002 Actual	2002/2003 Actual	2003/2004 Budget	2004/2005 Projection	2005/2006 Projection	2009/2010 Budget	2010/2011 Budget
(A)GOU Funded								
National Road Maintenance	32.6	37.8	29.8	31.9	35.0	35.0	30.1	79.1
National Road Development	19.7	24.3	15.4	17.2	13.7	13.7	213.5	118.6
Institutional Capacity Building	1.2	1.0	1.7	2.1	4.1	4.1	-	-
District and Urban Roads (Improvement)	7.5	6.8	16.6	16.5	15.5	15.2	9.7	11.3
District and Urban Roads (Maintenance)	10.3	11.0	0.5	2.3	3.3	3.1	1.1	43.6
Others	10.7	8.6	9.6	4.6	3.5	3.4		
Sub-Total of GOU Funded Investigation and Recurrent expenditure	82.0	89.5	73.6	74.6	75.0	74.5		
(B) Donor Funded								
National Road Development	13.7	74.9	23.9	93.1	106.1	109.1	135.2	136.7
District Road Development							11.8	7.2
National Road Maintenance	4.7	8.7	4.7	20.0	9.7	12.7	15.5	3.2
District Road Maintenance							21.0	0.0
Others	2.2	0.0	0.0	4.4	8.0	8.0		
Sub-total of Donor Funded Investigation and Recurrent expenditure	20.6	83.5	28.6	117.4	123.7	129.8		
TOTAL Financing (GOU and DONOR)	102.6	173.0	102.1	192.0	198.7	204.3		
<i>GOU % of Total</i>	79.9%	51.7%	72.0%	126.8%	37.7%	36.5%		
Sub-total of National and District Road Development (GOU and DONOR)	40.9	106.0	55.8	126.8	135.1	137.9	358.4	266.6
Sub-total of National and District Road Maintenance (GOU and DONOR)	47.7	57.4	35.0	54.2	48.0	50.8	46.8	125.9
Total Financing of National and District Development and Maintenance (GOU and DONOR)	88.5	163.4	90.8	181.0	183.1	188.7	405.1	392.6

Source: Data of 2000/2001-2005/2006: MoFPED of Uganda. Referred to in Republic of Uganda Appraisal Report, Road Sector Support Project, prepared by African Development Fund, March 2005

Data of 2009/2010-2010/2011: Ministerial Budget Policy Statements, 2009 and 2010

The current level of investment for district roads improvement has been around 5-10 million USD per year during the last decade. The current level of investment for district roads maintenance is still very limited at 18-21 billion Ushs. (around 8 million USD), compared to that for national roads. See the following table.

Table 13.2-2 Budget and Actual Expenditure of DUCAR for 2003/04 -2006/07

Unit: Billion Ushs.

Category	2003/04		2004/05		2005/06		2006/07		Total	
	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual
District Roads Maintenance	17.957	17.339	18.310	17.295	19.869	16.702	18.380	17.096	74.516	68.43
District Roads Development	18.315	19.121	13.460	16.193	13.870	14.909	10.400	9.256	56.045	59.48
<i>Sub Total</i>	<i>36.272</i>	<i>36.460</i>	<i>31.770</i>	<i>33.488</i>	<i>33.739</i>	<i>31.611</i>	<i>28.780</i>	<i>26.352</i>	<i>130.561</i>	<i>127.91</i>
Urban Roads Maintenance	4.078	3.862	3.992	4.057	3.946	3.745	4.100	3.901	16.116	15.57
Urban Roads Development	3.394	3.828	3.120	2.341	1.500	0.876	1.850	1.702	9.864	8.75
<i>Sub Total</i>	<i>7.472</i>	<i>7.690</i>	<i>7.112</i>	<i>6.398</i>	<i>5.446</i>	<i>3.829</i>	<i>5.950</i>	<i>5.603</i>	<i>25.98</i>	<i>23.52</i>
Community Access Roads	1.869	4.847	2.960	3.238	5.658	3.504	5.240	3.254	15.727	14.84
Total	45.613	48.997	41.842	43.124	44.843	38.944	39.97	35.209	172.268	166.27

Source: MoFPED

*Includes 15 billion Ushs. for Kampala

Table 13.2-3 Planned and Actual Physical Performance of DUCAR for 2003/04-2006/07

Unit: km

Category	2003/04		2004/05		2005/06		2006/07		Total	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
District Roads Routine Maintenance	18,000	16,800	18,026	16,800	18,000	16,800	18,000	16,800	72,026	67,200
District Roads Periodic Maintenance	1,370	696	748	531	1,370	1,258	1,370	1,065	4,858	3,550
District Roads Development	829	422	2,051	1,321	1,095	1,107	1,590	1,202	5,565	4,052
Urban Roads Maintenance	250	145	90	145	250	145	250	105	840	540
Urban Roads Development	8.8	3.7	70	41	64	34	34	16	177	95
Community Access Roads	-	-	652	300	652	250	489	391	1,793	941

Source: Final Draft, The Ten-Year District, Urban and Community Access Roads Investment Plan (DUCARIP), MoWT, March 2008

13.2.2.2 Budget for Maintenance of National Roads and District Roads**(1) Uganda Road Fund (URF)**

Between 2000 and 2005, the budget for national road maintenance was around 30-35 million USD per year. After the beginning of the Uganda Road Fund (FY 2010/2011), around 190 million USD, which is a six times larger budget, has been allocated to the national road maintenance.

Table 13.2-4 Ceiling Budget of the Uganda Road Fund (URF)

Unit: Million Ushs.

		FY2010/11			FY2011/12			Balance		
		Dist.	CARs	Total	Dist.	CARs	Total	Dist.	CARs	Total
District	Gulu	671.1	112.5	783.6	555.3	102.8	658.1	-115.8	-97.0	-125.5
	Kitgum	438.0	67.6	505.6	359.8	61.6	421.4	-78.2	-6.0	-84.2
	Lamwo				342.6	51.5	394.1	+342.6	+51.5	+394.1
	Pader	758.6	133.5	892.1	320.2	54.1	374.3	-438.4	-79.4	-517.8
	Agago				377.1	67.5	444.6	+377.1	+67.5	+444.6
	Sub-Total	1,109.1	313.6	1,422.7	1,955.0	337.5	2,292.5	+845.9	+23.9	+869.8
	TOTAL (incl. above sub-total)	43,312	7,459	50,771	37,740	6,900	44,640	-5,572	-559	-6,131
UNRA	Periodic and Routine maintenance	189,057			177,785			-11,272		
	Operational	6,913			4,080			-2,833		
	Total	195,959			181,865			-14,105		

Source1: Declaration of budget ceiling for road maintenance in FY2010/11, The New Vision May 24, 2010,

Source2: Final Indicative Planning Figures (FIP) to Uganda road fund designated agencies for financing maintenance of public roads in FY 2011/12, The New Vision June 2, 2011

Similarly after the commencement of the Road Fund (FY 2010/2011), the maintenance budget for district roads was also largely increased as high as 43 million USD. However, the total budget for road development and maintenance would be kept at the same level or slightly decreased compared to those before the beginning of the Road Fund.

In Acholi sub-region, the budget increased to 1,955 million Ushs. in FY2011/12 from 1,109 million Ushs. of the last FY. This is considered to be the result of the separation of districts.

(2) Peace, Recovery and development plan (PRDP)

The Peace Recovery and Development Plan (PRDP) in Northern Uganda is also a main source of income for the district and community access roads for Northern part of Uganda. The PRDP is a three year GOU plan started from July 2009 and currently programmed to run until June, 2012. So, this FY2011/12 will be the last year to receive funds under the current phase of PRDP. The second phase is now under planning by the government.

The following table indicates the funding by priority programme in FY2009/10 and 2010/11.

Table 13.2-5 PRDP funding by Priority Programme (FY2009/10-FY2010/11)

Unit: Million USD

Programme		PRDP Grant	Special Projects	Off-Budgets	Total	% of Total
SQ1: Consolidation of State Authority						
1	Facilitation of peace agreements	0.0	0.4	0.5	1.0	0.2%
2	Police enhancement programme	1.5	0.0	0.0	1.5	0.2%
3	Prisons enhancement programme	6.2	0.0	1.5	7.7	1.3%
4	Judicial enhancement programme	1.7	0.0	0.0	1.7	0.3%
5	Rationalization enhancement programme	0.0	0.0	0.0	0.0	0.0%
6	Local government enhancement programmes	0.0	0.0	1.6	1.6	0.3%
SQ2: Rebuilding and Empowering Communities						
7	IDP Emergency Assistance programme	0.0	2.1	39.5	41.6	7.0%
8	IDP return/resettlement programme	0.0	0.0	33.2	33.2	5.6%
9	Community Empowerment & Recovery Programme	66.5	28.8	219.2	314.5	53.3%

Programme		PRDP Grant	Special Projects	Off-Budgets	Total	% of Total
SQ3: Revitalisation of the economy						
10	Production and marketing enhancement programme	0.0	31.4	13.4	44.8	7.6%
11	Infrastructure Rehabilitation & Urban Improvement	19.3	0.1	6.6	26.1	4.4%
12	Environment, Land and Natural Resources	0.0	0.0	11.1	11.1	1.9%
SQ4: Peace Building and Reconciliation						
13	Public Information & Communication/Counselling services	0.0	0.0	18.9	18.9	3.2%
14	Mediation & reconciliation, Amnesty & reintegration of ex-commanders	0.0	0.0	1.6	2.6	0.4%
Multiple Programme funding		14.1	35.0	35.0	84.1	14.2%
Total		110.3	97.9	382.2	590.3	100%

Source: Mid Term Review of the Peace, Recovery and Development Plan (PRDP) for Northern Uganda, Office of the Prime Ministers, June 2011

From the above table, it can be found that 53.3% of the funding was provided for Community Empowerment & Recovery Programme (Programme 9), and that Infrastructure Rehabilitation & Urban Improvement (Programme 11) received only 4.4% of the overall funding. The major works was for the maintenance of the roads.

Table 13.2-6 shows the expenditure of PRDP in FY2009/2010.

Table 13.2-6 Acholi Sub-region PRDP Expenditure FY2009/10

District	Release ('000 Ushs.)	Ratio from Table 13.3-4	Estimated Amount for Infrastructure ('000 Ushs.)
Amuru (+Nwoya)	3,045,412	4.4%	133,998
Gulu	4,748,210	4.4%	208,921
Kitgum (+Lamwo)	3,903,090	4.4%	171,732
Pader (+Agago)	4,386,322	4.4%	192,998
Gulu Municipality	730,275	4.4%	32,132
Total	16,813,310	4.4%	7,119,786

Source1: District and Municipality First Year PRDP Implementation Report (FY2009/10)

Source2: Mid Term Review of the Peace, Recovery and Development Plan (PRDP) for Northern Uganda, Office of the Prime Ministers, June 2011

(3) Income from other Donors

1) U-Growth (DANIDA)

U-Growth is a project by DANIDA to fund mainly agriculture and district roads. This project was commenced in January, 2010. The target area covers the whole country but focusing on the northern part of Uganda in particular. The project consists of 1) Technical assistance to the agriculture sector, 2) improvement of 3,000km of district and community access roads in the northern region 3) Support MELTC and 4) Supporting agricultural industries. The following table indicates the contents and budget of the Project.

Table 13.2-7 Budget Allocation Plan of U-Growth

Category	Budget	Fund by DANIDA	Contents
Supporting Agricultural sector	0.9 million USD	0.9 million USD	Supporting agricultural sector under national development plan, investment plan
Improvement of district and community access roads	28.8 million USD	28.8 million USD	Improvement of district and Community Access Roads, and supporting private contractors. Targeted 3,000km of northern region of Uganda
Supporting Agricultural Industries	56.79 million USD	40.32 million USD	Funding to 100,000 farmers and 300 agricultural organizations
Review and survey	1.8 million USD	1.8 million USD	
Unplanned Contingency	7.38 million USD	7.38 million USD	
Total	95.31 million USD	79.20 million USD	

Source: U-Growth Programme Document

2) NUDEIL (USAID)

NUDEIL (Northern Uganda Development of Enhanced Local Governance Infrastructure and Livelihoods) is a Project sponsored by USAID aiming at providing social services down to the community level through the improvement of social infrastructure. The Project implements support in technology, the tendering process, budget management, reporting and strengthening public activities.

Hence, the following support is given in order to recover the local economy and facilitate the return of the IDP's by direct cash injection through labour based intensive construction.

- Strengthening local contractors by providing technical support
- Supporting the sector utilizing the government's system

NUDEIL is planned up to Phase-4 and recently Phase-2 was completed. Phase-3 is now under operation. The details of the contents will be determined by the local government. In phase-2, major activities were carried out in Gulu district and from the next phase it is planned to expand to other districts. Details, except for Gulu, were not determined at this moment, but furthermore, a GIS seminar is planned in order to handover to the local governments all the GIS data created in the project.

13.2.2.3 Investment Plan for Roads of the National Transport Master Plan

The National Transport Master Plan (2008-2023), established in May 2009, proposed a 15-year investment plan for the whole transport sector. The investment plan for the Road Sub-sector is shown in the following table.

Table 13.2-8 Investment Plan for the Road Sub-sector, 2008-2023

Unit: Million USD

	5 Years, 2008-2013	5 Years, 2013-2018	5 Years, 2018-2023
National Road Development Projects	1,682.9	1,463.1	1,375.0
National Road Bridge Development Projects	57.6	90.0	50.0
Upgrading of District Roads to National Roads	175.0	0.0	0.0
District Road Development	280.6	296.9	286.7
Community Access Road Development	24.2	24.3	24.2

Source: Table 18.2, page 191, National Transport Master Plan including Transport Master Plan for the Greater Kampala Metropolitan Area (NTMP/GKMA)

13.3 Present Road Maintenance Operation and Organization of Districts

13.3.1 Road Maintenance Operation of Districts

13.3.1.1 Introduction of Force Account in Routine Maintenance

To respond to the increasingly deteriorating condition of the DUCAR, the government has decided to change the effective maintenance system as following.

- 1) The district will directly manage routine maintenance (force account) by utilizing LBT.
- 2) The government will establish private regional equipment centres to support the maintenance

Following is the basic scheme according to the cabinet paper prepared in April 2010.

- a. Routine maintenance of district and urban roads will be managed by the district directly. Each district will be provided with light maintenance equipment such as motor graders, tipper trucks and pedestrian rollers. This equipment will be utilized for light grading and re-graveling of roads expected to be carried out once every 3 months.
- b. For routine manual Maintenance of district roads, workers organized in road gangs will be deployed. A gang of 6 under an overseer will maintain a road section of 12km. The gang will reside in a small camp and will be provided with the requisite road tools and implements.
- c. The government will procure a firm to maintain and operate the road equipment to re-gravel the district roads and reseal/seal urban roads (which means periodic maintenance). The operator will execute the works at fixed rates that will at least cover direct and operational costs. The operator will be paid a management fee. The local government will pay for the works based on pre-set unit rates from their conditional grant allocations.
- d. Consultancy services will be provided to assist the local governments prepare the documentation required to execute the works. It is envisaged that the local governments will be allocated adequate funds in the form of Conditional Grants to cover these financial requirements, and thereby ensure the viability of the scheme.
- e. Clear Guidelines for use of road gangs and light equipment will be prepared and local governments will be sensitised on the benefit of the scheme.
- f. Annually 2,000km of district roads will be rehabilitated and 3,500km will receive periodic maintenance treatments and 150km of urban roads will be resealed or sealed.

The details of the Scheme, the part which concerns district road maintenance is shown in the following tables. (Source: The scheme for use of equipment in district labour (Force Account) operations in maintenance of district and urban roads, garbage collection, and disposal and fire-fighting, MoWT, April 2010)

Table 13.3-1 Equipment Plan to be Provided to District and its Operation Cost

		No.	Fuel per day	No. of days work in a Month	Estimated fuel consumption per month	Total estimated fuel consumption per year
1	Motor Grader	1	150	15	2,250	27,000
2	Dump Truck	1	70	15	1,050	12,600
3	Pedestrian Roller	1	10	8	80	960
4	Pick up	1	20	10	200	2,400
5	Motorcycle	2	5	15	150	1,800
	Sub Total	litter				44,760
	Fuel Cost	2,000	x	44,760	=	89,520,000
	Oil & Lubricants	0.1	x	89,520,000	=	8,952,000
	Total				Ushs.	98,472,000

Source: MoWT

Table 13.3-2 Human Resources and its Salary Scale for Operation to District

	Description	No.	Salary Scale	Annual Salary per person (Ushs.)	Total Annual Salary (Ushs.)
1	Foreman	1	U5	4,114,241	4,114,241
2	Plant Mechanic	1	U7	2,353,288	2,353,288
3	Plant Operator	2	U7	1,802,502	3,605,004
4	Drivers	2	U8	1,476,763	2,953,526
	Total				13,026,059
5	Allowance		x1.5		19,539,089
6	Road Overseer		U7	1,802,502	
7	Road Gang			1,200,000	

Source: MoWT

Table 13.3-3 Maintenance Cost for the Equipment to District

		No.	Unit Cost ('000 Ushs.)	Total ('000 Ushs.)	Remarks
1	Motor Grader	1	400,000	400,000	
2	Dump Truck	1	170,000	170,000	
3	Pedestrian Roller	1	30,000	30,000	
4	Pick up	1	70,000	70,000	
5	Motorcycle	2	5,000	10,000	
	Total			680,000	
6	Service & Maintenance		x 0.05 x 1.2	40,800	First Year
			x 0.075 x 1.2	61,200	Second Year
			x 0.1 x 1.2	81,600	Third Year
			x 0.125 x 1.2	102,000	Forth Year
			x 0.15 x 1.2	122,400	Fifth Year & more

Source: MoWT

The government is expecting the funds to come in the form of a loan from the Chinese government. These funds are expected to be distributed to procure equipment for the district as well as for the regional equipment centre. However, since the negotiations between the governments are not concluded at the moment, it is not clear when the funds will be disbursed.

Also, it was confirmed that there is budget for the training but not for the operation for FY2011/12. Hence, it is clear that the operation of the force account will be postponed to the next coming years.

13.3.1.2 Current Maintenance Standards and Contents

The current system of road maintenance works is explained in this section, including routine maintenance, periodic maintenance and rehabilitation.

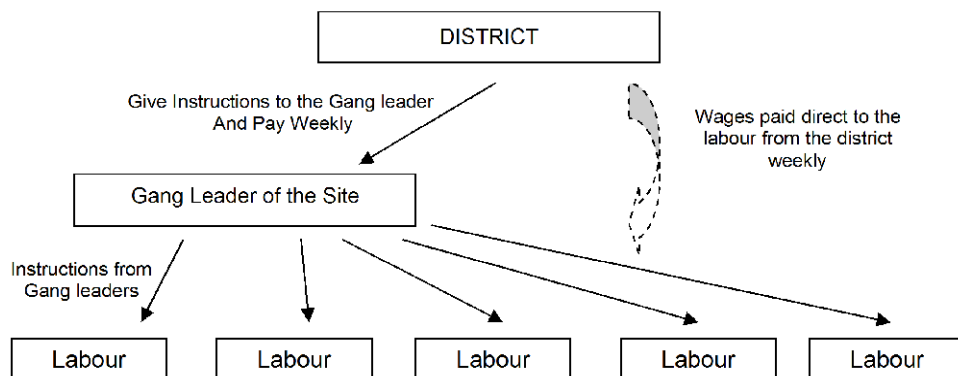
(1) Routine Maintenance

Routine Maintenance is an activity carried out throughout the year, and every road section shall be subject to routine maintenance at least once a year. The work items included in the routine maintenance are as follows:

- Clearing and de-silting of culverts, open and lined channels and culvert outfalls, mitre drains, off shoots and catch water drains.
- Digging up, dismantling and repair or replacement of broken culverts, head walls, wing walls, catch pits or splash aprons.
- Weeding and vegetation control along the carriageway and road verges.

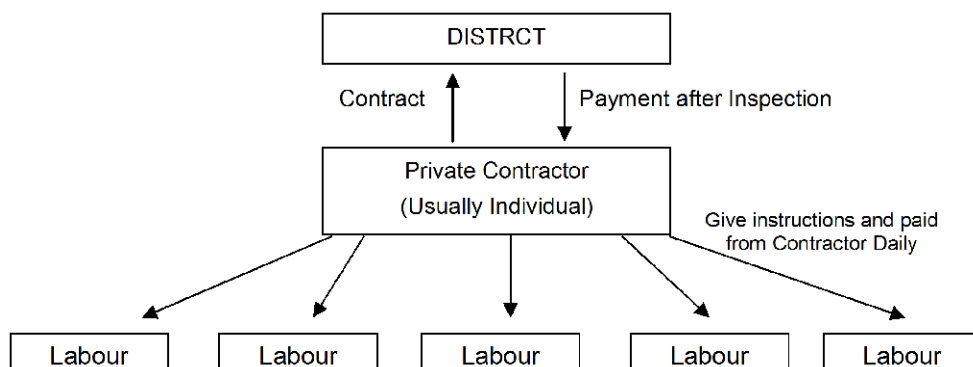
These operations mainly require small-scale, low skill technology. Therefore, for routine maintenance, labour-based construction is suitable. Labour-based construction would contribute to the local economy through direct increase in household incomes and personal expenditures.

The following figures show alternative models of implementing labour-based construction. One is maintenance work by force account, and the other is contracting with private contractors. However, since the preparation to operate the force account is not ready currently, most of the works are carried out by contracting out.



Source: JICA Study Team

Figure 13.3-1 Typical Model of Labour-based Construction by Force Account



Source: JICA Study Team

Figure 13.3-2 Typical Model of Labour-based Construction by Contract with Private Contractor

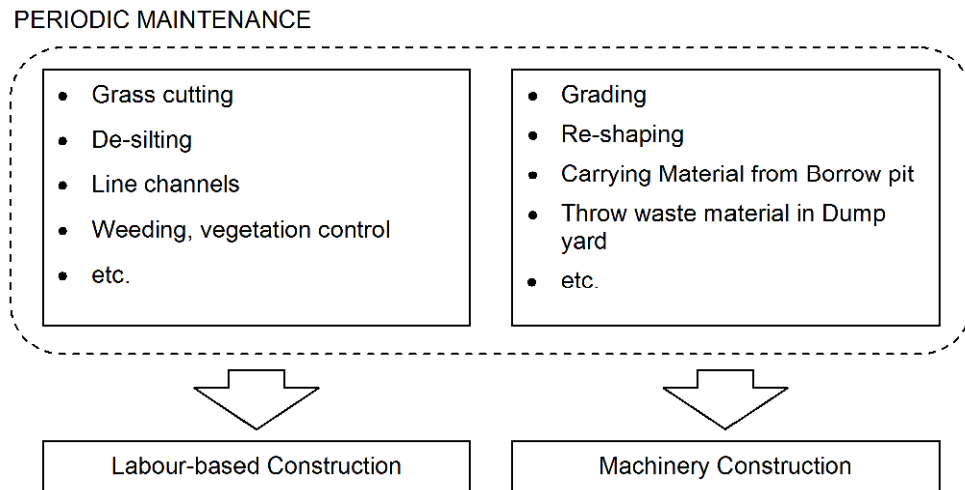
(2) Periodic Maintenance

Periodic Maintenance is an activity carried out after a few years. According to DUCARIP, district roads are preserved in fair condition by conducting periodic maintenance every 3 years. The work items of periodic maintenance include:

- Reshaping
- Re-graveling
- Spot Improvements on bad sections
- Replacement and repair of broken culverts
- Improvement of side drains

For some of these activities, using machinery is practical and convenient. The combination of labour-based techniques with using some machinery should be considered.

Using machinery for some work items is efficient, while grass cutting and de-silting are more effectively and efficiently conducted by using labour-based methods. See Figure 13.3-3, which illustrates that the periodic maintenance is to be done by using the two types of works. Certain work items are to be done by labour-based methods while the other work items are to be carried out using machinery.



Source: JICA Study Team

Figure 13.3-3 Periodic Maintenance by Labour-base and Machinery Construction

(3) Rehabilitation

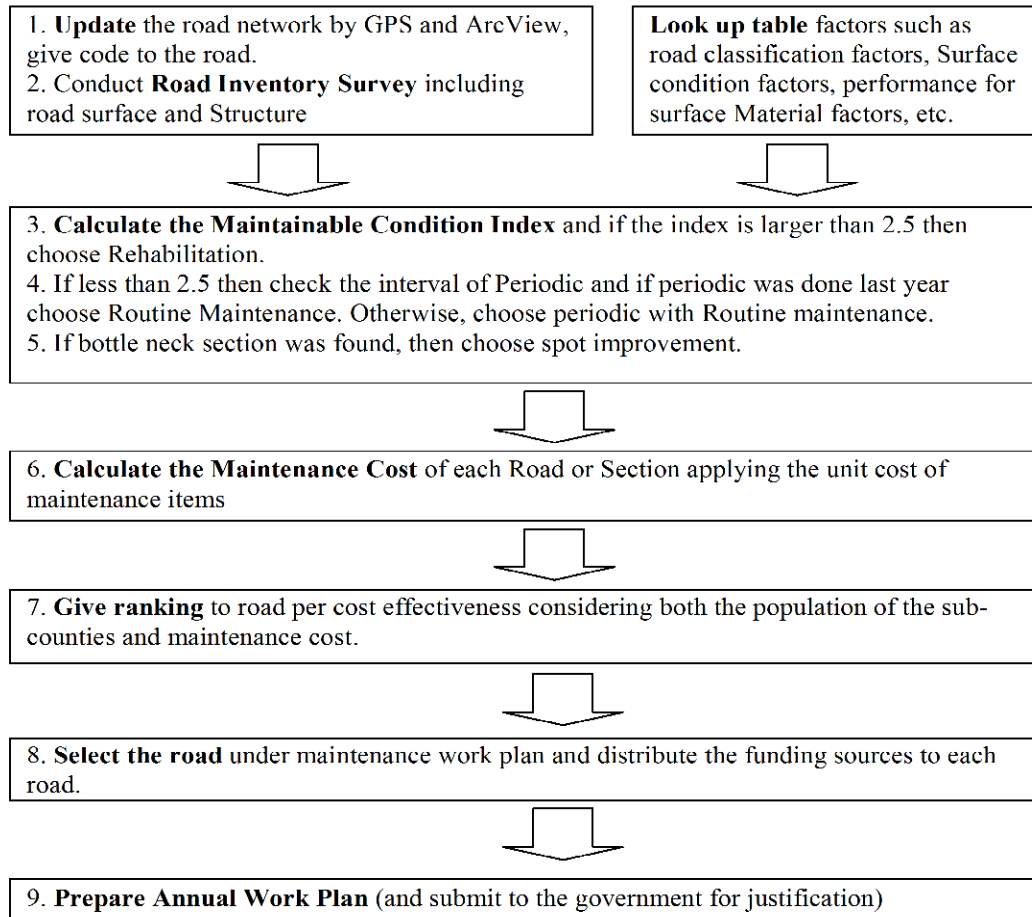
Rehabilitation refers to an activity (or activities) conducted on sections where the road has deteriorated to a state that is beyond the remedial recovery achievable by periodic maintenance, and according to DUCARIP, it is assumed that 15% of the periodic maintenance section is due for rehabilitation. Rehabilitation activities include:

- Bush clearing
- Heavy grading
- Reshaping of the carriageway
- Full gravelling
- Installation of culverts
- Improvement of side drains

13.3.1.3 Management Method of Road Maintenance at District Level

The district works department uses the “Rehabilitation and Maintenance Planning System (RAMPS)” and “Quarterly Progress Reporting System (QPRS)” for monitoring, planning and management for rehabilitation and maintenance of district roads. These tools are supported by computer software that was developed by the MoWT with DANIDA’s support.

The basic steps of using RAMPS and QPRS are shown in the following.



Source: JICA Study Team

Figure 13.3-4 Basic Flow Chart of RAMPS & QPRS

Updating the road network by implementing a road survey every year and assigning a road code to these new roads is a key to prepare a proper annual work plan. This work requires skill with a GPS and the software Map Source and ArcView. But due to inadequate literacy, most of this work is not in operation in some of the districts of Acholi sub-region. Training in this skill is not included in the curriculum of MELTC. Hence, the district has little chance to obtain this operational skill.

Also, RAMPS prioritizes with consideration of maintenance cost and population of the sub-counties. This ranking is made by cost effectiveness where it describes maintenance cost per person. However, in the interviews with the districts, a need was found for a system so that the impact of social infrastructure such as hospitals and schools shall also be included in the system as well as population. So, in practice, most of the districts are using the ranking from RAMPS as a reference and in the final decision, prioritization was made manually.

13.3.2 Budget, Organization and Management Plan of the District

13.3.2.1 Current Income of District

The maintenance of the district and community access roads is done by the district and the sub-counties which is the substructure of the Ministry of Local Government (MoLG). The district used to have their original income source which was called the G-Tax (Generation Tax) until 2006. In 2006, the government abolished the G-Tax and the ratio of independent revenue has declined from 30% to 7%. And even that 7% is spent for the running cost of the district itself. From this circumstance, for investment in the infrastructure, the district has become to depend on grants from the central government.

Currently, the budget for the road maintenance is provided by the URF, PRDP and Grants from donors (mainly from DANIDA) as shown in Table 13.3-4, Sample Form of Annual Work Plan for Road Maintenance. However, there is almost no fund from the original source.

Table 13.3-4 Sample Form of Annual Work Plan for Road Maintenance

Source	Routine	Periodic	Rehabilitation	Bottle Neck		Operation
				Road	Bridge	
URF	-	-	-	-	-	-
PRDP	-	-	-	-	-	-
Grant (Mainly from DANIDA)	-	-	-	-	-	-
Original source	-	-	-	-	-	-

Source: JICA Study Team

The budget and planning regarding road maintenance requires approval from the road committee which is established at each district. The members of the committee are as shown below. A road committee is also established at the sub-county level.

- CAO
- District Engineer
- Chairperson (Politician)
- Representative of Works (from the member of parliament)
- Member of Parliament

Further, road maintenance works are also done by CAIP (Community, Agriculture, Infrastructure Improvement Program) and NUDEIL (Northern Uganda Development of Enhanced Local Governance Infrastructure and Livelihoods) which is the 4 year plan of MoLG. However, these are implemented on a project basis and not included in the annual plan.

13.3.2.2 Gulu District

(1) Budget

The Gulu district maintained 572.59 km of district roads and 909.6km of community access roads in FY 2010/11. In the following year, 2011/12, the district is planning to maintain 650.60km (33 routes) of district roads and 909.6 km of community access roads as well.

According to the annual work plan of FY2011/12, the length of the district roads to be maintained increased from 572.59km to 650.60km. However, the budget has conversely decreased from 1,743.2 million Ushs. to 935.1 million Ushs. Also, there are community access roads which need to be rehabilitated that are not included in the annual work plan. From this, it can be said that the fund to implement the whole network in the district is inadequate.

Table 13.3-5 Budget Expenditure and Planning of Road Maintenance in Gulu

(Unit: million Ushs.)

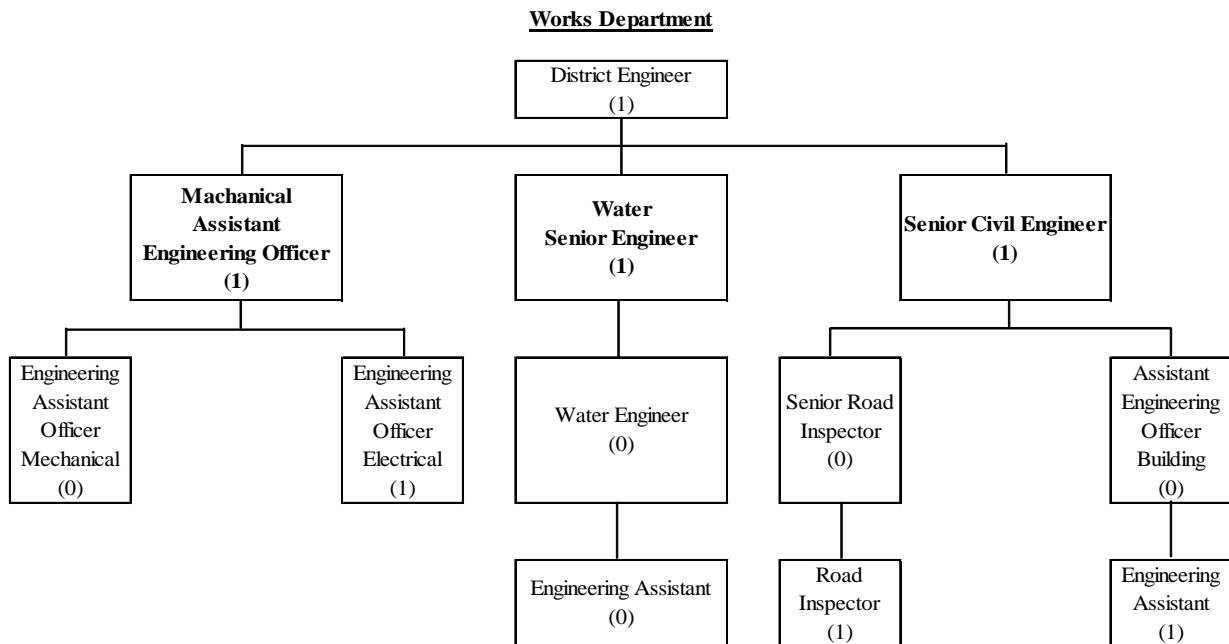
Source	Routine	Periodic	Rehabilitation	Bottle Neck		Operation	Total
				Road	Bridge		
URF	454.5 /338.6	56.8 /177.9				511.3 /38.9	611.9 /555.3
PRDP		504.6 /75.7					504.6 /75.7
Grant (DANIDA)		0 /189.9	626.7 /153.0				626.7 /342.9
Original source							
Total	454.5 /338.6	561.4 /443.5	626.7 /153.0				1,743.2 /935.1
km	516.39 /557.00	25.60 /32.70	30.60 /60.90				572.59 /650.60

Above/Below =FY2010/11 / FY2011/12

Source: Gulu District, Annual district road work plan for FY2010/11 and FY2011/12

(2) Organization

The person that takes care of road maintenance is the civil engineer who is under the works department. The civil engineer controls both roads and buildings but there is only one road inspector and a few supporting staffs as secretary and drivers. The following figure shows the organization of the Gulu District.



Source: Gulu District

Figure 13.3-5 Organization of Gulu District (Works Department)

(3) Maintenance Plan (Gulu)

There are 33 routes and 650.6km to be maintained in Gulu district. Out of the 33 routes, the following table indicates the roads which are planned to receive the periodic maintenance and rehabilitation. The rest of the roads are maintained by routine maintenance.

Table 13.3-6 Periodic Maintenance and Rehabilitation Roads in the Annual Work Plan FY2011/12

Road Code	District Priority Rank	Road Name	Road Length (km)	Section length (km)	Construction Length (km)	Type of Maintenance	Cost (,000 Ushs.)	Source
901	1	Pageya-Omel-Acet	51.60	7.60	7.6	Periodic	189,000	DANIDA
936	36		13.00	13.00	13.00	Rehabilitation	29,000	DANIDA
902	7	Abili-Abwoch	8.00	8.00	8.00	Rehabilitation	52,000	DANIDA
924	29	Coope-Monroch	9.60	9.60	9.60	Rehabilitation	52,000	DANIDA
911	5	Opit-Awoo	14.20	14.20	1.00	Rehabilitation	20,000	DANIDA
919	17	Alokolum-Ongako	12.50	12.50	12.50	Rehabilitation	312,500	PDRP
901	1	Pageya-Omel-Acet	51.60	5.90	5.90	Periodic	75,709	PDRP
927	26	Lakwaya-Minja	8.40	8.40	8.40	Rehabilitation	81,167	PDRP
903	22	LUkome-Gwengdiya	8.40	8.40	8.40	Rehabilitation	41,625	PDRP

Source: Gulu District

The following table indicates the Community Access Roads (CARs) which are considered to be important. Since these roads are not included in the annual work plan, they need a source of additional funds to implement the work.

Table 13.3-7 Important CARs of Gulu District (Needs further funds for maintenance)

	Road Name	Length (km)	Activity Required	Sub-County
1	Ongako-Amola	12.0	Rehabilitation and Bottleneck repair	Ongako
2	Tetugu-Pece	14.0	Rehabilitation and Bottleneck repair	Koro
3	Awere-Awali-Lapeta	10.7	Rehabilitation and Bottleneck repair	Odek
4	Akonyibedo-Lapeta	5.0	Rehabilitation and Bottleneck repair	Unyama
5	Opok-Ogul-Bulkur	19.0	Rehabilitation and Bottleneck repair	Lalogi, Koro, Paicho
6	Onyona-Oboljik	15.0	Rehabilitation and Bottleneck repair	Ongako
7	Onyona-Ayago	17.0	Rehabilitation and Bottleneck repair	Ongako

Source: Interview to Gulu District Works Department

Furthermore, the following table indicates which roads need further funds for rehabilitation while they are planned for routine maintenance in the annual working plan due to the limited funds.

Table 13.3-8 The Roads that Need Additional Funds to be Rehabilitated

S/No.	Road Name	Road Number	Road Length (Km)	Intervention
1	Rehabilitation of Bardege-Lalem_Pungwinyi	918	31.8	Rehabilitation
2	Rehabilitation of Minakulu-Okwii-Oraba	921	15.0	Rehabilitation
3	Rehabilitation of Lalogi-Bario	922	7.2	Rehabilitation
4	Rehabilitation of Cwero-Minja	913	41.5	Rehabilitation
5	Rehabilitation Labora-Loyoajonga-Acet	905	16.4	Rehabilitation
6	Rehabilitation of Cwero-Paigik-Paloro	907	36.0	Rehabilitation
7	Rehabilitation of Coope-Monroch	924	9.6	Rehabilitation
8	Rehabilitation of Negri-Paimanoo-Lalem	931	9.0	Rehabilitation
9	Rehabilitation of Adak-Awalkok-Idure	932	10.0	Rehabilitation
10	Rehabilitation of Plenga - Wiilacic	914	9.7	Rehabilitation
11	Rehabilitation of Bobi - Wiilacic	906	14.7	Rehabilitation
Total Road Length			200.9	

Source; Gulu District, Five year development plan 2011/12-2015/16

The following table indicates the list of community access roads which need rehabilitation but have to find another source of funding to implement the work.

Table 13.3-9 CARs Which Need to be Rehabilitated with Additional Funding

S/No.	Road Name	Road Number	Road Length (Km)	Intervention
1	Ajuri-Laminonami	946	6.7	Rehabilitation
2	Abole-Pece	947	11.4	Rehabilitation
3	Katikati-Paminano-Oitino	948	12.4	Rehabilitation
4	Bobo-Opaya-Opit	949	9.5	Rehabilitation
5	Loyobo-Copil	950	12.0	Rehabilitation
6	Paloro-Telute	951	18.0	Rehabilitation
7	Okwir-Lela Obaro	952	11.0	Rehabilitation
8	Layobo-Copil	953	12.0	Rehabilitation
9	Bungatira-St mauritz	954	5.0	Rehabilitation
10	Paloro-Telute	955	18.0	Rehabilitation
11	Opit-Ngai	956	13.0	Rehabilitation
12	Lukwir-Parwech	957	3.0	Rehabilitation
13	Opok-Tetugo	958	7.0	Rehabilitation
14	Lukwir-Hima	959	5.0	Rehabilitation
15	Gulu PTC-Barolam	960	12.0	Rehabilitation
16	Roko-Kidere	961	5.0	Rehabilitation
17	Laipainat-kiti	962	5.0	Rehabilitation
Total Road Length			166.0	

Source; Gulu District, Five year development plan 2011/12-2015/16

(4) Bottle Neck Section (Gulu)

The following table indicates the list of bottle neck sections in the district.

Table 13.3-10 Bottle Neck Sections of Gulu District

	Road/Structural Name	Location	Activity required	Sub-county
1	Pugwinyi-Otong HC	Atiabar Bridge	New Single span bridge construction	Patiko/Pabbo
2	Onyona-Abwoch	Abwoch swamp	Swamp raising	Ongako
3	Ongako-Ocaga-Orim	Ocaga swamp	Swamp raising	Ongako
4	Labora-Lamindera-Loyoajonga	Lagude	New Single span bridge construction	Koro
		Lamino Onyut	Vented drift	Lalogi
		Larwodo	Backfilling	Koro

Source: Interview to Gulu District Works Department

(5) Inventory of Machinery and its Condition (Gulu)

The following table indicates the construction machinery and equipment with its condition. The district possesses 11 pieces of equipment but only 4 are in running condition.

Table 13.3-11 Inventory of Machinery and its Condition

Item	Reg. No.	Year of Maintenance	Condition	Remarks
Supervision pick up	LG-0093-09	2001	Running but weak	Requires general service
Supervision pick up	LG-0094-09	2001	Poor	Requires general repair
Jiefang Tipper Truck		1999	Broken down	Requires general repair
Jiefang Tipper Truck		1999	Broken down	Requires general repair
Isuzu Tipper Truck		1992	Broken down	Requires general repair
Tractor	635-UEB	1997	Broken down	Requires general repair
Tractor	637-UEB	1997	Broken down	Requires general repair
Bull-dozer		1998	Running	Requires general service
Wheel-Loader		1992	Running	Requires general service
Grader		1992	Broken down	Requires general repair
Roller		1992	Running	Requires general service

Source: Gulu District, Annual district road work plan report for FY2011/12, 16-May, 2011

13.3.2.3 Kitgum District

(1) Budget

The Kitgum district maintained 251.20 km of district roads in FY 2010/11. In the following year, 2011/12, the district is planning to maintain 350.70km (25 routes) as well.

According to the annual work plan of FY2011/12, the length of the district roads to be maintained increased from 251.20km to 350.70km. However the budget has only increased from 1,992.6 million Ushs. to 2,266.9 million Ushs. Also, there are community access roads which need to be rehabilitated that are not included in the annual work plan. From this, it can be said that the funds to implement the whole network in the district are inadequate.

Table 13.3-12 Budget Expenditure and Planning of Road Maintenance in Kitgum

Unit: Million Ushs.

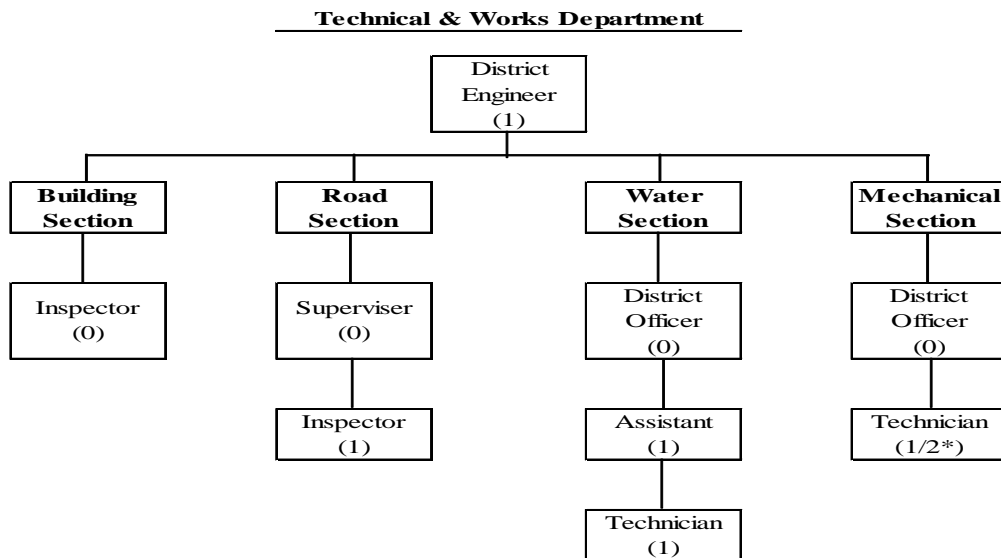
Source	Routine	Periodic	Rehabilitation	Bottle Neck		Operation	Total
				Road	Bridge		
URF	58.0 /118.7	342.0 /205.2		/25.2		38.0 /71.3	437.9 /420.4
PRDP	/	/1,134.5	927.0 /				927.0 /1,134.5
Grant (DANIDA)		/391.2	223.8 /	/39.9	403.8 /80.9		627.7 /512.0
Grant (NUDEIL)			/200.0				/200.0
Original source							
Total	58.0 /118.7	342.0 /1,731.0	1,150.8 /200.0	/65.1	403.9 /80.9	38.0 /71.3	1,992.6 /2,266.9
km	184.00 /269.10	23.00 /75.40	44.20 /6.20				251.20 /350.70

Above/Below =FY2010/11 / FY2011/12

Source: Kitgum District, Annual district road work plan-Expenditure Schedule - FY2010/11 and FY2011/12

(2) Organization

The division that takes care of road maintenance is the road section which is under the Technical and Works Department. There are only one road inspector under the District Engineer and a few supporting staffs such as a secretary and drivers. The following figure shows the organization of the Kitgum District.



Source: Kitgum District

Figure 13.3-6 Organization of Kitgum District (Technical and Works Department)

(3) Maintenance Plan (Kitgum)

There are 25 routes and 350.7km to be maintained in Kitgum district. Out of the 25 routes, the following table indicates the roads which are planned to receive the periodic maintenance and rehabilitation. The rest of the roads are maintained by routine maintenance.

Table 13.3-13 Work Plan for Periodic and Rehabilitation Maintenance in FY 2011/12

Road Code	District Priority Rank	Road Name	Road Length (km)	Section length (km)	Construction Length (km)	Type of Maintenance	Cost (,000 Ushs.)	Source
2215	7	Coner Kalabong-Akiok	23.00	23.00	4.00	Periodic	90,067	URF
2226	10	Akworo-Okidi HCIII	12.80	12.80	6.00	Periodic	115,200	URF
2224	1	Omiya Anyima - lagot	12.60	12.60	3.20	Periodic	62,041	PRDP
2218	6	Mucwini-Namokora	35.00	35.00	25.00	Periodic	560,000	PRDP
2216	9	Ayoma-Alune	35.00	35.00	7.00	Periodic	194,996	PRDP
2223	11	Orom-Akilok	18.20	18.20	15.00	Periodic	317,475	PRDP
2219	12	Mucwini-Abino	11.00	11.00	5.00	Periodic	135,213	DANIDA
2210	13	Mucwini-Kitgum Matindi	19.00	19.00	10.20	Periodic	256,000	DANIDA
2229	15	Ocettoke-Okora	6.20	6.20	6.20	Rehabilitation	200,000	NUDEIL
2230	8	Pawidi-Lagoro	5.00	5.00	-	Struc. Bottle Neck	80,908	DANIDA

Source: Kitgum District, Annual district road work plan-Expenditure Schedule - FY2011/12

Also, following are the Community Access Roads to be rehabilitated in Kitgum. The construction is planned to be funded by NUDEIL.

Table 13.3-14 CARs Maintenance Included in Work Plan FY 2011/12

Road Code	Road Name	Road Length	Length	Number of Bridges in bad condition	Number of Culverts in bad condition	Source
CAR01	Omiya anyima-Onyala	12.80	12.80	0	10	NUDEIL
CAR02	Awuch-Lukwor North	12.00	12.00	1 x 7.0 m	11	NUDEIL
CAR03	Corner Kalabong Onyala	16.00	16.00	0	13	NUDEIL
CAR04	Omiya Anyima-Omiya Pacwa	17.50	17.50	0	23	NUDEIL
CAR05	Lamola Lanydyang	11.00	11.00	1 x 9.0 m	9	NUDEIL
CAR06	YY.Okot-Ocettokke	8.20	8.20	0	7	NUDEIL
CAR07	Lagoro TC-Laono Central	15.00	15.00	0	18	NUDEIL

Source: Kitgum District, Annual district road work plan-Expenditure Schedule - FY2011/12

The following table indicates the roads planned to be updated from CARs to District roads. However, according to the Five Year Development Plan (FY2011/12-FY2015/16), there are 19 routes recommended to be updated to district roads. From this, the rest of the 12 routes have to be carried over to the next years due to the limited budget.

Table 13.3-15 Roads Planned to be Upgraded from CARs to District Roads in FY 2011/12

Road Code	District Priority Rank	Road Name	Road Length (km)	Section Length (km)	Type of Maintenance	Cost ('000 Ushs.)	Source
2223	11	Orom-Akilok	18.20	18.20	Routine	317,475	URF
2224	1	Omiya Anyima-Lagot	12.60	12.60	Routine	6,552	URF
2225	2	Pudo-Obyen Community Polytechnic	12.80	12.80	Routine	6,656	URF
2226	10	Akiworo-Okidi HCIII	12.80	12.80	Routine /Periodic	6,656 /115,200	URF
2227	3	Omiya anyima-Apotallo	11.30	11.30	Routine	5,876	URF
2228	4	Beyolangec-Lamugu	7.40	7.40	Routine	3,838	URF
2229	15	Ocettoke-Okora	6.20	6.20	Rehabilitation	200,000	NUDEIL

Source: Kitgum District, Annual district road work plan-Expenditure Schedule - FY2011/12 and interview with the technical and works department

(4) Inventory of Equipment and its Condition

The following table indicates the construction machinery and equipment with its condition. The district possesses 16 pieces of equipment but only 5 are in running condition.

Table 13.3-16 Inventory of Equipment and its Condition (Kitgum)

Item	Reg. No.	Year of Maintenance	Condition	Remarks
Bull Dozer D53A-17	LG 003-22		Good	Running in fair condition
Motor Grader GD115a	LG 005-22		Good	Running in fair condition
Wheel Loader Wa-180	LG 008-22		Fair	Running in fair condition
Nissan Hardbody Pick-Up	LG 0069-22	1994	Fair	Running in poor condition
Nissan Hardbody Pick-Up	LG 0051-22	1994	Fair	Running in poor condition
Isuzu Tipper Lorry	UG 0235 W		Poor	Grounded, Require major repair
Isuzu Tipper Lorry	LG 0011-22		Poor	Grounded, Require major repair
Motor Roller Cs 431 b	LG 0010-22		Poor	Grounded, need major repair
Water Bowser	LG 0004-22		Poor	Grounded
Pedestrine Roller	45		bad	Grounded
Pedestrine Roller	46		bad	Grounded
Massey Ferguson Tractor	624 UEA		Poor	Grounded
Massey Ferguson	694 UEB		Poor	Grounded
Isuzu Pick-Up	UDN 896		Bad	Grounded
Motorcycle Hero puch	LG 0066-22		Poor	Grounded
Motorcycle Hero puch	LG 0067-22		Poor	Grounded

Source: Kitgum District

13.3.2.4 Lamwo District

(1) Budget

The Lamwo district maintained 310 km of the district roads in FY 2011/12. In the following year, 2011/12, the district is planning to maintain 401 km. Out of the 341.8km of the routine maintenance, 202.6km shall be works on the CARs. And out of the 42 km of rehabilitation, 24.0km shall be for CARs, which will be allocated 360 million Ushs. out of the 820 million

Ushs. for the construction works. The budget has increased to 1,531 million Ushs. from 1,342 million Ushs. last year.

Table 13.3-17 Budget Expenditure and Planning for Road Maintenance in Lamwo

Unit: million Ushs.

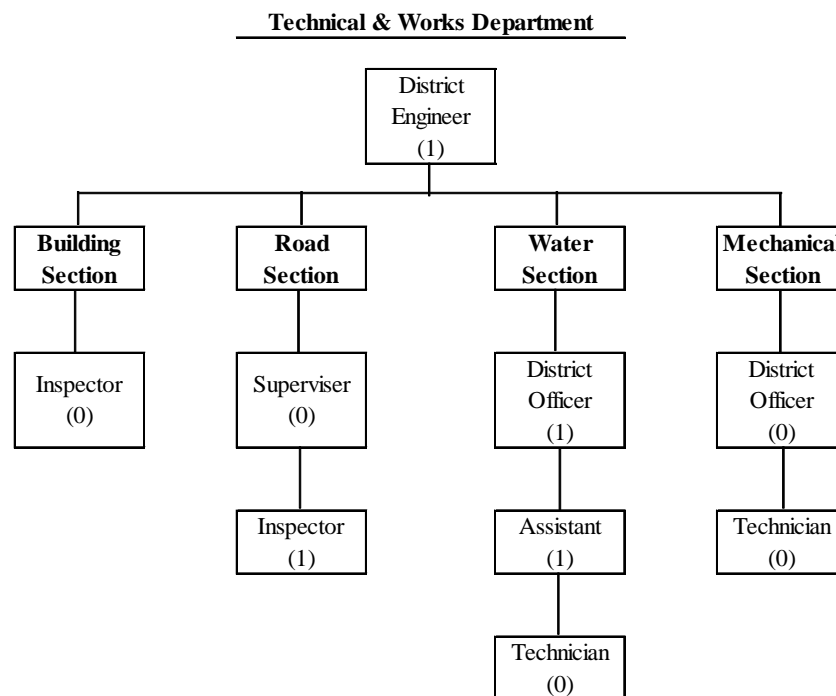
Source	Routine	Periodic	Rehabilitation	Bottle Neck		Operation	Total
				Road	Bridge		
URF	76.3 /119.9	310.8 /270.0		51.9 /	45.0 /	42.9 /42.9	475.0 484.7
PRDP			630.0 /820.0			10.0 /	640.0 /820.0
Grant (DANIDA)			200.0 /		200.0 /200.0		200.0 /200.0
Original source			27.1 /	27.1 /27.1			27.1 /27.1
Total	76.3 /119.9	310.8 /270.0	857.1 /820.0	79.0 /79.0	45.0 /200.0	52.9 /43.0	1,342.1 /1,531.8
km	212.2 /341.8	28.0 /18.0	70.4 /42.0				310.6 /401.8

Above/Below =FY2010/11/ FY2011/12

Source: Lamwo District, Annual district road work plan-Expenditure Schedule - FY2010/11, Draft annual district work plan for FY2011/12

(2) Organization

The organization of Lamwo follows the same organization as the Kitgum district before separation. There are only 2 people especially in charged, the assistant and the technician. Also there are a few staffs such as secretary and drivers. The following figure shows the organization of the Lamwo District.



Source: Lamwo District

Figure 13.3-7 Organization of Lamwo District (Technical and Works Department)

(3) Management Plan (Lamwo)

Totally, 34 roads/sections are listed to be maintained in FY2011/12. Out of the 34, the following are the roads which are planned for work above routine maintenance.

Table 13.3-18 Work Plan of Periodic and Rehabilitation Maintenance in FY 2011/12

Road Code	District Priority Rank	Road Name	Road Length (km)	Section length (km)	Type of Maintenance	Cost (,000 Ushs.)	Source
004	4		18.0	18.0	Periodic	27,000	URF
CAR04	15	Padwat-Aywee	15.0	15.0	Bt'l Neck (Road)	51,875	URF
008	8	Oloi-Okubo	9.0	9.0	Rehabilitation	18,000	PRDP
009	9	Labworoyeng-Pagar	9.0	9.0	Rehabilitation	18,000	PRDP
010	10	Okol-Kilombe-Madi	15.0	15.0	Rehabilitation	28,000	PRDP
011	11		9.0	9.0	Rehabilitation	18,000	PRDP
CAR01	12		12.0	12.0	Bt'l Neck (Strut.)	200,000	DANIDA
CAR04	15	Padwat-Aywee	15.0	15.0	Bt'l Neck (Road)	27,075	Original

Source: Lamwo District, Draft annual district work plan for FY2011/12

Also, the following community access roads will be included in the work plan of the district.

Table 13.3-19 CARs Included in the Work Plan of FY 2011/12

Road Code	District Priority Rank	Road Name	Road Length (km)	Section length (km)	Type of Maintenance	Cost (,000 Ushs.)	Source
CAR01	12		12.0	12.0	Routine	4,176	URF
CAR01	12		12.0	12.0	Bt'l Neck (Strut.)	200,000	DANIDA
CAR02	13	Lugwar-Lugedde	3.0	3.0	Routine	1,099	URF
CAR03	14	Paludar-Lobur	20.0	20.0	Routine	7,326	URF
CAR04	15	Padwat-Aywee	15.0	15.0	Routine	5,494	URF
CAR04	15	Padwat-Aywee	15.0	15.0	Bt'l Neck (Road)	51,875	URF
CAR04	15	Padwat-Aywee	15.0	15.0	Periodic	27,075	Original
CAR05	16	Kwoncok-Oboko	8.3	8.3	Routine	3,040	URF
CAR06	17	Kal-Kirombe	7.5	7.5	Routine	2,747	URF
CAR07	18	Kal-Kirombe	22.0	22.0	Routine	8,058	URF
CAR08	19	Karuma-Kirombe	7.0	7.0	Routine	2,564	URF
CAR09	20	Kiti-Kiti-Lugede	7.5	7.5	Routine	2,747	URF
CAR10	21	Gago-Kapete	6.3	6.3	Routine	2,308	URF
CAR11	22	Pobel-Pakalabule	3.0	3.0	Routine	1,099	URF
CAR12	23	Atwol-Laguli	5.0	5.0	Routine	1,831	URF
CAR13	24	Paloga-Orii	12.0	12.0	Routine	4,395	URF
CAR14	25	Atwol-Katum	6.0	6.0	Routine	2,198	URF
CAR15	26	Kamama Center-Kafata	4.0	4.0	Routine	1,465	URF
CAR16	27	Kamama Center-Kafata	16.0	16.0	Routine	5,860	URF
CAR17	28	Gem-Anaka	9.0	9.0	Routine	2,970	URF
CAR18	29	Gem-Pawena	10.0	10.0	Routine	2,376	URF
CAR19	30	Agoro-Ngacino	14.0	14.0	Routine	4,620	URF
CAR20	31	Agago-Lupulingi	15.0	15.0	Routine	4,950	URF

Source: Lamwo District, Draft annual district work plan for FY2011/12

Source: Interview to Lamwo District, Technical and works department

The community access roads mentioned in the above table, excluding CAR05, CAR13 and CAR20 are planned to be upgraded as district roads in FY2011/12.

(4) Bottle Neck Section (Lamwo)

The following table is the list of district roads/sections that need additional funds for construction.

Table 13.3-20 Unfunded Prioritized District Roads/Sections

Ranking	Project Name	Recurrent Activity/Priority Area	Estimated Budget ('000 Ushs.)
1	Olebi – Lela Pwot	Upgrading CAR to Feeder Roads 20.0km	360,000
2	Atwol – Lamwo town council	New road construction, 26kms	520,000
3	Corner Kalatus – Lamwo town council	New road construction, 15kms	300,000
4	Pager Bridge construction	New Bridge, 2 span bridge	180,000
5	Aringa bridge - Potika	Upgrading of security road to district road, 12kms	180,000
6	Construction of district administration building including council hall.	New construction.	1,600,000
Grand total			3,140,000

Source: Lamwo District, Five Year Development Plan

Also, the following table indicates the list of unfunded sections of community access roads.

Table 13.3-21 Unfunded Community Access Roads

Sub-County	Activity	Target	Location	Estimated budget ('000 Ushs.)
Paloga	Road Rehabilitation	10 km	Lotogo-Olima Hill	20,000
	Bridge construction	1 bridge	Orii-Karuma	300,000
Lamwo Town Council	Open roads	10 km	HQ	30,000
Palabek gem	Open roads	-	KAmama-Awach, Mugono-Apweta	184,000
Lokung	Open roads	60 km	Dibolyec-Aweno Olwi, Olebi-Pangira, Potwac, lalak, Lelapwot- Lelabul, Logwac- Dibolyec, Dibolyec- otika	400,000
	Road Maintenance	15 km	Pobel-Pakalabule Pobel-Pokalabule	7,000
Padibe west	Road opening	-	Padibe West-Akwang, Laguri-Abakadyak Laguri - Lamwo, Atwol - Lamwo Laguri - Atwol, Opoki Lamwo, Lacara -Opoki, Madi-Kiloc-Lacara, Lakidi tar-Akwang, Kamama Central -Okwici P/S	630,000
Palabek Ogili	Road opening	-	Apyeta-Lugwar, lagot-Opuk, Anaka- Padwat Agee Bidinn-Owiny Kibul	70,000

Sub-County	Activity	Target	Location	Estimated budget ('000 Ushs.)
	Bridge Construction and culverts	-	Lugwar-Paracelle padwat Agee Apyeta-Lubwo lagor-Opuk-apyeta	80,000
Madi-Opei	Road opening	10 km	Lotuko- Oboko	-
	Road opening	5 km	Orogo- Luda	-
Agoro	Bridge Construction	1 bridge	Aringa (Placam-Logopii)	550,000
	Bridge Construction	1 bridge	Okura steam (Lopulingi –Agoro HC)	200,000
	Road Rehabilitation	15 km	Palacam-Lotuturu	500,000
	Road opening	72 km	Lobule –Potika HC (6km) Toget kwera –Odicri (6km) Pobar –Loguru (20km) Apwoyo –Loromibenge- Apiriti (20km) Opeko –Yawaya (10km) Pawachi-Placam-Logopii (10km)	588,000
	Road Rehabilitation	12 km	Agoro TC –Irumo Irrigation area Aringa bridge- Potika Parish	230,000
Palabek	Road opening	6 km	Lopulingi – Lorunya P/S –Agoro TC	20,000
	Road Maintenance	-	All Parishes	9,000
	Road opening	46 km	Ayuu -Adodi	80,000

Source: Lamwo District, Five Year Development Plan

13.3.2.5 Pader District

(1) Budget

The Pader district maintained 286 km of the district roads in FY2010/11 and 382km is planned in FY2011/12. The budget has increased from 1,203 million Ushs. in FY2010/11 to 1,554 million Ushs. in FY2011/12.

Table 13.3-22 Budget Expenditure and Planning for Road Maintenance in Pader

Unit: Million Ushs.

Source	Routine	Periodic	Rehabilitation	Bottle Neck		Operation	Total
				Road	Bridge		
URF1	111.9 /216.1					50.0 /	162.0 /216.1
URF2		171.3 /312.5					171.3 /312.5
PRDP		180.3 /100.8	0 /189.6				180.3 /290.4
Grant (DANIDA)			649.7 /735.0				649.7 /735.0
Original source					40.0 /0		40.0 /
Total	111.9 /216.1	351.6 /413.3	649.7 /925.0		40.0 /0	50.0 /	1,203.3 /1,554.0
km	/304.0	/36.6	/41.8				286.0 /382.4

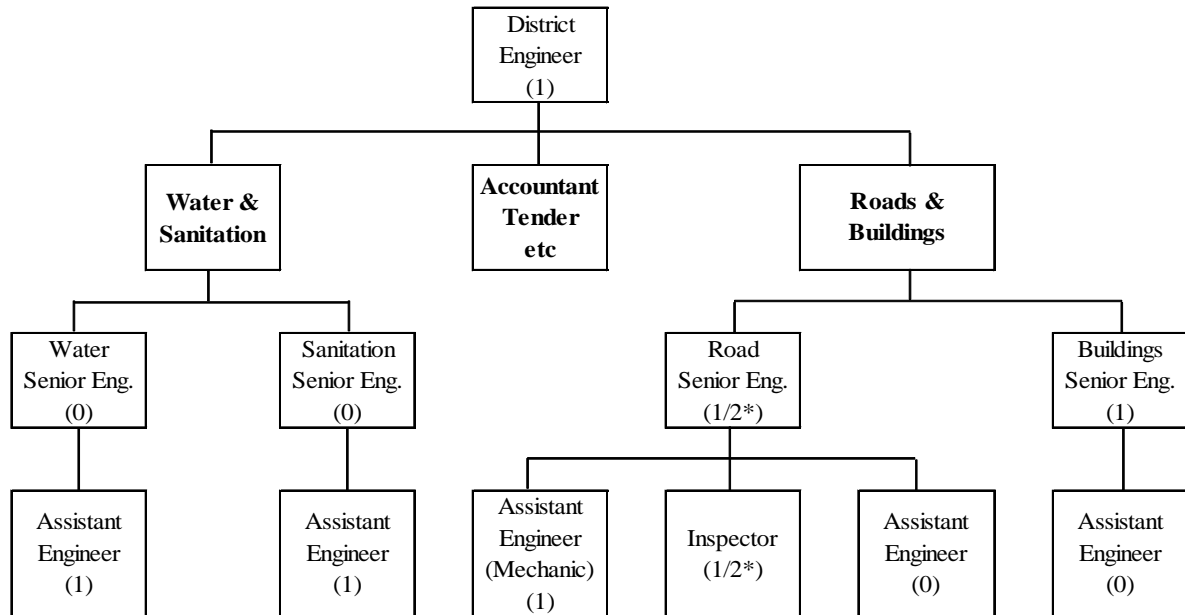
Above/Below =FY2010/11 / FY2011/12

Source: Pader District, Annual district road work plan-Expenditure Schedule - FY2010/11, Draft annual district work plan for FY2011/12

(2) Organization

The division that takes care of road maintenance is the road & building section which is under the works and technical service department. There are only one road senior engineer and one road inspector. Also there are a few supporting staffs such as secretary and drivers.

Works & Technical Services Department



Source: Pader District

Figure 13.3-8 Organization of Pader District (Technical and Works Department)

(3) Maintenance Plan (Pader)

Totally, 20 roads/sections are listed to be maintained in FY2011/12 in Pader. Out of the 20, the following are the roads that are planned for maintenance higher than routine maintenance.

Table 13.3-23 Work plan of Periodic and Rehabilitation Maintenance in FY 2011/12 in Pader

Road Code	District Priority Rank	Road Name (km)	Road Length (km)	Section length (km)	Type of Maintenance	Cost (,000 Ushs.)	Source
5313	9	Acholpi-Harambee	5.20	5.20	Periodic	62,500	URF
5314	6	Puranga-Achola Stream	20.00	20.00	Periodic	250,000	URF
5319	8	Laguti-Lanyadyang	12.00	12.00	Periodic	100,800	PRDP
5326	10	Pader-Auch	11.80	11.80	Rehabilitation	189,600	PRDP
5312	15	Puranga-Awere	15.00	15.00	Rehabilitation	420,000	DANIDA
5325	-	Jupa-Acholi-Ranch-Palalabek	15.00	15.00	Rehabilitation	315,000	DANIDA

Source: Pader District, Annual district road work plan-Expenditure Schedule FY2011/12

There is no maintenance work for CARs in Pader district in FY2011/12 and also no roads will be upgraded to district roads from CARs.

(4) Bottle Neck Sections (Pader)

Following table indicates the bottle neck sections in the district.

Table 13.3-24 Bottle Neck Sections of the District

S/N	Road/Structural Name	Location	Activity required	Remarks
1	Pader-Lukola	Lukola	Needs bridge or culvert to prevent flooding	Road connects to Agago district and also Kilak Primary school. People cannot cross the road during the rainy season.
2	Puranga-Awere(5332)	Awere sub-county	Needs bridge to cross Paweta Stream	Links people between Puranda and Awere. Connects pupils to Atede, Angole and Ter-Okutu primary schools. Also, connects to Atede Health Center II
3	Angura-Aruu fall	Agago river/Aruu fall	30 m length bridge and embankment of 300 m on both sides	This road leads to the prospective tourist attraction centre of Aruu falls. Connects pupils to Aruu falls primary school, Aruu falls village and Angagura Trading Centre.
4	Japa-Acholi(5325)	Acholi Ranch	Replace 2 culverts (900mm dia.) and maintain the existing drift.	This road leads to Acholi Ranch, 15km from the main road. Also connects to Bur-Lobo primary school.
5	Atanga-Amilobo-Goma Hill(5234)	Goma Hill	Needs a double culvert or a single span bridge to cross Kedo river. Also a bridge is needed to cross the Apolo river.	This road connects to Lamwo's district road. Lamwo side's construction is finished. So, this section remains to complete the network.

Source: Interview to Pader District works department

(5) Inventory of Equipment and its Condition

The following table indicates the construction machinery and equipment with its condition. The district possesses 5 pieces of equipment but only 2 are in running condition.

Table 13.3-25 Inventory of Equipment and its Condition (Pader)

Item	Reg. No.	Year of Maintenance	Condition	Remarks
Motor Grader	LG 0022-53	2004	Good	Needs major service
Tipper Lorry	LG 0023-53	2004	Good	Needs major service
Double Cabin	LG 0020-53	2005	Broken down	Needs major repair
Nissan Hardbody	LG 0021-53	2005	Broken down	Needs major repair
Mitsubishi L200	LG 0015-53	2001	Broken down	Beyond repair

Source: Pader District

13.3.2.6 Agago District

(1) Budget

The Agago district maintained 214 km of district roads in FY2010/11. The budget was 248 million Ushs. in FY2010/11.

Table 13.3-26 Budget Expenditure and Planning for Road Maintenance in Agago

Unit Million Ushs.

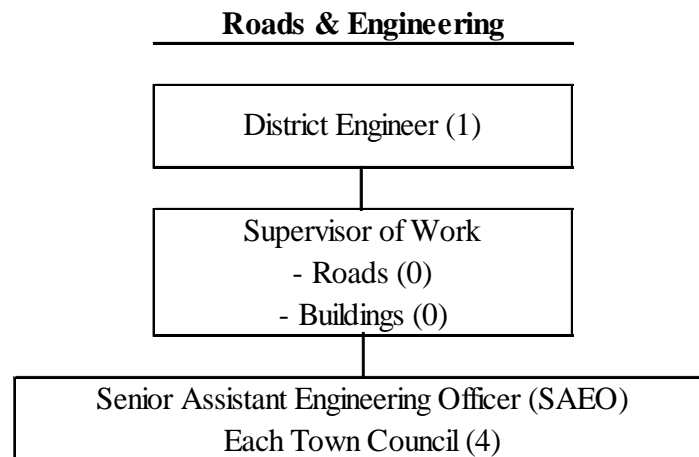
Source	Routine	Periodic	Rehabilitation	Bottle Neck		Operation	Total
				Road	Bridge		
URF	85.6 /						85.6 /
PRDP		112.6					112.6 /
Grant (DANIDA)							
Others (original, RRP)		50.0					50.0 /
Total	85.6 /	162.6 /					248.2 /
Km	146.0 /	68.0 /					214.0 /

Above/Below =FY2010/11/ FY2011/12

Source: Agago District, Annual District Work Plan for FY2010/11 and FY2011/12

(2) Organization

The following table indicates the organization of Agago-Road & Engineering Department.



Source: Agago District

Figure 13.3-9 Organization of Agago District (Technical and Works Department)

(3) Maintenance Plan

Since Agago is a newly established district, inventory of the district and community access roads is not clear. The district is now working to list the lengths of the roads. According to the five year development plan, the lengths of the roads were roughly indicated as follows.

Table 13.3-27 Rough lengths of the Roads in Agago District.

Category of Roads	Length of roads in km
Classified Roads/Trunk	206km
District roads	485km
Community access roads	440km
Total	1,131km

Source: Agago District, Five year development plan

Furthermore, according to the five year development plan, Agago district is planning to open more than 2,000km of community access roads in the next 5 years. From this, it is obvious that the maintenance cost of the newly opened roads will become the main issue in the district.

13.3.3 Capacity Assessment and Cause Analysis on Road Maintenance

Capacity assessments of districts concerning road maintenance were conducted at three levels, namely individual level, organization and social levels.

At the individual level, officers of the road sector were analyzed; at the organization level, the work department was targeted. The capacity assessment was based on the comparison of expected capacity and current capacity.

Table 13.3-28 Capacity Assessment (Individual Level) of District

	Position	Expected Capacity			Current Capacity			Measures to be Taken
		K: Knowledge	S: Skill	C: Consciousness	K: Knowledge	S: Skill	C: Consciousness	
K-1: English Communication and Composition	DE	K-11: Use English as native language in conversation and composition.			N/A			N/A
	SE	K-12: Ditto to K-11			K-12: Using English as native level.			K-12: Not necessary
	RI	K-13: Speak English fluently in communication and can prepare government documents.			K-13: Using English at an adequate level in communication and document production.			K-13: Not necessary
	RO	K-14: Ditto to K-13			N/A			N/A
K-2: Road Design (Soil, Pavement, Drainage, Alignment, Traffic, etc)	DE	K-21: Understand basic theory of the design standard and practical works.			N/A			N/A
	SE	K-22: Ditto to K-21			K-22: Understands the basics of road design and practical works. However, has not been trained systematically, so it is difficult for him to evaluate the private consultants' designs.			K-22: Needs training to learn basic theory systematically to be able to evaluate the private consultants' designs.
	RI	K-23: Ditto to K-21			K-23: Ditto to K-22			K-23: Not Necessary
	RO	K-24: Ditto to K-21			N/A			N/A
K-3: Structure Design (Culvert, Retaining wall, and Bridge)	DE	K-31: K-21: Understands basic theory of the design standard and practical works.			N/A			N/A
	SE	K-32: Ditto to K-31			K-32: Understands basics of structure design. However inadequate knowledge of essentials of design and practical construction works. So it is difficult for him to evaluate the private consultants design.			K-32: Needs training to learn basic theory to be able to evaluate the private consultants' designs.
	RI	K-33: Ditto to K-32			K-33: Ditto to K-32			K-33: Ditto to K-32
	RO	K-34: Ditto to K-33			N/A			N/A
	DE	K-41: Understands necessary procedures for procurement and related laws on contracts.			N/A			N/A
K-4: Procurement, Tendering, Evaluation and Contract	SE	K-42: Ditto to K-41			K-42: Understands necessary procedures for of procurement. However, has not been trained systematically.			K-42: Needs training to have systematic understanding.
	RI	K-43: Understands necessary procedures for procurement.			K-43: Understands necessary procedures for procurement.			K-43: Not Necessary
	RO	K-44: Ditto to K-43			N/A			N/A

	Position	Expected Capacity			Current Capacity			Measures to be Taken
		K: Knowledge	S: Skill	C: Consciousness	K: Knowledge	S: Skill	C: Consciousness	
K-5: Construction Supervision	DE	K-41: Understands technical theory and practical works of Road & Structure construction.			N/A			N/A
	SE	K-42: Ditto to K-41			K-42: Understands necessary technical theory and practical works of Road construction.			K-42: Not necessary
	RI	K-43:			K-43: Understands necessary technical theory and practical works of Road construction. However, inadequate knowledge and has had no systematic training experience.			K-43: Needs training to obtain knowledge of practice of structure construction.
	RO	K-44: Ditto to K-43			N/A			N/A
K-5: Labour Based Construction	DE	K-51: Understands practical works of Labour based construction.			N/A			N/A
	SE	K-52: Ditto to K51			K-52: Understands general theory, however has not been trained systematically.			K-52: Needs training to have systematic understanding of Labour based technology.
	RI	K-53: Ditto to K-51			K-53: Ditto to K-52			K-53: Ditto to K-52
	RO	K-54: Ditto to K-51			N/A			N/A
K-6: Machinery Construction	DE	K-61: Understands practical works of machinery construction.			N/A			N/A
	SE	K-62: Ditto to K-61			K-62: Understands practical works of machinery construction.			K-62: Not Necessary
	RI	K-63: Understands practical works of machinery construction for supervisor in particular.			K-63: Ditto to K-62			K-63: Not Necessary
	RO	K-64: Ditto to K63			N/A			N/A
K-7 :Road Administration	DE	K-71: Understands the process and design standard of road planning and points to consider.			N/A			N/A
	SE	K-72: Ditto to K-71			K-72: Understands the road planning of the district. However, necessary to study other cases for further understanding.			K-72: Needs training for further understanding. Training in Japan will be considered.
	RI	K-73: Understands the purpose and points of the road plan.			K-73: Understands the purpose and points of the plan.			K-73: Not necessary
	RO	K-74: Ditto to K-73			N/A			N/A
S-1: Computer Literacy	DE		S-11: Able to operate office software as necessary tool.			N/A		N/A
	SE		S-12: Ditto to S-11			S-12: Have adequate skills to create impressive reports		S-12: Not Necessary
	RI		S-13: Ditto to S-11.			S-13: Ditto to S-12		S-13: Not Necessary
	RO		S-14: Ditto to D-11			N/A		N/A

	Position	Expected Capacity			Current Capacity			Measures to be Taken
		K: Knowledge	S: Skill	C: Consciousness	K: Knowledge	S: Skill	C: Consciousness	
S-2: GIS Literacy	DE		S-21: Able to operate office software as necessary tool.			N/A		N/A
	SE		S-22: Ditto to S-21			S-22: Has no experience using GIS		S-22: Needs training to gain skills to operate GIS software as necessary tool.
	RI		S-23: Ditto to S-21			S-23: Ditto to S-22		S-23: Ditto to S-22.
	RO		S-24: Ditto to S-21.			N/A		N/A
C-1: Positive Attitude	DE, SE, RI, RO			Has consciousness as public worker to support people living in Districts.			Has adequate consciousness as public worker in the District.	Not Necessary
C-2: Responsibility								
C-3: Punctuality								

DE=District Engineer, SE=Senior Engineer, RI=Road Inspector, RO=Road Overseer

Source: JICA Study Team

Table 13.3-29 Capacity Assessment (Organization Level)

	Expected Capacity				Current Capacity				Measures to be Taken (INPUT)
	H: Human Asset	F: Financial Asset	P: Physical Asset	I: Intellectual Asset	H: Human Asset	F: Financial Asset	P: Physical Asset	I: Intellectual Asset	
H-1: Organizational Structure	Refer to Chapter 13.3.2				Organization established				Not necessary
H-2: Number of Members and qualification	DE, SE & RE in position.				Some positions Vacant				Recruitment campaign by district
H-3: Decision-making system	CAO, DE & SE in position.				CAO & RE in position, some position is vacant				Recruitment campaign by district
H-4: Coordination Skills	CAO, DE & SE in position				CAO & RE in position, some position is vacant				Recruitment campaign by district.
H-5: Human Assets (Frequent shuffle, settlement)	Stay in position after C/D.				Staffs are recruited by District, so there is no shuffle and basically stay at their position.				Not Necessary
H-6: Human Resources Management (Capacity Development program, evaluation method)	Have proper assessment and capacity development system.				Have internal system for personal performance assessment.				Not Necessary
F-1: Financial planning		1) Proper cost estimation. 2) Plan and develop DDP.				Able to evaluate cost estimation properly and to develop DDP.			Not Necessary
F-2: Financial Output		Release funds of donors and Government as scheduled.				Funds Not released on schedule due to bureaucratic procedures.			1) PR and lobby activities to government. 2) Recruitment campaign to fill all vacant positions

	Expected Capacity				Current Capacity				Measures to be Taken (INPUT)
	H: Human Asset	F: Financial Asset	P: Physical Asset	I: Intellectual Asset	H: Human Asset	F: Financial Asset	P: Physical Asset	I: Intellectual Asset	
F-3: Financial Input		1) Adequate funds from donors 2) Adequate allocation from the government. 3) Secure source of revenue				1) Inadequate funding from donors 2) Inadequate allocation as this is newly established district from Government. 3) Poor commercial activity in the district.			1) PR and lobby activities to government. 2) Recruitment campaign to fill all vacant positions
P-1: Construction & Management Machinery			Need basic machinery to operate force account				Not enough and most in bad condition		Request government for procurement
P-2: Depot/Store (Maintenance & Improvement of workshop, Safety Instructions)			Need basic maintenance facilities				Ditto		Ditto
P-3: Improvement Plan (Periodic & future Improvement Plan)			RAMPS & QPRS system, GIS from Road Inventory				Ditto		Need GIS system and training for operation.
P-4: IT equipment & software, stationary, furniture (desk, bookshelf)			Needs basic facilities				Ditto		Request government for procurement
I-1: Machinery for Construction & Maintenance				Management and operation manual & Guideline				Have no Manual & guideline.	Develop Manual & Guidelines
I-2: Depot/Store				Management Manual & Guideline				Ditto	Ditto
I-3: Maintenance of Machinery				Ditto				Ditto	Ditto
I-4: Technical Manual & Guidelines				Technical Manual & Guidelines				Have Technical Manuals by MoWT.	Not Necessary

Source: JICA Study Team

Table 13.3-30 Capacity Assessment (Society Level)

	Expected Capacity			Current Capacity			Measures to be Taken (INPUT)
	S: System	C: Consciousness of the Public	B: Basic Infrastructure	S: System	C: Consciousness of the Public	B: Basic Infrastructure	
S-1: Policy	Have clear and strong policy representing the road plan.			Have policy and plan but not enough opportunity to disclose to the public.			Need explanation and disclosure of road plan to public through lower local government.
S-2: Regulation	Have clear laws/rules on land procurement for use on roads.			Have to follow the laws of Uganda.			Not necessary.
C-1: Intention and Participation in Road Management		1) Have understanding of importance of building roads. 2) Have understanding regarding using land for roads. 3) Have understanding on importance of road maintenance.			Understands importance of building and carrying out maintenance on roads. However, need understanding and consent regarding land procurement.		Maintain polite negotiations with public, land owners in particular.
C-2: Cost Allocation		Have understanding regarding spending budget on road works.			Understands importance of budget allocation for road investment.		Need explanation and disclosure of road plan to public through lower local government.
B-1: Public Transport System			Have bus route that connects main town, residential areas and community facilities.			Have a few bus routes connecting to Major cities.	Need more road investment to clear bottle necks and for maintenance works to make roads passable through all seasons.
B-2: Establishment of Lifeline			Power, Water & Sewerage has been introduced.			No power, water or sewerage systems.	Need more investment to prepare lifeline for basic human needs.

Source: JICA Study Team

13.4 Present Road Maintenance Operation and Organization of UNRA

13.4.1 Road Maintenance Operation of UNRA

The road maintenance of UNRA is basically implemented by contracting out except for a few activities such as emergency maintenance. And, also most of the works are equipment based but in some fields of routine maintenance, such as grass cutting (vegetation control) and de-silting drainage, LTB is applied.

In road maintenance management, UNRA is using original software which is called “dTIMS”. “dTIMS” is a software combination of “HDM4” and “ROMAP” which was created by the World Bank. All Sub-stations are using “ROMAP” to do the road management and planning.

The tendering and procurement of contractors are done at headquarters, and the sub-station concentrates on the practical operations.

13.4.2 Budget, Organization and Management Plan of UNRA

(1) Budget

The following table indicates the allocation of the national road sector budget to stakeholders. Under “District road maintenance” and “Urban road maintenance”, it can be found that there

has been no allocation since FY2010/11. This is because the budget for these roads is included in the URF and the “Trunk Road Maintenance” to UNRA.

Table 13.4-1 Allocation of Road Sector Budget

No.	Category	Budget (Billion Ushs.)					
		2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
016	Works & Transport	126.74	95.16	119.22	123.93	168.21	171.33
		10.4%	10.3%	12.1%	11.4%	13.7%	13.3%
113	Uganda National Roads Authority (UNRA)	435.96	342.21	428.43	483.57	523.52	542.19
		35.9%	37.2%	43.6%	44.4%	42.7%	42.2%
113	Trunk Road Maintenance	67.70	-	-	-	-	-
		5.6%	-	-	-	-	-
118	Road Fund	116.24	301.86	383.42	481.87	534.87	572.31
		9.6%	32.8%	39.0%	44.2%	43.6%	44.5%
501-850	District Road Maintenance	53.70	-	-	-	-	-
		4.4%	-	-	-	-	-
501-850	Urban Road Maintenance	14.22	-	-	-	-	-
		1.2%	-	-	-	-	-
113	Transport Corridor Project	400.26	180.26	52.27	-	-	-
		32.9%	19.6%	5.3%	-	-	-
Grand Total		*1,214.83	919.50	983.33	1,089.36	1,226.60	1,285.83

Source : National Budget Framework Paper FY 2010/11 – FY 2014/2015

Allocation of URF for FY2011/12 was 181,865 million Ushs. which was 64.7 % of the overall budget. This includes 4,080 million Ushs. for the operation.

Table 13.4-2 Allocation of URF to UNRA

Unit: Million Ushs.

		FY2010/11	FY2011/12	Balance
UNRA	Periodic and Routine maintenance	189,057	177,785	-11,272
	Operational	6,913	4,080	-2,833
	Total	195,959	181,865	-14,105

Source 1: Declaration of budget ceiling for road maintenance in FY2010/11, The New Vision May 24, 2010,

Source 2: Final Indicative Planning Figures (FIP) to Uganda road fund designated agencies for financing maintenance of public roads in FY 2011/12, The New Vision June 2, 2011

14. ROAD MAINTENANCE AND OPERATION IMPROVEMENT PLAN

14.1 Issues and Considerable Countermeasures

14.1.1 Issues

14.1.1.1 General

Until 1993, the road maintenance was implemented basically by force account. The force account system was reasonable and the quality could be controlled by the district. But difficulty in the management such as personnel, budget and equipment management was found. In particular, in budget and equipment management had become a large burden for the district. Therefore, the government decided to introduce a contract out system.

In the contract out, the contractor will receive approx. 20% to 30% of the contract price as advance payment. However, since the contractor has to prepare the payment for the Tax (26%), retention and insurance, the total price of the construction became higher than by force account. Also, there were some contractors who tried to generate benefit by lowering the quality of the construction. Although the district has to manage the construction by inspections according to the contract, it was difficult to work on all contracts due to short-staff. This affected the quality of the road directly.

Furthermore, one of the reasons why the contract price was higher was because most of the contractors, materials and personnel resources were concentrated in Kampala. Hence, contractors who can undertake the work were limited, and since there was not enough work to invest in machinery, the number of contractors who had equipment was very limited. From this, often contractors in Kampala monopolized the work and charged high prices and this led to a reduction in the number of the works which resulted in poor road maintenance.

From the circumstances mentioned above, and with the realization that the regional area's development is a must for the entire county's development, there was an announcement to shift back to force account as it was before. According to this, the government has announced it will provide the required machinery to the district.

The fund for the procurement is expected to come from a loan agreement between the Chinese Government and the Ugandan Government. However, currently in FY2011/12, the negotiation between the governments has not concluded and it is obvious the introduction of the force account system will be after the next FY.

The district has to employ personnel and procure equipment, but the budget for the force account is not provided in this FY as mentioned above. One of the reasons for this comes from the inadequate budget of the Ugandan government but also because the procedure is complicated and some of the budget is used for other purposes such as operation costs. To operate the force account, it is obvious that the district needs qualified operators and mechanics, but currently the district has laid off these people and hired temporary help when the district needed them. In particular, mechanics are necessary to maintain the machinery which directly affects the quality of the works, but even this position is permanently vacant.

A cause analysis to solve the problems is shown on the next pages. From these analyses, the issues of road maintenance can be categorized into Institutional, Technical/Engineering and Facilities.

(1) Institutional

At the national level, establishment of an equipment regional centre is a key to operate periodic and rehabilitation maintenance properly. However, since the agreement between the governments is not concluded yet, the provision of this machinery has been postponed.

At the district/regional level, low income of the district officers is one of the reasons why the personnel turnover rate is so high. And as a consequence, technology is lacking in the district.

(2) Technical/Engineering

Inadequate capability of the training centre itself and not enough training opportunities for the district engineers causes a serious lack of technical skill. Lack of Manuals /Guidelines for operation of the force account, including maintenance of equipment, is also one of the reasons for poor road maintenance.

(3) Facilities

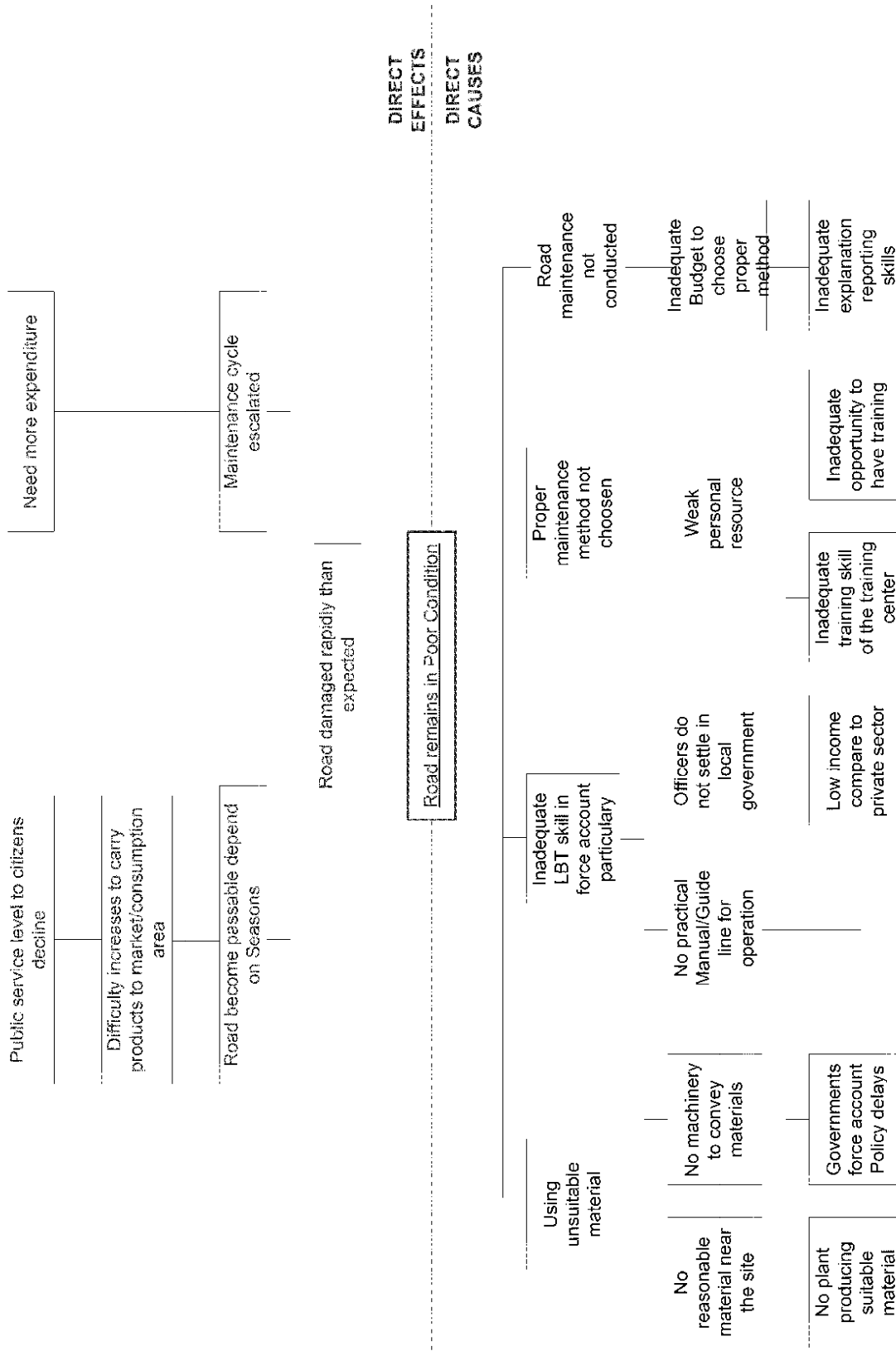
Lack of plant to produce proper quality material is also one of the reasons for the poor road condition. This problem is exacerbated by the lack of equipment to haul the material. The provision of equipment is related to the issue of delay of operation of the force account policy mentioned above.

The following table indicates the issues mentioned above in a matrix description.

Table 14.1-1 Issues at the National and District/Regional levels in Road Maintenance

Causes	1) National Level	2) District/Regional Level
A) Institutional	A-1-1: Government's force account policy delays	A-2-1: Low income compared with private sector
B) Technical /Engineering	B-1-1: Inadequate technical capability regarding LBT and its related technologies such as GIS. B-1-2: Lack of training opportunities	B-2-1: No manual/Guideline to prepare Force Account
C) Facilities	C-1-1 No plant to provide an adequate quantity of proper material.	C-2-1: Lack of equipment to operate force account in LBT (related to A-1-1)

Source: JICA Study Team



Source: JICA Study Team

Figure 14.1-1 Cause Analysis Tree

14.1.2 Countermeasures

An objective analysis to explain the solutions is shown in Figure 14.1-2. From this analysis tree, the countermeasures against the issues mentioned in Table 14.1-1 shall be considered as follows.

(1) Short Term

Delay of agreement between the governments to procure machinery is affecting the force account policy seriously and it is the main cause of delay in providing the necessary equipment for the road maintenance. Also in parallel, preparation of operational manuals/guidelines is required for proper works. Training in technical skills regarding LBT and structure design is also required.

(2) Mid Term

In Acholi sub-region, there are areas where it is difficult to secure suitable aggregate and gravel. From this, establishment of a plant to create these materials will provide controlled quality material constantly. This will contribute to lower the cost of construction works and brings constant quality.

Also, at the district level, creation of persuasive reports to explain to the government the need to obtain adequate budget requires strengthening of the literacy of the personnel including training regarding GIS related to RAMPS as well as training on use of PCs.

(3) Long Term

Low income of the officers is one of the reasons for the high personnel turnover rate. From this, providing incentives such as construction of lodgings shall be considered.

Table 14.1-2 Countermeasures at the National and District/Regional levels in Road Maintenance

Terms	1) National Level	2) District/Regional Level
A) Short Term	A-1-1: Facilitate Force Account Policy	A-2-1: Provide training opportunities regarding LBT and structure planning & design A-2-2: Prepare Manuals/Guidelines to operate force account including equipment maintenance
B) Mid Term	B-1-1: Establish aggregate and gravel plant to provide adequate material B-1-2: Strengthening the training capability of the training centre including operation of RAMPS	B-2-1: Provide PC training to create persuasive and effective reports including GIS which relates to RAMPS
C) Long Term	C-1-1: Establish practical structure planning and designing course in the University.	C-2-1: Provide benefits the same as the private sector.

Source: JICA Study Team

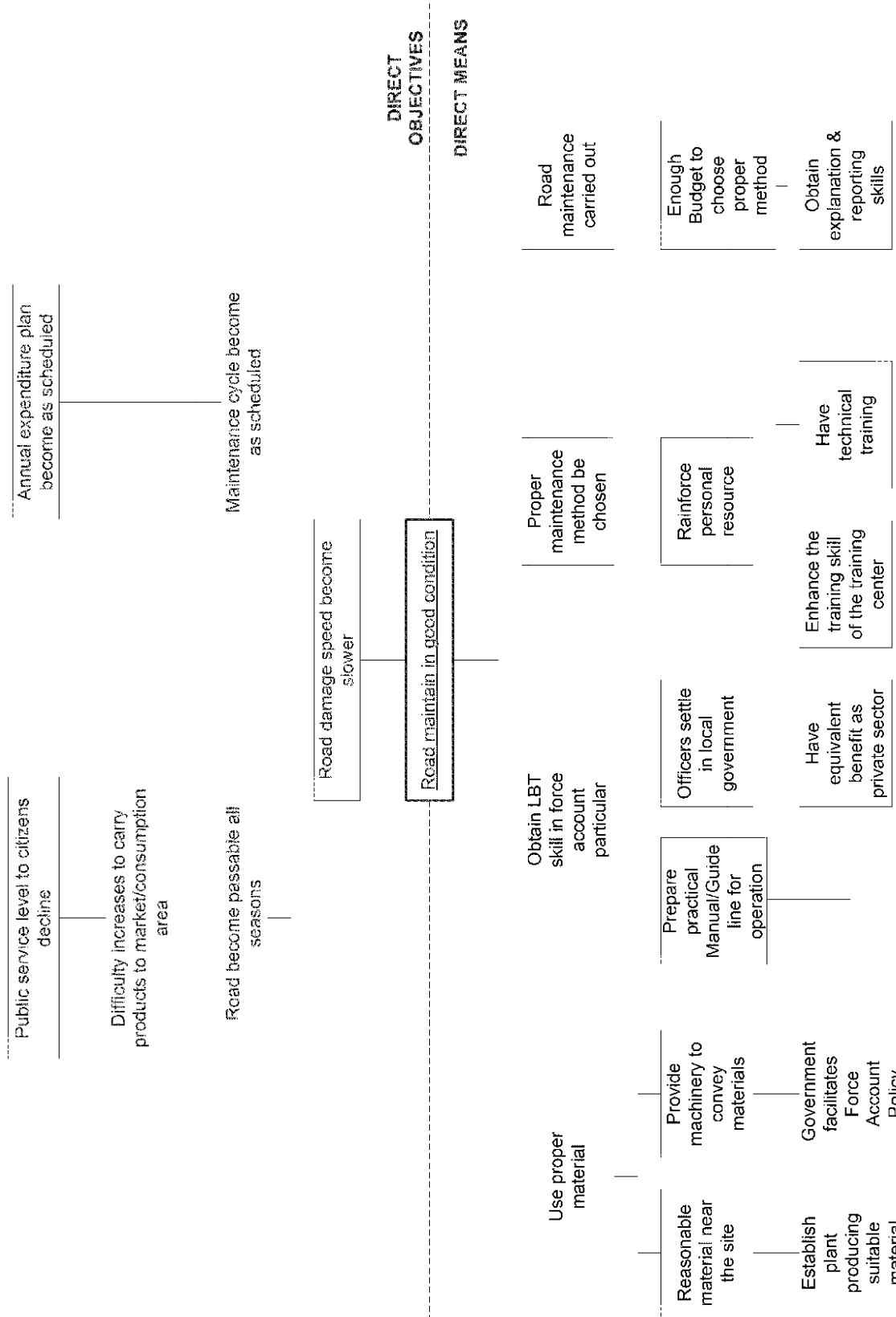


Figure 14.1-2 Objective Analysis Tree

Source: JICA Study Team

14.2 Improvement Plan at the District/Regional Level (Short Term)

14.2.1 Provide LBT and Structural Planning & Design Training Opportunities

The capacities required of the district officers for road maintenance are shown below.

Table 14.2-1 Capacity Required of District Officer

Area	Required Capacity
a) Update and maintenance of the road inventory system	<ul style="list-style-type: none"> Understanding the theory of RAMPS Practical operational skill to utilize RAMPS Understanding the technical evaluation skills of defects such as defect type, cause and countermeasures.
b) Development of road maintenance plan	<ul style="list-style-type: none"> Road condition evaluation skill by utilizing output of RAMPS. Road planning skills, utilizing labour based technology in particular.
c) Instruction, supervision and evaluation of private consultants	<ul style="list-style-type: none"> Basic knowledge of road design and cost estimation. Basic knowledge of road construction.

Source: JICA Study Team

According to the result of the capacity assessment mentioned in the previous section, and the above mentioned required capacity, it is necessary to conduct the following kinds of training:

Table 14.2-2 Training Options for Capacity Development

	CD Plan-1	CD Plan-2	CD Plan-3	CD Plan-4
Training Organization	MELTC	JICA	KTC	UDSM or DIT
Venue	Mbale, Uganda	Japan	Kshii, Kenya (The Third Country)	Dar es Salaam, Tanzania (The Third Country)
Character	<ul style="list-style-type: none"> The only training institute in Uganda. Covers comprehensive engineering of LBT construction 	<ul style="list-style-type: none"> Various and comprehensive training courses supported by JICA. 	<ul style="list-style-type: none"> First established training institute in east Africa. MELTC introduced its knowledge from KTC initially. Able to train in techniques regarding bituminous surfacing which is difficult in Uganda. Able to conduct comprehensive training which covers most of the fields related to civil engineering. 	<ul style="list-style-type: none"> Have practical training unit on civil engineering including road & structure design.
Major Targets	<ul style="list-style-type: none"> District Engineers, Technicians, Private contractors, Foremen 	<ul style="list-style-type: none"> District engineer, engineer who is responsible for the section, Managers 	<ul style="list-style-type: none"> District Engineers, Technicians, Private contractors, Foremen and mechanics. 	<ul style="list-style-type: none"> District Engineers, Technicians, Private contractors, Foremen, Private consultants
Major Contents	<ul style="list-style-type: none"> Refer to the following Table 	<ul style="list-style-type: none"> Refer to the following table 	<ul style="list-style-type: none"> Tailor made courses. 	<ul style="list-style-type: none"> (Not Known)
Advantages	<ul style="list-style-type: none"> Low cost due to domestic location Able to gain knowledge of RAMPS. Specialized institute for training. 	<ul style="list-style-type: none"> Able to observe the latest technology in the world Able to gain administrative skills Able to have international interchange 	<ul style="list-style-type: none"> Relatively low cost due to neighbouring location. Able to gain skills accord to Acholi's needs Specialized institute for training 	<ul style="list-style-type: none"> Relatively low cost due to neighbouring location. Able to gain knowledge from academic perspective

	CD Plan-1	CD Plan-2	CD Plan-3	CD Plan-4
Disadvantages	<ul style="list-style-type: none"> Limited to field of Labour Based Technology Some courses such as GIS need update of curriculum 	<ul style="list-style-type: none"> High cost due to location Limited common ground in terms of Acholi's current needs. 	<ul style="list-style-type: none"> Need number of participants to carry out the tailor made course. 	<ul style="list-style-type: none"> Need number of participants to carry out the tailor made course. Field that it corresponds with is narrower than others.

Source: JICA Study Team

These training programmes shall be managed under the technical transfer project supported by the Japanese Government. This Project shall be comprehensive and include the provision of hardware such as construction of a mechanical workshop and mechanical tools which are necessary for the sustainable operation as well as the capacity development.

14.2.2 Preparation of Manuals/Guidelines

The following manuals/guidelines are necessary to undertake road maintenance including operation of the force account policy.

Table 14.2-3 Necessary Manuals/Guidelines

		MG-1: Cost Estimation manual	MG-2: Supervision Guideline	MG-3: Planning and Design Manual	MG-4: Equipment Maintenance Manual	MG-5: Workshop Operational Guideline
Objective		Estimate the required cost for operation of force account. Cost for contracting out periodic, rehabilitation, and spot improvements shall also be included.	Guideline to supervise the routine maintenance activities in the field and how to control them.	Technical manual for Planning and designing of road maintenance works.	Technical manual for equipment maintenance.	Operational guideline for the workshop.
Major contents		<ul style="list-style-type: none"> General Personnel cost Material cost Transport cost Application documents 	<ul style="list-style-type: none"> Supervision in the field Reporting 	<ul style="list-style-type: none"> LBT Technology Type of defect and its evaluation. Reporting Planning & design of structures in specific cases 	<ul style="list-style-type: none"> Daily maintenance Preventative maintenance Light and serious repair Equipment operation 	<ul style="list-style-type: none"> Renting control Spare parts management Facilities Reporting
Target	District Engineer	X		X		
	Road Inspector		X			
	Mechanical Engineer				X	X
	Road Overseer		X			
	Labour		X		X	X

Source: JICA Study Team

14.3 Improvement Plan at the District/Regional Level (Mid Term)

14.3.1 Obtain PC Literacy to Create Persuasive Reports Including RAMPS

Budget for the road maintenance comes from URF, PRDP and donor projects such as U-growth (DANIDA) and NUDEIL (USAID). However, PRDP is planned to end this FY (2011/12) and considering that the number of districts has tended to increase in recent years, it must be considered that it will be difficult to increase funds from URF. So the district has to try to explain the ministry why they need to get that limited budget from the government. Hence, presentation skill will be necessary.

On the other hand, making an efficient road maintenance plan that accords with the severe budget circumstances shall be required. In Uganda, the district road maintenance plans are made using RAMPS. This is the standard software for the districts in road maintenance. However, it can be found that the districts are not using all the functions of RAMPS. The parts related to planning, such as inputting the road inventory data and using GIS & GPS is almost abandoned due to lack of literacy.

From the comments mentioned above, it is necessary to provide adequate training opportunities to district officers on presentation which is mostly documentation skills using a PC, including operation of RAMPS. MELTC will be the proper organization to carry out this training, however, since MELTC doesn't have a training curriculum related to RAMPS or reporting, strengthening the institution of MELTC shall be considered also.

14.4 Improvement Plan at the District/Regional Level (Long Term)

14.4.1 Provide Benefits at the Same Level as the Private Sector

One of the major causes of the bad personnel turnover rate is the difference in income between the public and private sectors. After officers have received training to contribute to the district works, he will leave to join the private sector with the skill that he obtained for the higher income. Therefore, providing benefits by the following measure will be needed to provide the same level as the private sector.

- Provide officers residences near the district office.

14.5 Improvement plan at the National Level (Short Term)

14.5.1 Facilitate Force Account Policy

Equipment is the key to operate road maintenance properly and even when choosing the Labour Based method, a minimum amount of equipment, such as pedestrian rollers, tow graders and water dozers will be required. The equipment is expected to be provided by the loan agreement with the Chinese government. However, the negotiations between the two governments are still ongoing and have not been concluded yet. The early agreement is highly expected since the source to procure equipment is expected from this.

The details of the Scheme, the part which concerns district road maintenance, is shown in the following tables. (Source: The scheme for use of equipment in district labour (Force Account) operations in maintenance of district and urban roads, garbage collection, and disposal and fire-fighting, MoWT, April 2010)

Table 14.5-1 Equipment Provided to District and its Operation Cost

	Equipment	No.	Fuel per day	No. of days work in a Month	Estimated fuel consumption per month	Total estimated fuel consumption per year
1	Motor Grader	1	150	15	2,250	27,000
2	Dump Truck	1	70	15	1,050	12,600
3	Pedestrian Roller	1	10	8	80	960
4	Pick up	1	20	10	200	2,400
5	Motorcycle	2	5	15	150	1,800
	Sub Total	litter				44,760
	Fuel Cost	2,000	x	44,760	=	89,520,000
	Oil & Lubricants	0.1	x	89,520,000	=	8952000
	Total				Ushs.	98,472,000

Source: The scheme for use of equipment in district labour (Force Account) operations in maintenance of district and urban roads, garbage collection and disposal, and fire-fighting, MoWT, April 2010

Table 14.5-2 Human Resources and Salary Scale for Operation to District

	Description	No.	Salary Scale	Annual Salary per person (Ushs.)	Total Annual Salary (Ushs.)
1	Foreman	1	U5	4,114,241	4,114,241
2	Plant Mechanic	1	U7	2,353,288	2,353,288
3	Plant Operator	2	U7	1,802,502	3,605,004
4	Drivers	2	U8	1,476,763	2,953,526
	Total				13,026,059
5	Allowance		x1.5		19,539,089
6	Road Overseer		U7	1,802,502	
7	Road Gang			1,200,000	

Source: The scheme for use of equipment in district labour (Force Account) operations in maintenance of district and urban roads, garbage collection and disposal, and fire-fighting, MoWT, April 2010

Table 14.5-3 Maintenance Cost for the Equipment to District

	Equipment	No.	Unit Cost ('000 Ushs.)	Total ('000 Ushs.)	Remarks
1	Motor Grader	1	400,000	400,000	
2	Dump Truck	1	170,000	170,000	
3	Pedestrian Roller	1	30,000	30,000	
4	Pick up	1	70,000	70,000	
5	Motorcycle	2	5,000	10,000	
	Total			680,000	
6	Service & Maintenance		x 0.05 x 1.2	40,800	First Year
			x 0.075 x 1.2	61,200	Second Year
			x 0.1 x 1.2	81,600	Third Year
			x 0.125 x 1.2	102,000	Forth Year
			x 0.15 x 1.2	122,400	Fifth Year & more

Source: The scheme for use of equipment in district labour (Force Account) operations in maintenance of district and urban roads, garbage collection and disposal, and fire-fighting, MoWT, April 2010

14.6 Improvement plan at the National Level (Mid Term)

14.6.1 Establish Aggregate and Gravel Plant

Through the Amuru Bridge Pilot Project, it was found that construction material such as sand and aggregate which is suitable was difficult to find in the area, and came from far away. For instance, sand was initially conveyed from Kampala before sand in Pakuwachi was found.

From this fact, establishing a plant for aggregate and sand shall contribute directly to cost effectiveness. Also, gravel can be found in quite a lot of places around the Sub-Region. However, there are gravels which have not passed the quality control at the laboratory before use. It will be recommended to mark the locations where suitable gravel can be found with confirmation by necessary laboratory tests.

The north part of Agago District shall be recommended as a suitable location to establish a crusher plant to produce aggregate and sand since exposed rocks are found in this area. The aggregate and sand produced is expected to be used for concrete and bituminous surfacing. Also, gravel can be excavated from the road reserve, but it would be better to find proper sites at constant intervals which can be developed as borrow pits.

14.6.2 Capacity Strengthening of the Training Centre (MELTC)

MELTC is the only training centre for labour based technology in Uganda. The following table indicates the current training courses.

Table 14.6-1 Current Training Courses of MELTC

	Courses	Training Days
1	Labour-based Road Rehabilitation Course for Assistant Managing Directors	26
2	Labour-based Road Rehabilitation Course for Forepersons	70
3	Labour-based Road Rehabilitation Course for Assistant Forepersons	70
4	Training of Trainers for Routine Road Maintenance Course	70
5	Labour-based Road Contract Management Course for Engineers	10
6	Labour-based Road Contract Supervision Course for Supervisors of Work	30
7	Labour-based Road Contract Supervision Course for Road Inspectors	50
8	Labour-based Awareness for District Administrators and Policy Makers	10
9	Cross-Cutting Issues Related to Planning and Implementation of labour-Based Road Works for Community Based Services Officers	10
10	Community Access Innovations Course for Technical staff	15

Source: <http://meltc.org/>, MELTC =Mt. Elegon Labour Based Training Centre

The curriculum courses at MELTC tend to focus on LBT skill in both the field and in contracts, but there are no specific courses for the coming force account and RAMPS. RAMPS is a trunk system for road maintenance in Uganda, though it seems that the district is not using the whole system. In particular, the planning part for using GPS to collect inventory data from the field and to transfer that data to the RAMPS GIS system is almost abandoned.

One of the reasons why LBT is not preferred among the public is that there is a perception that LBT is inferior to equipment based methods. This belief comes from the poor result of LBT construction works in the past, which were caused by improper quality control. Improper quality control might one of the strongest reasons for not choosing LBT, but there are other reasons such as dissatisfaction with income and projects that run way behind schedule. Considering that MELTC is the only training centre focused on LBT in Uganda, MELTC should also take responsibility to try to spread the use of LBT in Uganda.

Because of this fact, MELTC should establish the following training courses and carry out research as well.

Table 14.6-2 New Curriculum and Research Subjects for MELTC

	MT-1 Operation of RAMPS	MT-2 Force Account	MT-3 Mechanical Maintenance	MT-4 LBT Promotion
Field	New Curriculum	New Curriculum	New Curriculum	Research/Activity
Objective	Train and master RAMPS including operation of GIS, and collection of data for the road inventory.	Understand the required institutional procedure and technical skill of the force account.	Understand the required technical skill of mechanical maintenance in construction equipment in particular, and management of the workshop.	Carry out promotion and research to recognize the use of LBT in Uganda. Have role as one of the representative LBT institutes of east Africa.
Major Contents	<ul style="list-style-type: none"> Road inventory Operation of GPS & GIS System of RAMPS Practical training PC Literacy 	<ul style="list-style-type: none"> Administrative procedure Contents of Manual/Guideline Reporting 	<ul style="list-style-type: none"> Contents of the Manual/Guideline Practical training Reporting 	<ul style="list-style-type: none"> Pilot Project Advertising/Promotion Research on quality control, contracts, etc.

Source: JICA Study Team

14.7 Improvement Plan at the National Level (Long Term)

14.7.1 Establish Practical Planning and Design Course in the University

As mentioned above, district engineers are using standard drawings and tendering documentation in the road maintenance. However, there are sites that are difficult to manage by these standard materials. In this case, the District has to ask for technical assistance from the private sector, but it is difficult to evaluate the works of the private sector properly. The reason why this happens can be said eventually that there is no classroom that teaches structural engineering as a practical field.

Establishing a practical curriculum course in structural engineering will work in the long run to raise the level of the engineers in Uganda, since the graduates every year will work as engineers in MoWT, UNRA and the districts. The following is the recommended curriculum and this shall be established in major universities in Uganda.

Table 14.7-1 New Curriculum Courses for the University

	CU-1 Structural Planning	CU-2 Structural Designing (Culverts, drifts, etc.)	CU-3 Structural designing (Bridges)	CU-4 Practical Training
Objective	Learn how to choose the proper structural type and find the general cost.	Learn how to do structural calculations and draw detailed designs for general structures.	Focus on bridges; learn the structural calculations and drawings.	Learn what is needed for structure designing up to tendering in practical applications. (Bridge design in particular)
Major Contents	<ul style="list-style-type: none"> Characteristics of each structural type. Check points for the site investigations. Conditions to choose structures. How to make general cost estimates. Procedure of tendering and the next step. 	<ul style="list-style-type: none"> Method of structural calculations. Condition of the design. How to make BOQ. Construction methods and BOQ Tendering documents. Structural Maintenance. 	<ul style="list-style-type: none"> Bridge type and its characteristics. Method of structural calculations. Condition of the design. Construction methods and BOQ. Tendering documents. Access roads. Bridge Maintenance. 	<ul style="list-style-type: none"> Learn data to collect from site inspections in the field practically. Planning and choosing the structural type. Do structural calculations practically. Draw detailed designs using CAD system. Make BOQ and tendering documents.

Source: JICA Study Team

14.8 Maintenance of Community Access Roads

14.8.1 PRDP2

The Peace Recovery and Development Plan (PRDP) was launched by the Government of Uganda in 2007 to stabilize Northern Uganda and lay a firm foundation for recovery and development. The current phase is scheduled to run until June 2012. The second phase (PRDP2) is planned to run continuously from July 2012 until June 2015.

In the Strategic paper issued in November 2011, it is mentioned that the total budget shall be 455 million US\$ where approximately 30% will spend for the infrastructure. The major target of the infrastructure in PRDP2 is the rehabilitation and maintenance of community access roads. It mentions that the funds received for maintenance of these roads only cover the routine maintenance. The PRDP2 will take over the periodic and rehabilitation maintenance by applying LBT as much as possible. The following shows the major road & bridge projects indicated in the strategic paper.

Table 14.8-1 Road and Bridge Projects of PRDP2

Project	Proposal	Financing Modality
Infrastructure	Rehabilitation and Periodic maintenance of District, Urban and Community Access Roads (DUCAR network) and opening of community access roads using Labour based methods.	PRDP Grant Special & Off-budget Projects
Road User Committees	Training of Road User Committees for roads opened, rehabilitated or maintained under PRDP.	PRDP Grant Special & Off-budget Projects

Source: The Peace, Recovery and Development Plan, Phase-2, November-2011, Office of the Prime Minister

Under PRDP2, the PRDP budget grant will be used to finance periodic maintenance and rehabilitation of the DUCAR network including bridges and culverts. It will also be used for special and off-budget projects where cooperation is expected from donors. The labour based method will be prioritized in order to create local employment and inject money into the community.

Also, PRDP2 funds will be used to sensitize communities and to train the road user community to ensure community involvement and ownership of the roads.

14.8.2 Lessons from the Pilot Project

Pilot Projects (PP) were implemented in Gulu and Kitgum districts. The objective of the PP is to learn how to apply LBT to CARs maintenance through actual construction works. Following are the lessons we learned from the PP.

14.8.2.1 Impact of the PP

The following positive impacts were observed and expected during and after the pilot project.

- Income generation for residents by introduction of labor based technology, and
- Increased convenience for pedestrians and bicycle users
- Improvement in transport and walking during the rainy season.
- Supporting economic activities along the roads.

No negative impacts caused by the pilot project were observed.

14.8.2.2 Evaluation of the District and Sub-County

- Although the contract for the Pilot Project was between the JICA study team and the contractors, the Sub-county was expected to act as the client to observe the performance of the contractor. The district was expected to support the sub-county on technical matters in particular.
- For the District, it was found to be difficult to inspect and give directions to the contractor frequently due to inadequate number of technical staffs in the district. Actually, due to his other duties it was at the limit of the district inspector's ability to join the mid term and final inspections during the construction. The district does not have enough capacity to take care of CARs, hence it was reconfirmed that the sub-county will be the suitable organization to manage their maintenance.
- The sub-county is presently the organization to maintain CARs. And the budget is approximately 3 million to 5 million Ushs. However, this budget is mostly spent on education and health, and there is nothing for road maintenance.
- It was confirmed that the parish level is the most suitable organization to manage the labourers who are mostly the people that live in the communities along the road.

14.8.2.3 Evaluation of the Contractor

- Construction using machinery was adopted in Gulu and the purely labour based method was adopted in Kitgum. It was confirmed that the capability of the foreman which the contractor dispatches will determine the quality of the construction. At both sites, the foreman which the contractor dispatched did not have adequate capability and eventually an engineer from MELTC had to do their work.
- In Kitgum, almost all the works were done using the Labour based method and any difficulty in the major works such as procurement of material or directing the labourers could be solved.
- On the other hand, in the pilot project in Gulu, the construction was partially done using machinery. While the machinery was functioning the construction had much better efficiency compared with the labour based method. However, the machine frequently broke down and a mechanic was hired to repair it or they had to ask Kampala to swap for a new machine. This affected the contractors account seriously as well as the construction schedule.
- Eventually, the delay caused by mechanical trouble was caught up by using the labour based method. Hence it was found that a service station /workshop shall be needed nearby to operate construction machinery. And since there were no such facilities in Northern Uganda, the use of the Labour based method has a great advantage in this area.
- On this Pilot Project, the JICA team has allowed the contractor to partially use machinery since the contractor did not have confidence to complete the 13km contract within the contract period which was 60 days. Therefore, to apply the Labour based method in construction work it was found that choosing the appropriate construction period including seasonal conditions will be essential.

14.8.2.4 Evaluation of the Community

- The construction started with a 2 day LBT training session for the labours. The trainees had mastered the techniques from the training and the actual practice through the construction. From this, the capability to acquire knowledge through training in Northern Uganda was confirmed.
- By joining the LBT construction, the labours had obtained from 2 to 3 times more income than in a regular month, and since it was the Christmas season, it was confirmed that the income has spent in the community, which is one of the advantages of applying LBT.

14.8.2.5 Evaluation of MELTC

- In this pilot project, MELTC has worked as the actual foreman for the contractor, which was supposed to have been done by the sub-county. From this it was confirmed that MELTC has adequate skill to do training in the field and make up for the incapability of the local contractors.
- Currently, the training courses in MELTC are operated in Mbale and none of them are in the field. And also it was confirmed that there is no monitoring system to look after the training to find the items missing from the curriculum and syllabus.

14.8.3 Recommendations for maintenance of CARs

The applicability of applying LBT was confirmed from the PP and it was also strongly stated in the PRDP2. So, the following shall be recommended from the above mentioned findings.

- a. The periodic and rehabilitation maintenance shall be undertaken using the PRDP funds and the donors shall support clearing the bottlenecks such as bridge and culverts in the field because those are the most costly items.
 - b. The routine maintenance shall be conducted by the funds disbursed from the current URF. However, the following measures shall also be taken. The details are shown in Chapter 17.
- Establishment of Road Maintenance System Applying Community Workers
 - Strengthening the Sub-County Administration Capacity
 - Establishment of an Equipment Centre
 - Strengthening of MELTC

15. TECHNICAL TRANSFER

The aim of technical transfer activities is to impart necessary skills to counterparts on how to develop and maintain road inventory information. To achieve this aim, counterparts were trained on the following main topics:

- Road Survey Data Collection Techniques and
- Road Information GIS Processing Techniques

Two training workshops were conducted. The first workshop focused on GPS skills necessary to collect road information effectively. This was held last May, 24-25, 2011 and was attended by district engineers from districts covered by the study. The second workshop focused on GIS skills necessary to process road information and produce thematic maps and analyses. This consisted of three training sessions conducted in November, 2011 at three locations in Gulu, Kitgum for Acholi district engineers and at the Ministry of Works and Transport in Entebbe in November, 2011.

The training courses cover topics on GPS survey and GIS skills useful for road inventory work.

The GPS survey and GIS skill levels of the target participants range from beginner level to intermediate level. In order to address the varying skill levels of the participants, the courses cover topics from GPS and GIS concepts to practical applications of the technologies in road inventory development and maintenance. Exercises were given to the participants to maximize their learning even outside the training room.

At the end of each lecture session, time was given for the participants to ask questions of the lecturer regarding the topics covered and other topics pertaining to their work where GPS and GIS could be useful.

In order to avoid duplication of training topics with other donor agencies active in Acholi region, coordination meetings were held with USAID. USAID is also providing equipment, software and training on GPS in the Acholi area.

The following section discusses the contents of the road inventory technical transfer workshops:

15.1 Workshop 1: Training on Road Survey Techniques Using GPS

15.1.1 Workshop Objectives

The "Training on Road Survey Techniques using GPS" workshop was conducted last May 24-25, 2011. The objectives of the workshop are:

- To enable the participants to handle processing of GPS centre line data coming from the district engineers
- Enable trainees to collect Road Inventory Information Properly

The workshop was attended by personnel from the District Engineer's Offices of Agago, Gulu, Kitgum, Lamwo and Pader.

15.1.2 Contents of the Workshop

The following topics were covered in the workshop:

- Objectives of Road Survey
- Terminologies Used
- Road Survey Forms
- Sequence of the Road Survey
- GPS Basics
- Organizing Road Survey Data
- Conducting GPS Road Survey
- Conducting Road Structure Survey
- GPS Classroom and Field Exercises

15.1.3 Highlights of the Workshop

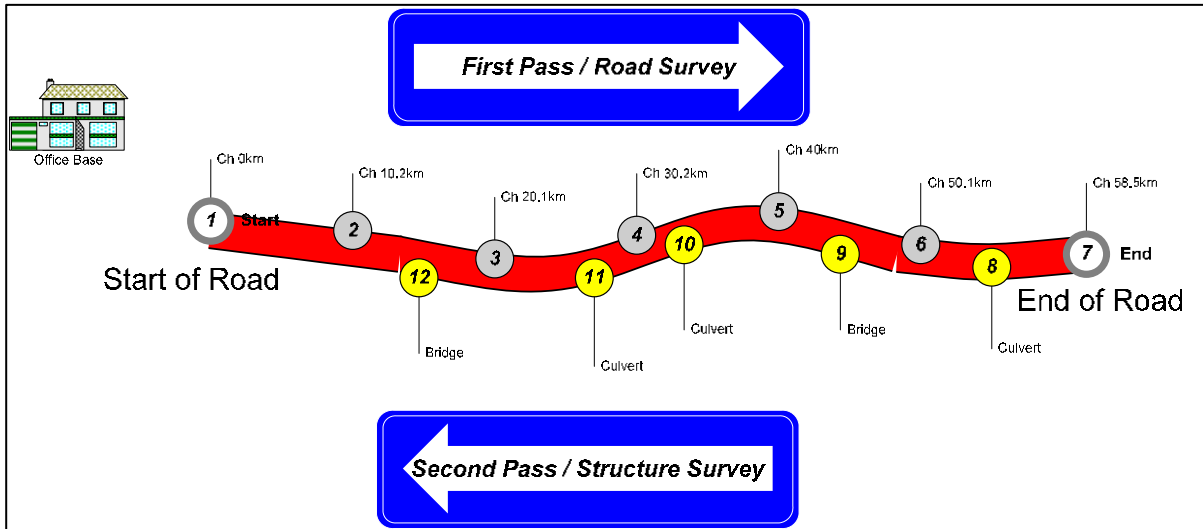
The workshop broke down the tasks necessary to effectively implement road survey tasks into simple step by step procedures which the participants can replicate on their own. The participants were given manuals which could also be used as operating manuals that they could use when conducting their own road surveys.

Although many of the participants have received training on GPS before, the main difference of the workshop is its focus on simple and effective road survey techniques.

The workshop covered topics from pre-survey mission planning, to conducting the actual survey up to downloading and processing the GPS data.

As much as possible, the workshop emphasized the use of simple software which the participants may already know. An example is the use of MS Excel software to encode survey data. In order to help the participants validate their survey, the participants were also shown techniques on how to display their survey data into Google Earth.

Figure 15.1-1 below illustrates the basic sequence of survey on which the participants were trained.



Source: JICA Study Team

Figure 15.1-1 Basic Sequence of Road Survey

Simplified forms to capture road information without the need for customized software were also provided. The forms were also integrated with easy to understand instructions on how to fill in the forms. Complicated tasks such as measuring roughness of the road were broken down into simpler steps using basic GPS functions.

Table 15.1-1 Road Survey Forms

Form 1
Waypoint Recording Sheet

Form 2
Road Section Condition Assessment Form

Form 3
Structure Recording Sheet

Waypoint Number	Chainage Station	Bridge	Culvert	Other	Road Sect. No.	Road Section Chainage (km)		Waypoint No.	Average Speed km/hrs	Waypoint Number	Structure Type	
						Start	End				Bridge	Culvert
Record from GPS	Place Checkmark	Place Checkmark	Place Checkmark	Place Checkmark	(i)	(ii)	(iii)	(xix)	(xxiv)	Mark in GPS	Place Checkmark	Place Checkmark
1	X						0	1	0	1		
2	X					10.2	24	2	24	2		
3	X					20.1	35	3	35	3		
4	X					30.2	30	4	30	4		
5	X					40	25	5	25	5		
6	X					50.1	30	6	30	6		
7	X					58.5	35	7	35	7		
8			X					8		8		X
9		X						9		9	X	
10			X					10		10		X
11			X					11		11		X
12		X						12		12	X	

Source: JICA Study Team

Exercises in both the classroom and field were also conducted in order to reinforce the learning of the participants.



Source: Photo taken by JICA Study Team

Figure 15.1-2 Classroom Training Sessions



Source: Photo taken by JICA Study Team

Figure 15.1-3 Field Training Sessions

15.2 Workshop 2: Training on Road Inventory GIS Processing Techniques

15.2.1 Workshop Objectives

The "Training on Road Inventory GIS Processing Techniques" was conducted in November, 2011. The objectives of the workshop are:

- Educate participants on the applications of GIS in Road Inventory Development and Maintenance
- Orient the participants on the contents of the GIS database developed by the JICA Study Team for the Acholi Sub-region
- To enable the participants to Process Road Centerline Data with Road Condition Information using GPS/CAD/GIS software
- To enable participants to produce Thematic Maps and Tabular Reports based on the Road Database

The second workshop consisted of training sessions conducted in three locations namely:

- Gulu Training (Nov 15-18, 2011) for District Engineer Personnel
 - o Districts Covered: Amuru, Gulu, Pader (7 Participants)
- Kitgum Training (Nov 22-25, 2011) for District Engineer Personnel
 - o Districts Covered: Agago, Kitgum, Lamwo (6 Participants)
- Entebbe Training (Nov 28-Dec 1, 2011)
 - o Participants from Ministry of Works and Transport (12 participants)

15.2.2 Contents of the Workshop

The following topics were covered in the workshop:

- Introduction
- The GIS Database Developed for Acholi Sub-region

- Overall Process of Road Database Development
- Road Survey Techniques Using GPS (Review)
- GIS Concepts
- ArcGIS Basics
- Practical Exercises on Road Data Processing Techniques Using GIS

15.2.3 Highlights of the Workshop

The training course consisted of lectures and exercises over four days. Three separate courses were conducted at different locations, namely, Gulu, Kitgum and MoWT in Entebbe. The training course was designed for district engineers and MoWT engineers to whom road condition information are necessary. This training course was also intended as a follow up to the training course on "Road Survey Technique Using GPS" conducted last May 2011. Emphasis was given to simplified and practical techniques to process road condition data.

The GIS skill levels of the participants ranged from beginner level to intermediate level. Many of the participants from the districts also attended the training course on road survey techniques using GPS conducted by the JICA Study Team last May 2011.

At the end of each training topic, assessment forms containing questions about the topics covered were distributed to participants to assess their understanding of the course. Based on the assessment forms, most of the participants were able to satisfy the requirements of the course and were able to acquire basic skills necessary to process road condition information. It is noted that some participants from the districts who missed the first training on road survey techniques by GPS previously by the study team last May, 2011 had some difficulty in performing some tasks involving GPS equipment. It is also noted that MoWT engineers who attended the training course in Entebbe showed high degrees of understanding and skill in processing road condition information.



Source: Photo taken by JICA Study Team



Figure 15.2-1 Gulu Training for Amuru/Gulu/Pader District Engineers (2011/11/15 to 18)



Source: Photo taken by JICA Study Team

Figure 15.2-2 Kitgum Training for Kitgum/Lamwo/Agago District Engineers (2011/11/22 to 25)



Source: Photo taken by JICA Study Team

Figure 15.2-3 MoWT Training for MoWT Engineers (2011/11/28 to Dec 1)

16. SELECTION OF PRIORITY PROJECTS

16.1 Mid Term (2018)

As discussed in “Chapter 11 Road Development Plan”, the primary objective of the priority projects is to improve living standards and accommodate industrial potential by 2018. There are development ideas by the functional road classes as follows.

- International Trunk Roads: to meet international road standard by tarmac and widening, the design LOS is D,
- Inter –Regional Trunk Roads: to meet national trunk standard by tarmac and widening, the design LOS is F,
- Inter District Roads: to secure passability throughout the year by bottleneck improvements such as for drainage systems,
- City Roads: to regulate and increase efficiency of traffic movements by improvement of road structure and pavement, and
- Feeder Roads: to remove bottlenecks to allow the road to provide access to the distinct roads.

In addition to the above, a proposal for improvement of the public transport system is made because of the following.

There is no reliable public transport system in the study area except in the townships. People need to prepare their own transport means if they need to travel. This situation limits the activities of public and increases transportation cost.

The objective of the proposal of public transport improvement is to provide a reliable and reasonable transport system connecting district centres and remote areas, which is expected to contribute to improving the living standard.

To implement the above ideas, the priority projects by 2018 are proposed as follows.

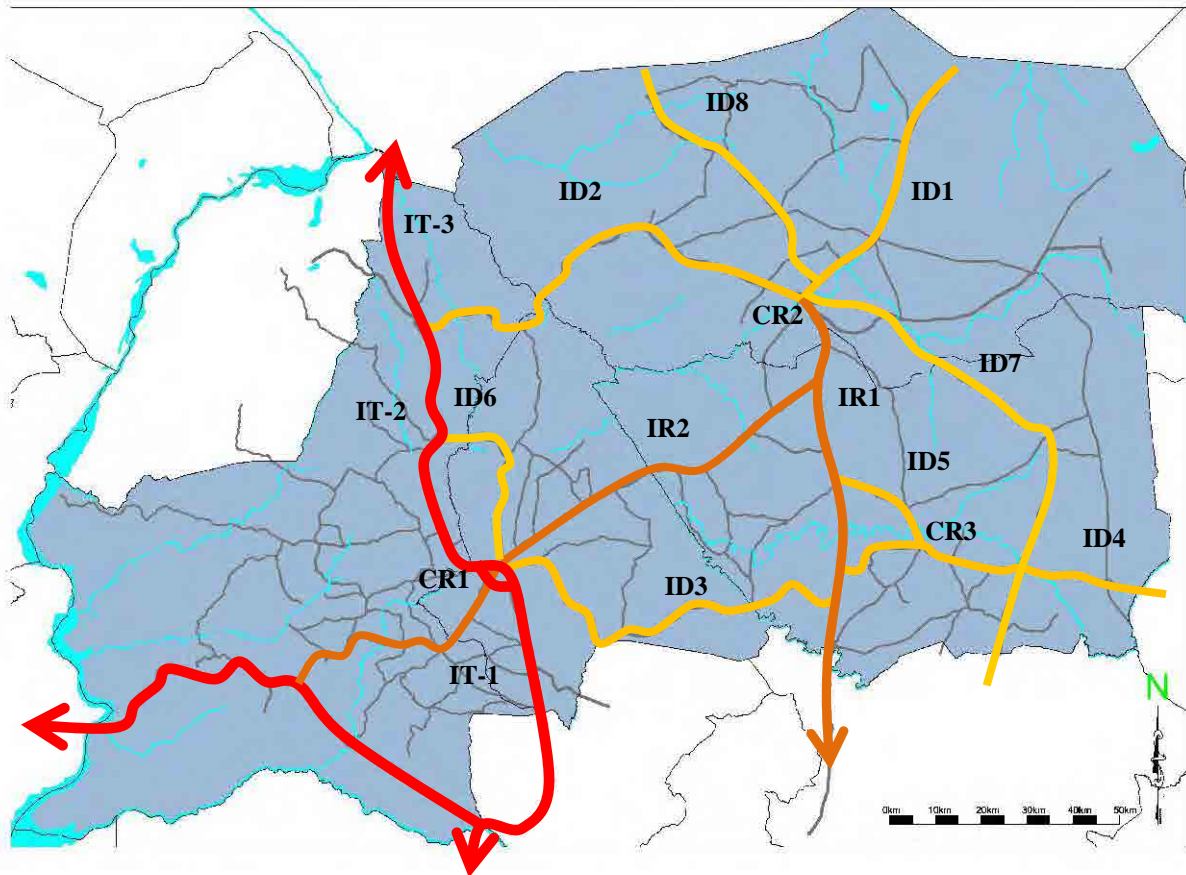
Table 16.1-1 List of Priority Projects

ID	Program Name	Scope	Description
<u>International Trunk Road Improvements</u>			
IT1	Kamdini-Gulu Road Section Improvement	L=58km W(9.5):1.5-3.25-3.25-1.5 Bituminous Standard	The paved surface of the road section is heavily deteriorated in the entire section and shoulders are eroded due to drainage problems. The cross section is narrower than standard width. The program aims to improve the section to meet the same standard as the Gulu-Atiak-Nimule Rd.
IT2	Gulu-Atiak Road Section Improvement	L=67km, W(9.5):1.5-3.25-3.25-1.5 Bituminous Standard	Currently this is a marrum road. Since the road section has been identified as an international corridor connecting between Kenya and South Sudan, the section needs to meet international trunk road standard with tarmac pavement. At Gulu township, a bypass was designed. The project is financed by WB and the project is in the evaluation stage for the Contractor.
IT3	Atiak-Nimule Road Section Improvement	L=35km, W(9.5):1.5-3.25-3.25-1.5 Bituminous Standard	Currently this is a marrum road. Since the road section has been identified as an international corridor connecting between Kenya and South Sudan, the section needs to meet international trunk road standard with tarmac pavement. At Gulu township, a bypass was designed. The project is financed by JICA and the project is in the evaluation stage for the Contractor.
<u>Inter-Region Trunk Road Improvements</u>			
IR1	Kitugum-Lira Road Section Improvement	L=120km W(8.6):1.5-2.80-2.80-1.5 (Paved III) Bituminous Standard	The road section is identified as a regional trunk road in northern Uganda and the road continues to the Kenyan border. The section from Lira to the Kenyan Border has been upgraded to bituminous standard with financial assistance of WB. UNRA has completed FS and DD for the Kitugum-Lira-Apac section and awaits funds for implementation.
IR2	Gulu-Acholibur Road Section Improvement	L=85km W(8.6):1.5-2.80-2.80-1.5 (Paved III) Bituminous Standard	The section runs east-west in Acholi Sub-region and has also been identified as a regional trunk road. The construction of Aswa Bridge is underway as of Oct. 2011. The section is a part of the Olwiyo – Gulu- Kitgum road and its FS and DD has been completed by UNRA and awaits funds for implementation.
<u>Inter-District Road Improvements</u>			
ID 1	Kitgum-Musingo(South Sudan Border) Road Section Improvement	L=70km W(10.0)=2.0-3.0-3.0-2.0 Gravel A Gravel Standard	The section is a part of IR1 and its FS and DD has been completed. The section was designed with bituminous standard. Estimated traffic volume remains low at approx. 100 in 2018 according to the traffic forecast. Because of low traffic, this study proposes marrum standard as the improvement.
ID 2	Kitgum-Atiak Road Section Improvement	L=96km W(10.0)=2.0-3.0-3.0-2.0 Gravel A Gravel Standard	The section runs east-west in the northern part of Acholi Sub-region. The section provides direct access from Kitgum to Gulu-Atiak-Nimule Rd. The section near the Atiak has been damaged due to overloading. A temporary Bailey bridge has been provided for passenger vehicles or smaller.
ID 3	Gulu-Rackoko Road Section Improvement	L=70km W(10.0)=2.0-3.0-3.0-2.0 Gravel A Gravel Standard	The section runs east-west in the south part of Acholi Sub-region. The section is located between Gulu-Kampala Rd. and Kitgum-Lira Rd. The maintenance condition is relatively poor. The traffic sometime needs to be diverted to other roads because of it.

ID	Program Name	Scope	Description
ID 4	Kilak-Adilang Road Section Improvement	L=48km W(10.0)=2.0-3.0-3.0-2.0 Gravel A Gravel Standard	The section runs east-west in the south part of Acholi Sub-region. The improvement works on two (2) bridges is underway with financial assistance by the Governments of Japan and Italy. There is an army camp along the road section.
ID 5	Pajule-Pader-Kwon kic Road Section Improvement	L=26km W(10.0)=2.0-3.0-3.0-2.0 Gravel A Gravel Standard	The road section links IR1 and the ID4 via Pader. The section gives the shortest access to Kitugm from Pader.
ID 6	Gulu-Ajulu-Pabbo Road Section Improvement	L=40km W(10.0)=2.0-3.0-3.0-2.0 Gravel A Gravel Standard	Urbanization is progressing along the road section and its adjacent area will be new residential area as Gulu develops. A bridge and culvert construction is underway as of Oct.11 with financial assistance from the Government of Japan.
ID 7	Kitgum- Kalingo –Patongo Road Section Improvement	L=125km W(10.0)=2.0-3.0-3.0-2.0 Gravel A Gravel Standard	Agogo district office is located on this road section and the section continues to Kitgum. High population growth is expected along the road section.
ID 8	Kitgum- Padibe-Ngomoromo Road Section Improvement	L=65km W(10.0)=2.0-3.0-3.0-2.0 Gravel A Gravel Standard	The road links between Kitgum and the South Sudan border and continues to Torrit, South Sudan, which is in the Green Belt.
City Road Improvements			
CR1	Gulu City Roads Improvement	L=14.3km W(14.0):2.5-1.5-3.0-3.0-1.5-2.5 Bituminous Standard	The pavement of the city roads is heavily deteriorated due to poor maintenance and no walkways or parking lanes have been provided although there are many NMT and Boda-Boda that create chaos in the city traffic. The project application as Japan's Grant Aid is under preparation by GOU as of Oct.2011.
CR 2	Kitgum City Roads Improvement	L=to be Studied W(14.0):2.5-1.5-3.0-3.0-1.5-2.5 Bituminous Standard	The pavement in the city no longer exists because of poor maintenance. No walkways or parking lanes have been provided There is a narrow bridge, which may be a bottleneck for the traffic in the near future. The city is expected to be an agricultural industrial centre.
CR 3	Pader City Road Improvement	L=to be Studied W(14.0):2.5-1.5-3.0-3.0-1.5-2.5 Bituminous Standard	The pavement of the city roads are heavily deteriorated due to poor maintenance and no walkways or and parking lanes have been provided. The existing roadway is wide, however the road is not being effectively used.
Feeder Road Improvements			
FR 1	Gulu Feeder Road Drainage System Improvements Program	Pipe Culvert D900 N=170	Approx. 170 culverts have been identified as being in poor condition by the Road Inventory Survey. These culverts will be replaced with min. 900mm dia. culverts together with additional filling.
FR 2	Kitgum Feeder Road Drainage System Improvement Program	Pipe Culvert D900 N=30	Approx. 30 culverts have been identified as being in poor condition by the Road Inventory Survey. These culverts will be replaced with min. 900mm dia. culverts together with additional filling.
FR 3	Pader Feeder Road Drainage System Improvements Program	Pipe Culvert D900 N=40	Approx. 40 culverts have been identified as being in poor condition by the Road Inventory Survey. These culverts will be replaced with min. 900mm dia. culverts together with additional filling.
FR 4	Lamwo Feeder Road Drainage System Improvements Program	Pipe Culvert D900 N=30	Approx. 30 culverts have been identified as being in poor condition by the Road Inventory Survey. These culverts will be replaced with min. 900mm dia. culverts together with additional filling.

ID	Program Name	Scope	Description
FR 5	Agago Feeder Road Drainage System Improvements Program	Pipe Culvert D900 N=20	Approx. 20 culverts have been identified as being in poor condition by the Road Inventory Survey. These culverts will be replaced with min. 900mm dia. culverts together with additional filling.
Public Transport Improvements			
PT1	Gulu Community Bus Service Program	Provision of community buses which will also be available to cater to small scale cargos. TA for O&M will be part of the program.	There is no reliable public transport in the District and that limits people's activities. Community buses should be provided so as to establish public access to social infrastructure and trading markets by scheduled operation but not daily.
PT2	Kitgum Community Bus Service Program	Provision of community buses which will also be available to cater to small scale cargos. TA for O&M will be part of the program.	There is no reliable public transport in the District and that limits people's activities. Community buses should be provided so as to establish public access to social infrastructure and trading markets by scheduled operation but not daily.
PT 3	Pader Community Bus Service Program	Provision of community buses which will also be available to cater to small scale cargos. TA for O&M will be part of the program.	There is no reliable public transport in the District and that limits people's activities. Community buses should be provided so as to establish public access to social infrastructure and trading markets by scheduled operation but not daily.
PT 4	Bus Terminal Integration Program in Gulu City	Bus Terminal and Parking Space Construction	There are 2 existing bus terminals in Gulu which are being operated by the private sector. One of the bus terminals is located in the middle of town and that disturbs city traffic flow. To improve city traffic and increase user's convenience, an integrated bus terminal is proposed.

Source: JICA Study Team



Source: JICA Study Team

Figure 16.1-1 Location of Priority Projects

16.2 Selection of Prioritized Sections in CARs

As discussed in Chapter 5 “5.4 Community Access Roads Survey”, the improvements and strengthening of the CARs, which is considered as the road network being used by the community daily and frequently, are very essential. The CARs to be prioritized by the districts are listed in Table 5.4-1 to 5.4-5 and shown in Figure 5.4-1. These selections were made by the districts themselves.

The issue is how to maintain those prioritized roads so that they are passable to motorized traffic. As one countermeasure, the application of the labour based technology (LBT) is considered, which is to use available human resources for the maintenance work and this would be expected to bring an additional benefit, which is the acceleration of social and economic settlements for the IDPs in this Acholi Sub-region.

This study seeks appropriate and applicable work methods and organization approaches for the maintenance of the CARs by the execution of Pilot Projects which is further explained in Chapter 17.

16.3 Selection of High Priority Projects

As explained in Chapter 9, Regional Development Plan, the study area needs to improve accessibility to Gulu and Kitgum to attain regional development. In particular the international

trunk road network conveying international freight needs to be emphasized and connected to the regional network.

Establishment of a strategic investment plan for the improvement network is necessary and it should be justifiable based on economic and social feasibility.

Taking account of the above, the selection is made with the following view points.

- 1) Improvement of Connectivity to the International Distribution Corridor
- 2) Accessibility to Gulu and/or Kitgum
- 3) Numbers of Beneficiaries from the Improvement
- 4) Average Daily Traffic
- 5) Contribution to Regional Industries

Table 16.3-1 Program Evaluations

Project ID	Road Section	Improvement of Connectivity to International Distribution Corridor	Accessibility to Gulu and/or Kitgum	Nos. of Beneficiaries from the Improvement	ADI (PCT2018)	Evaluation (Impacts on Regional Economy)
International Trunk Road Improvements						
IT1	Kamdi-Gulu Road Section Improvement	<ul style="list-style-type: none"> The road section connects between Gulu and the bunching point to Lira (Kamdi). The road reaches Nairobi and Kampala, where are major industrial centers in EAC countries, with continuous tarmac roads, eventually. Improvement of the road section would result in enhancing the distribution corridor of Mombasa – Juba 	<ul style="list-style-type: none"> The road is directly connected with Gulu 	<ul style="list-style-type: none"> 462,100(Direct Beneficiaries) 800,000(Indirect Beneficiaries) 	<ul style="list-style-type: none"> 1,900-2,300 	<ul style="list-style-type: none"> The Project is expected to bring great contributions to regional economy Gulu would play a rely point on the distribution corridor that would make service industries be developed. Positive economic impacts would spread to rest of Acholi Sub-region. <p style="text-align: right;">A</p>
IT2	Gulu-Atiak Road Section Improvement	<ul style="list-style-type: none"> The road section connects between Gulu and Atiak where is 35km before the border of South Sudan. The road would reach Nairobi and Kampala, where are major industrial centers in EAC countries, with continuous tarmac roads, eventually. Improvement of the road section would result in enhancing the distribution corridor of Mombasa – Juba 	<ul style="list-style-type: none"> The road is directly connected with Gulu 	<ul style="list-style-type: none"> 462,100(Direct Beneficiaries) 800,000(Indirect Beneficiaries of Population of Juba City) 	<ul style="list-style-type: none"> 1,100 	<ul style="list-style-type: none"> The Project is expected to bring great contributions to regional economy Gulu would play a rely point on the distribution corridor that would make service industries be developed. Positive economic impacts would spread to rest of Acholi Sub-region. Implementation of the Project is committed by WFB
IT3	Atiak-Nimule Road Section Improvement	<ul style="list-style-type: none"> The road section connects between Atak and Nimule where is the border of South Sudan. The road would reach Nairobi and Kampala, where are major industrial centers in EAC countries, with continuous tarmac roads, eventually. Improvement of the road section would result in enhancing the distribution corridor of Mombasa – Juba 	<ul style="list-style-type: none"> The road is a part of link between Nimule and Gulu 	<ul style="list-style-type: none"> 462,100(Direct Beneficiaries) 800,000(Indirect Beneficiaries of Population of Juba City) 	<ul style="list-style-type: none"> 1,100 	<ul style="list-style-type: none"> The Project is expected to bring huge great contributions to regional economy. Implementation of the Project is committed by JICA
IR1	Kitgum-Lira Road Section Improvement	<ul style="list-style-type: none"> The road section connects between Kitgum and Lira. The road would reach Nairobi through Lira with continuous tarmac roads, eventually. The improvement of the road section would result in travel time saving and shorter distance between Kitgum and Kampala 	<ul style="list-style-type: none"> The road is directly connected with Kitgum 	<ul style="list-style-type: none"> 475,100 	<ul style="list-style-type: none"> 1,500-1,600 	<ul style="list-style-type: none"> The Project will bring in the time saving to Kampala and Kitgum that is expected to make Kitgum a relay point of agriculture product from North including South Sudan and to generate new industry such as food processing. Fader and Lamwo will also be beneficiaries because of creation of shorter access to Kampala by the improvement. <p style="text-align: right;">A</p>
IR2	Gulu-Acholbir Road Section Improvement	<ul style="list-style-type: none"> The road section connects between Gulu and Kitgum. The improvement of the road section would result in creation of multi linkage such as to Juba, Kampala and DRC via Gulu. 	<ul style="list-style-type: none"> The road is directly connected with both Gulu and Kitgum 	<ul style="list-style-type: none"> 738,800 	<ul style="list-style-type: none"> 1,100-1,800 	<ul style="list-style-type: none"> The Project will bring in the time saving to Kampala and DRC that is expected to make Kitgum a relay point of agriculture product from North including South Sudan and to generate new industry such as food processing. Lamwo will also be beneficiaries because of shorter access to Kampala by the improvement. <p style="text-align: right;">A</p>

Project ID	Road Section	Improvement of Connectivity to International Distribution Corridor	Accessibility to Gulu and/or Kitgum	Nos. Beneficiaries from the Improvement	ADL (PCU/2018)	Evaluation (Impacts on Regional Economy)
Inter-Region Trunk Road Improvements						
ID1	Kitgum-Musingo(South Sudan Border) Road Section Improvement	<ul style="list-style-type: none"> The road section connects between Kitgum and South Sudan Border (North East). The road section is a continuation of Gulu-Kitgum and Lira-Kitgum road. 	<ul style="list-style-type: none"> The road is directly connected with Kitgum 	<ul style="list-style-type: none"> 165,900 	<ul style="list-style-type: none"> 110 	<ul style="list-style-type: none"> The Project will give positive impact on agricultural industry along the road if the IR1 and IR2 are constructed.
ID2	Kitgum-Atiak Road Section Improvement	<ul style="list-style-type: none"> The road section connects between Kitgum and Atiak at the Atiak – Nimule (South Sudan Border) Road. 	<ul style="list-style-type: none"> The road is directly connected with Kitgum 	<ul style="list-style-type: none"> 283,300 	<ul style="list-style-type: none"> 200 	<ul style="list-style-type: none"> The Project will give positive impact on agricultural industry along the road. Increase of exportation of agricultural products to South Sudan is expected.
ID3	Gulu-Rackoko Road Section Improvement	<ul style="list-style-type: none"> The road section connects between Gulu and Rackoko at the Kitgum-Lira Road 	<ul style="list-style-type: none"> The road is directly connected with Gulu 	<ul style="list-style-type: none"> 191,800 	<ul style="list-style-type: none"> 1,000 	<ul style="list-style-type: none"> The Project will give positive impact on agricultural industry along the road if the IR1 and IR2 are constructed.
ID4	Kilak-Adilang Road Section Improvement	<ul style="list-style-type: none"> The road section connects between Kilak at the Kitgum- Lira Road and Adilang 	<ul style="list-style-type: none"> The road is not connected with neither Gulu nor Kitgum 	<ul style="list-style-type: none"> 260,900 	<ul style="list-style-type: none"> 170 	<ul style="list-style-type: none"> The Project will give positive impact on agricultural industry along the road if the IR2 is constructed.
ID5	Pajule-Pader-Kwoni Road Section Improvement	<ul style="list-style-type: none"> The road section connects with Pajule at Kitgum-Lira Road and Pader and Kwoni in Agago. 	<ul style="list-style-type: none"> The road is not connected with neither Gulu nor Kitgum 	<ul style="list-style-type: none"> 233,500 	<ul style="list-style-type: none"> 350 	<ul style="list-style-type: none"> The Project will give positive impact on agricultural industry along the road if the IR2 is constructed.
ID6	Gulu-Ajulu-Pabbo Road Section Improvement	<ul style="list-style-type: none"> The road section connects with Gulu and Ajulu and Pabbo at the Gulu-Nimule Road 	<ul style="list-style-type: none"> The road is directly connected with Kitgum 	<ul style="list-style-type: none"> 169,800 	<ul style="list-style-type: none"> 360 	<ul style="list-style-type: none"> The Project will give positive impact on agricultural industry along the road when the IR2 is constructed.
ID7	Kitgum-Patongo Road Section Improvement	<ul style="list-style-type: none"> The road section connects with Kitgum and Kalino –Patongo at Agago 	<ul style="list-style-type: none"> The road is directly connected with Kitgum 	<ul style="list-style-type: none"> 234,600 	<ul style="list-style-type: none"> 100 	<ul style="list-style-type: none"> The Project will give positive impact on agricultural industry along the road when the IR1 and the IR2 are constructed.
ID8	Kitgum-Padibe-Ngomoromo Road Section Improvement	<ul style="list-style-type: none"> The road section connects with Kitgum and Ngomoromo at South Sudan Border (North West) 	<ul style="list-style-type: none"> The road is directly connected with Kitgum 	<ul style="list-style-type: none"> 184,100 	<ul style="list-style-type: none"> 100 	<ul style="list-style-type: none"> The Project will give positive impact on agricultural industry along the road when the IR1 and the IR2 are constructed There is a national development plan on agriculture industry after the border (South Sudan side). If the road section is improved and the area at South Sudan could be a part of Kitgum agricultural zone
Municipal Road Improvements						
MR1	Gulu Municipal Roads Improvement	<ul style="list-style-type: none"> The improvement work contains the road sections at CBD area with 14.3km 	<ul style="list-style-type: none"> The roads are located within Gulu municipality 	<ul style="list-style-type: none"> 172,000 	<ul style="list-style-type: none"> 5,000 	<ul style="list-style-type: none"> The Project will contribute to the effectiveness of urban transport The Project is expected to bring new industries such as on service industries (Retail Trade, Bank, Tourism)
MR2	Kitgum Municipal Roads Improvement	<ul style="list-style-type: none"> The improvement work is on the road sections at town centre with 7.5km 	<ul style="list-style-type: none"> The roads are located within Kitgum municipality 	<ul style="list-style-type: none"> 78,000 	<ul style="list-style-type: none"> 300-500 	<ul style="list-style-type: none"> The Project will contribute to improvement of living standards and stimulate local economy. Infrastructure development including roads will bring new industry such as agriculture product processing
MR3	Pader Town Council Roads	<ul style="list-style-type: none"> The improvement work is on the road section at town centre with 1.5m 	<ul style="list-style-type: none"> The road is not connected with neither Gulu nor Kitgum 	<ul style="list-style-type: none"> 18,000 	<ul style="list-style-type: none"> 300 	<ul style="list-style-type: none"> The Project will contribute to improvement of living standards and stimulate local economy.

Source: JICA Study Team

As a result, the following programs are selected as the high priority projects.

- 1) IT1 Kamdini-Gulu Road Section Improvement L=58km
- 2) IR1 Kitgum-Lira Road Section Improvement L=120km
- 3) IR2 Gulu-Acholibur Road Section Improvement L= 85km
- 4) MR1 Gulu Municipal Roads Improvement L=14.3km

17. PLANNING AND IMPLEMENTATION OF PILOT PROJECT

17.1 Objective and Scope of the Pilot Project

17.1.1 Outline of Road Maintenance in Uganda

Since Uganda is a landlocked country, most of the distribution and passenger travelling is dependent on motorization. It is said that the total length of the road network in Uganda is approx. 65,000km and out of that 10,000km are classified as national roads. Furthermore, it is also said that of the 55,000km which are classified as district and community access roads, the sections paved with tarmac in good condition is just 700km: the rest are paved with gravel or remain as earth roads.

The maintenance of the National Roads is implemented by Uganda National Roads Authority (UNRA) and most of the works are carried out on a sub-contract basis. On the other hand, maintenance of district roads was shifted from force account to sub-contract basis in 1993; however, the system did not consequently operate properly because of issues such as increase of contract price, delay of works and lack of quality control.

One of the reasons why this occurred could be because most contractors, materials and personnel resources are concentrated in Kampala. Hence it becomes difficult to expect availability of contractors in regional areas such as Acholi. Contractors who can handle the order are limited in number. Furthermore, since there is not enough work requiring machinery in Acholi sub-region, contractors who have equipment are very limited. As a result of this, contractors from Kampala oftentimes monopolize works in high price contracts. This leads to a reduction in the number of works, which brings about poor road maintenance.

In response to this, the Uganda Government introduced two policies: introduction of a road fund and force account on district roads. The road fund was introduced in FY2009/10 and has already been distributed to clients such as UNRA, districts and municipalities. For the force account policy, since the loan from the Chinese Government, which is expected to be the major funding for the operation, is still under negotiation between both governments, the commencement date of this is not settled. Although this may not come in the current FY (2011/2012), it is expected to come in the next FY (2012/2013).

17.1.2 Objective of the Pilot Project

The role of the district in road maintenance can generally be categorized as 1) Road inventory survey utilizing GIS system, 2) develop a road maintenance plan and 3) order road maintenance construction and conduct the supervision. These works have basically been systematized by software called RAMPS. However, currently in the districts, only item 2) and

part of item 3) of the above mentioned system are undertaken. For item 1), due to inadequate literacy of personnel in using the system and lack of its update, the system is almost not in use. And as for item 2), it is not in use adequately for reasons similar to 1): only the printing part is used and the data is directly typed in by the engineer. Furthermore, according to the administrative jurisdiction of Uganda, sub-counties have the responsibility for maintaining CARs. However, since sub-counties do not have enough in terms of either personnel resources or equipment, maintenance of CARs is hardly conducted, with the exception of basic labour work which doesn't require equipment, for example slashing weeds.

A policy has been enacted to change the method of road maintenance from the current equipment-based method to Labour-based techniques, especially for routine maintenance. However, the districts and sub-counties are more familiar with equipment-based methods by sub-contracting to contactors. Therefore, the Government conducted technical training at Mt-Elgon Labour Based Technology Training Centre (MELTC), which is the only training institute regarding LBT in Uganda, for the district engineers. But since there has been no practical experiment on managing LBT by force account in the districts, the effect of the training is not clear.

LBT is a construction method where mainly manpower is used together with small equipment for compaction or hauling materials. Therefore, it is expected that this method will be applied in the sub-counties which do not have enough resources to manage or operate the maintenance works. Besides, the fact is that CARs are part of a district's road network and maintenance of CARs is work which will directly enhance the lives of the people in the community. Because of this, it is absolutely necessary to implement a pilot project targeting CARs and collect and evaluate the data to determine the needs for the sub-counties to introduce LBT.

17.1.3 Scope of the Pilot Project

The road maintenance work can be categorized into: 1) Routine, 2) Periodic, 3) Rehabilitation, 4) Spot Maintenance and 5) Urgent Improvement, and the required technology for each of these five categories is different. Therefore, in this Pilot Project, routine and periodic maintenance shall be chosen due to the typicality of the maintenance works.

The "DONOU Method" is a road maintenance method in which gunny bags (which are called "donou" in Japanese) are used. Action has been carried out by JICA volunteers and Japanese NPO to spread the method widely in Uganda. The donou method is a method which is reasonable and uses simple technology, so it is expected that it can be managed even at sub-county level. Therefore, in this Pilot Project, accessibility of this donou method to sub-counties shall be verified.

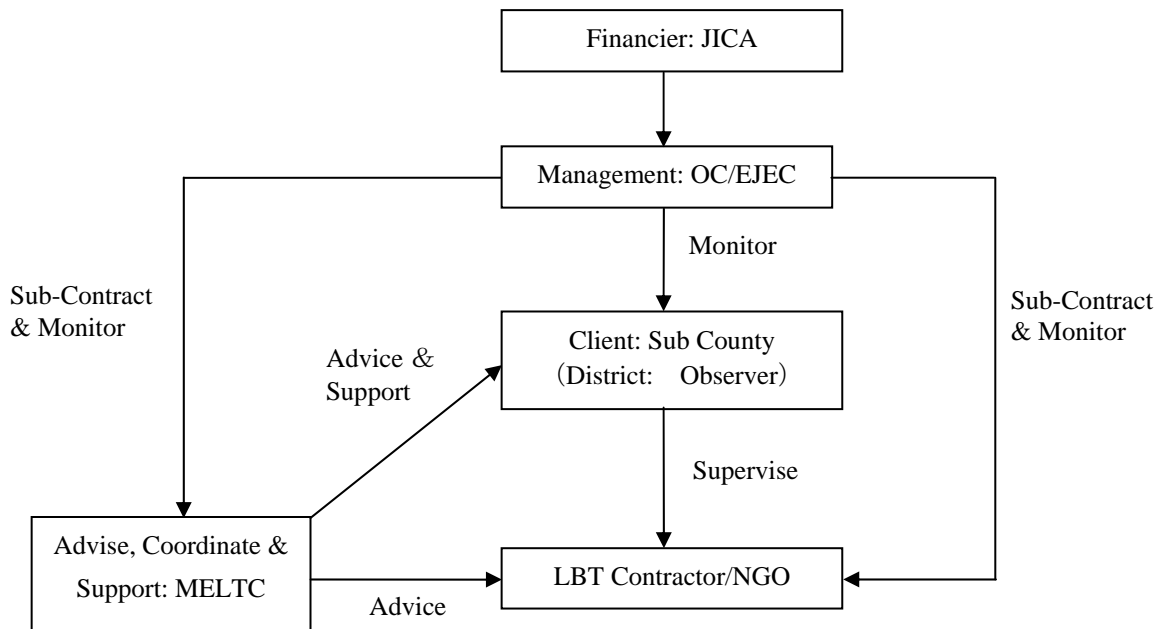
Despite the fact that sub-counties have the responsibility of managing the CARs, it should be noted that CARs form part of the road network of the district. So, in this Pilot Project, the district will be asked to be involved in the inspection of the works. There will be need for consultations between the district and sub-county to verify institutional roles.

Through the practical activity of the Pilot Project, wide issues at the district and sub-counties including capability of the contractors, necessity of technical assistance and direction of the assistance shall be verified. And also, from the result of the verification, the way forward for JICA to tackle road maintenance shall be considered.

17.2 Organization, Schedule and Location of the Targeted Road

17.2.1 Organization

The following figure indicates the organization of the Pilot Project.



Source: JICA Study Team

Figure 17.2-1 Organization of the Pilot Project

The logic behind the above mentioned organization of the pilot project is shown below:

- a. Due to its purpose of verifying the series of activities of the sub-county on road maintenance, the sub-county shall be the client. However, the district shall also be involved as observer and to assist the sub-county.
- b. Since it is unreasonable to expect adequate technical skills from the sub-county as well as from the district in managing LBT, MELTC, the only training centre specialized in LBT in Uganda shall provide support to the project. Further, MELTC itself shall be included as a target of the evaluation to find a comprehensive solution to road maintenance including “training “
- c. MELTC shall support the contractor, sub-county, and district as well as the study team in technical and procedural aspects.
- d. The JICA study Team shall work as overall manager and enter into a sub-contract with MELTC and the contractors. Allowances shall be paid to the sub-county and district.

17.2.2 Schedule

The following table indicates the general schedule of the Pilot Project.

Table 17.2-1 General Schedule of the Pilot Project

	September	October	November	December	January
(1) Meeting with District & Sub-Counties	██████████				
(2) Meeting with MELTC	██████████				
(3) Internal progress of JICA		██████████			
(4) Contract with MELTC			██		
(5) Public Consultation & tendering preparation			██		
(6) Tendering procedure			██████████		
(7) Construction (Periodic)				████████████████████	██████████
(8) Construction (Routine,)				██████████	

Source: JICA Study Team

17.2.3 Location

Since most of the CARs have not had proper road maintenance due to financial reasons, their current condition is basically very poor. Most of the roads are impassable by vehicles and even those that are passable have many sections that are flooded during the rainy season. To this kind of road, the required maintenance works shall go beyond the scope of routine and periodic, and will need overall maintenance such as rehabilitation.

Furthermore, considering the purpose of this Pilot Project to attempt to apply LBT for the construction works, there is a need to select a road where LBT shall be applicable. From what is mentioned above, the condition of the road of the Pilot Project shall be as follows:

- a. Able to work at routine or periodic level
- b. Passable for all seasons
- c. Nominated as important route in the sub-county
- d. Enough people settled along it to provide necessary labour for LBT
- e. Easy to collect road material such as gravel and stone
- f. Area where sub-county awareness is high

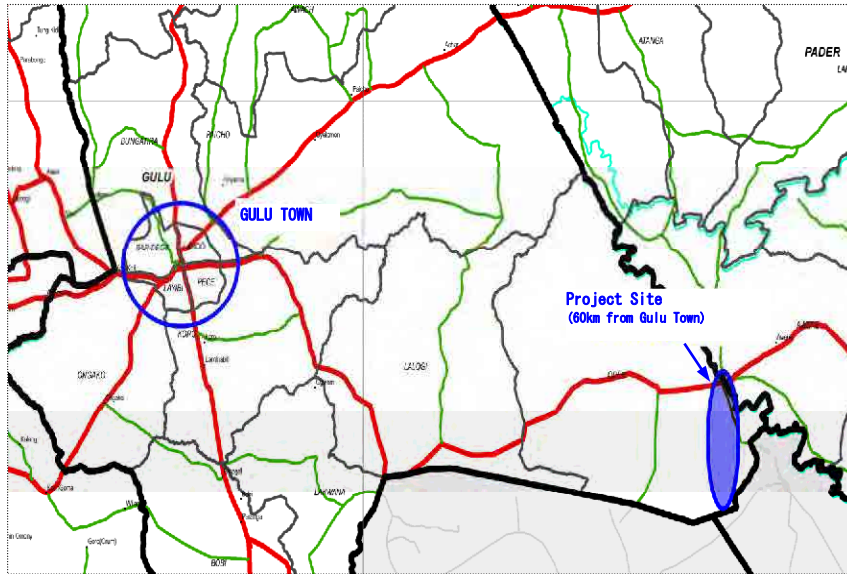
Given the above selection criteria, the routes mentioned in the table below were chosen from Gulu and Kitgum districts.

Table 17.2-2 Criteria of the Targeted Route for the Pilot Project

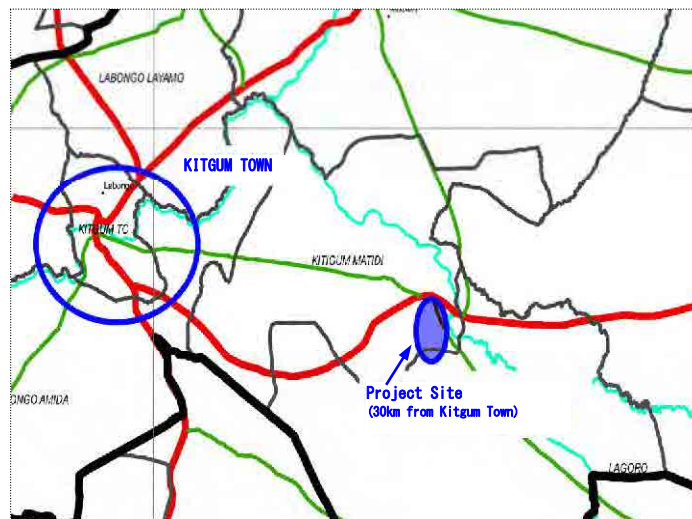
		Gulu District (Periodic)	Kitgum District (Routine)
Name of Sub-County and Route		Gulu Odek Sub-County/ Awere-Awali-Akiget	Kitgum Matid Sub-County/ Kitgum-Natidi-Jang-Yat
Distance		11.8 km	3.0 km
Evaluation	a. Level	Currently, passable by vehicles and able to recover its function with periodic level maintenance.	Currently passable by vehicles and the carriageway can recover its function at routine level maintenance. However, a few pipe culverts have collapsed and need to be repaired.
	b. Passable throughout the year	The route is passable throughout the year, so the road function shall be secured even after the routine works are completed.	The road function shall be secured by repairing the crossing pipe culverts
	c. Nomination	The target route is nominated as an important route in the sub-county	The target route is nominated as an important route in the sub-county
	d. Applicability of LBT	A few villages are located along the road and adequate labour can be expected for the LBT. (Approx. 200 labourers are expected to be hired)	A few villages are located along the road and adequate labour can be expected for the LBT. (Approx. 200 labourers are expected to be hired)
	e. Material	Based on interviews conducted in the district, it was confirmed that enough material can be expected from areas near the site.	Based on interviews conducted in the district, it was confirmed that enough material can be expected from areas near the site.
	f. Awareness	High awareness of the sub-county	High awareness of the sub-county
	Evaluation	Since the route connects with the neighbouring district "Oyam", this route can expect a high potentiality of travel between communities. Furthermore, there is a plan to use equipment partially on top of the Labour-based techniques: from this, further knowledge for comparison of labour-based methods and equipment-based methods can be acquired.	Since the road function is extremely reduced due to broken pipe culverts, significant effect can be expected as a result of the routine maintenance works. Furthermore, during this construction, the Donou Method will be attempted and from this, further knowledge shall be collected.
Major Works	Slashing Grass and removing roots	X	X
	Clean and make the site even	X	X
	Leveling	-	-
	Drainage cleaning	X	X
	Ditching	X	-
	Outlet Treatment	X	X
	Gravel Pavement	X	-
	Crossing Culverts	-	X

Source: JICA Study Team

Location maps are shown in the next page.



(a) Gulu District (Approx. 60km from Gulu)



(b) Kitgum District (Approx.30km from Kitgum)

Source: JICA Study Team

Figure 17.2-2 Maps Showing Location of the Pilot Project

17.3 Considerable Risks and Mitigation Measures

17.3.1 Delay by Unseasonable Weather, Contractors' Capability, etc.

Recently in Uganda, weather patterns have been erratic and it is becoming increasingly difficult to predict the rainy and dry seasons precisely. From experience, the duration of the Pilot Project falls in the dry season: however, there is a possibility of the occurrence of unexpected heavy rains. It is common for the contractor to prepare a working schedule making an allowance for rain-interrupted days. However, it might be difficult to expect such management skills from the contractor, and this kind of skill is also one of the targets of the evaluation.

Therefore, when delays occur as a result of circumstances such as those mentioned above, the construction shall be suspended and at the end of the contract period, the payment shall be finalized. Furthermore, if, as a result of afore-mentioned reasons, there was a change in quantities or if a new issue had arisen, the construction shall be suspended at the maximum price of the contract. Contract amendments shall be required for these cost finalizations and suspensions.

17.3.2 Procurement of Gravel

Gravel for construction was originally planned to be obtained from the district borrow pit (free of charge) or at reasonable price. However, when it was found that the capacity of the borrow pit was inadequate, it became difficult to establish an understanding with the land owner; thus, gravel for use on the project had to be procured at market price. In such a case, an amendment of contract such as reviewing the quantity and items to fit within the contract price shall be made.

17.4 Pilot Project in Odec Sub-County, Gulu District

17.4.1 Outline of the Construction

(1) Summary of Construction Method

The Pilot Project in Gulu was conducted in Odec Sub-County, Gulu District. Since construction was done at the periodic maintenance level, using machinery was allowed. However, the priority of CARs is lower than that of the district roads, and this means that there are inadequate funds for road maintenance. According to an interview with the sub-county personnel, the annual budget is approximately 3 to 5 million Ushs. Therefore, there was a great advantage to using a labour based method rather than machinery as much as possible during the PP in order to find the best way to employ the labour based method for CARs at several maintenance levels. By using a labour based method it was expected to complete the road maintenance at a more suitable cost.

The length of the target road was 13km and it had to be completed within a 60 day construction period. MELTC joined the construction as supervisor and monitor to evaluate the performance of the contractor, authorities and the casual labourers that were hired from the communities along the targeted road.

The construction started on the 19th November and ended on 17th January, 2012. The details are shown in the following chapters.

(2) Major works

The major works of the construction are shown in the following table.

Table 17.4-1 Major Works (Gulu)

Item	Unit	Quantity
1. Setting Out and Site Clearing Works	m	13,000
2. Re-Construction of road formation	m	13,000
2.1 Excavation , mitre, catch water drains	m ³	7,800
2.2 Form, compact road bed	m	13,000
2.3 Fill material at embankment section	m ³	1,725
3. Supply and install concrete culvert pipe	line	4
4. Gravelling (Excavate gravel, haul, spread and compact in place)	m ³	800

Source: JICA Study Team

17.4.2 Tendering Procudure and the Results

The procedure for the tendering and the results are shown in the following.

- Name of the Project: The Periodic Maintenance in Awere-Awali-Anget Road in Gulu Odek Sub-County
- Date of BOQ submission : 10th November 2011
- Date of Site visit : 13 November 2011
- Bidding Companies : a) Karahn Enterprises Ltd.
b) Gila Technical Services Ltd.
c) Emmaus General Workshop Co. (U) Ltd.
- Budget for the Construction : Ushs. 120,931,034 -
- Date of tendering : 18th November, 2011
- Result of the tendering :

Table 17.4-2 Results of the Tendering (Gulu)

	Karahn Enterprises Ltd.	Gili Technical Services Ltd.	Emmaus General Workshop
Tendering Price	113,318,000	135,449,150	143,108,450
Result	1	2	3

Source: JICA Study Team

- Contract Company : Karahn Enterprises
- Contract Price : Ushs. 113,318,000
- Construction Period : From 19th November, 2011 to 17th January, 2012.

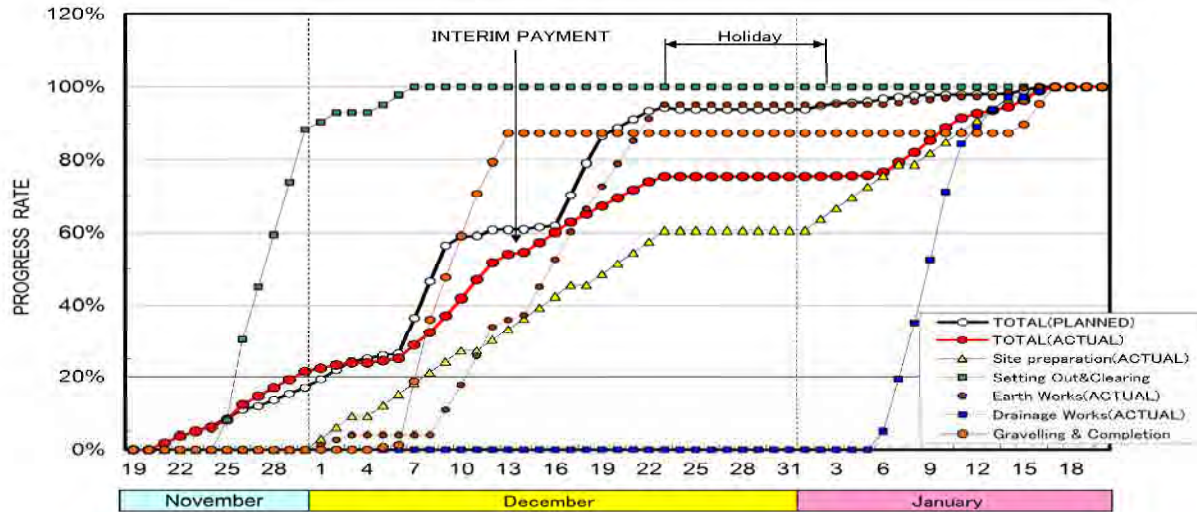
17.4.3 Constuction Supervision

(1) Progress of the Construction

The following indicates the details of the payment and inspection

- Interim Inspection Day : 13th of December 2011
- Issuance Date of Interim Payment Certificate : 13th of December 2011
- Interim Payment Amount : Ushs. 57,901,900
- Final Inspection Day : 18th of January 2012
- Issuance Date of Final Payment Certificate : 19th of January 2012
- Final Payment Amount : Ushs. 114,278,300

The following shows the progress in a graph description.



Source: JICA Study Team

Figure 17.4-1 Construction Progress (Gulu)

(2) Bill of Quantities

The Bill of Quantities at the initial, interim and final stages are shown in the next table.









Table 17.4-3 Summary of Financial Statement (Gulu)

SUMMARY FINANCIAL STATEMENT						
SERIES	DESCRIPTION	CONTRACT AMOUNT (Ush)	INTERIM		FINAL	
			AMOUNT (Ush)	%	AMOUNT (Ush)	%
Bill 1	Site Preparatory Works	1,900,000	1,900,000	100.0%	1,900,000	100.0%
Bill 2	Setting Out and Site Clearing Works	17,096,000	17,950,000	105.0%	17,950,000	105.0%
Bill 3	Earth Works	19,037,500	13,390,500	70.3%	40,000,500	210.1%
Bill 4	Drainage Works	12,617,400	0	0.0%	18,502,700	146.6%
Bill 5	Gravelling and Completion Works	50,039,100	19,638,700	39.2%	22,505,100	45.0%
Bill 6	Hand Tools for Routine Work	2,628,000	2,820,000	107.3%	2,820,000	107.3%
	SUBTOTAL	103,318,000	55,699,200	53.9%	103,678,300	100.3%
Bill 7	PRELIMINARY AND GENERAL ITEMS	10,000,000	6,570,000	65.7%	10,600,000	106.0%
1	TOTAL FOR WORKS	113,318,000	62,269,200	54.95%	114,278,300	100.85%
2	ADVANCE PAYMENT	23,906,500				
3	DEDUCT: (a) Recovery of Advance Payment		-23,906,500		-23,906,500	
	(b) Recovery of Interim Payment				-33,995,400	
	(c) Adjustment		-4,367,300			
	(d) Others					
4	NET AMOUNT PAYABLE		33,995,400		56,376,400	

Source: JICA Study Team
















(3) Construction Photos

Following photos indicate the difference between before and after the construction at the same locations.

1. No.0+00		
		
1-1 Existing Road Condition (Before)	1-2 Re-shaping Work	1-3 After Compaction Work
2. No.1+900		
		
2-1 Existing Road Condition (Before)	2-2 Re-shaping Work	2-3 After Compaction Work
3. No.8+500		
		
3-1 Existing Road Condition (Before)	3-2 Re-shaping Work	3-3 After Compaction Work

The following photos indicate the construction procedure from commencement to the end.

		
1-1 Setting out of Stakes	2-1 Site Clearing Work	2-2 After Site Clearing Work

 No.10+500	 No.10+400	 No.10+500
3-1 Reshaping & Side drain Work	4-1 Compaction Work	4-2 After Compaction Work
 No.1+700	 No.1+700	 No.1+700
5-1 Setting out for Earth Work	5-2 Earth work (Fill material)	5-3 After Earth Work
 No.3+800	 No.3+800	 No.3+800
6-1 Setting out for Gravelling Work	6-2 Spread Gravel	6-3 After Gravelling Work
 No.1+750	 No.1+750	 No.1+750
7-1 Setting out for Setting Culvert	7-2 Excavation & Casting concrete	7-3 Completion of Pipe Culvert
 No.7+000	 No.1+650	 No.13+000
8. Site Training	9. Final Inspection	10. Project Board

17.5 Pilot Project in Matindi Sub-County, Kitgum District

17.5.1 Outline of the construction

(1) Summary construction method

Contrary to the Pilot Project in Gulu, the Pilot Project in Kitgum attempted to undertake the construction by applying purely a labour based method as much as possible. One of the objectives to applying a labour based method is to determine the applicability of the labour based method to community road maintenance by hiring community people. The maintenance level was planned to be routine.

Also, the clearance of the bottlenecks is one of the greatest difficulties which the sub-county has, and this mostly comes from the inadequate budget. To solve this issue, the donou method was used instead of concrete where cross culverts were needed. "Donou" is a Japanese word which means sand bag or gunny bag.

The length of the target road was approx. 8km with 3 crossing culverts. The construction period was 30 days. MELTC joined the construction as supervisor and monitor to evaluate the performance of the contractor, authorities and the casual labourers where hired from the communities along the targeted road.

The construction started 19th November and ended on 17th December, 2011. The details are shown in the following chapters.

(2) Major Works

The major works of the construction are shown in the following table.

Table 17.5-1 Major Works (Kitgum)

Item	Unit	Quantity
1. Setting out site clearing works	M	6,000
2. Rehabilitation of existing formation	M	5,800
3. Re-construction of road formation		
3.1 Excavation, mitre, water drains	M	2,200
3.2 Form, compact road bed	M	200
3.3 Fill material (Embankment)	M3	160
4. Installation of Concrete Pipe Culverts	Line	5
5. Graveling (Excavation of gravel for Donou Works)	M3	120
6. Donou Works	No.	2,500

Source: JICA Study Team

17.5.2 Tendering Procedure and the results

The procedure for the tendering and the results are shown in the follows.

- Name of the Project : The Routine Maintenance in Kitgum Matidi-Jan Yat Road in Kitgum Matidi Sub-County
- Date of BOQ submission : 11 November 2011
- Date of Site visit : 14th November 2011
- Bidding Companies : a) Giant Plum Enterprises (u) Ltd.
b) Akemkwerne Enterprises Company Ltd.
c) Emmaus General Workshop Co. (u) Ltd

- Budget for the Construction : Ushs. 55,586,207
- Result of the tendering :

Table 17.5-2 Results of the Tendering (Kitgum)

	Giant Plum Enterprises (u) Ltd.	Emmaus General Workshop Co. (u) Ltd	Akemkwerne Enterprises Company Ltd.
Tendering Price	53,972,584	58,721,900	59,268,000
Result	1	2	3

Source: JICA Study Team

- Contract Company : Giant Plum Enterprises (u) Ltd.
- Contract Price : Ushs. 53,972,884
- Construction Period : From 19th November, 2011 to 18th December, 2011

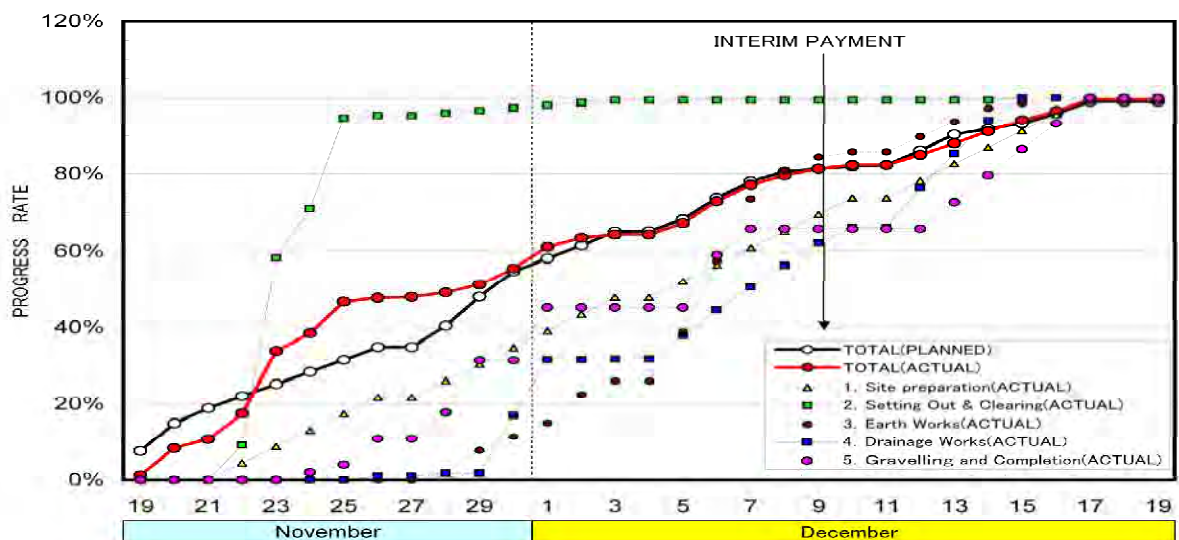
17.5.3 Construction Supervision

(1) Progress of the Construction

Follows indicates the detail of the payment and its inspection.

- Interim Inspection Day : 9th of December 2011
- Issuance Date of Interim Payment Certificate: 9th of December 2011
- Interim Payment Amount : Ushs. 43,073,100
- Final Inspection Day : 17th of December 2011
- Issuance Date of Final Payment Certificate: 18th of December 2011
- Final Payment Amount : Ushs. 54,415,984

The following shows the progress in a graph description.



Source: JICA Study Team

Figure 17.5-1 Construction Progress (Kitgum)

(2) Bill of Quantities

The Bill of Quantities at initial, interim and final phases is shown in the next table.

Table 17.5-3 Summary of Financial Statement (Kitgum)

SUMMARY FINANCIAL STATEMENT						
SERIES	DESCRIPTION	CONTRACT AMOUNT (Ush)	INTERIM		FINAL	
			AMOUNT (Ush)	%	AMOUNT (Ush)	%
Bill 1	Site Preparatory Works	1,830,000	740,000	40.4%	1,830,000	100.0%
Bill 2	Setting Out and Site Clearing Works	20,136,600	17,820,000	88.5%	17,920,000	89.0%
Bill 3	Earth Works	3,314,000	4,819,000	145.4%	6,794,000	205.0%
Bill 4	Drainage Works	12,279,000	8,862,000	72.2%	10,222,000	83.2%
Bill 5	Gravelling and Completion Works	3,778,984	2,230,000	59.0%	3,778,984	100.0%
Bill 6	Do-nou Work	1,650,000	1,981,100	120.1%	2,750,000	166.7%
Bill 7	Hand Tools for Routine Work	6,584,000	4,621,000	70.2%	6,721,000	102.1%
	SUBTOTAL	49,572,584	41,073,100	82.9%	50,015,984	100.9%
Bill 8	PRELIMINARY AND GENERAL ITEMS	4,400,000	2,000,000	45.5%	4,400,000	100.0%
1	TOTAL FOR WORKS	53,972,584	43,073,100	79.81%	54,415,984	100.82%
2	ADVANCE PAYMENT	8,095,000				
3	DEDUCT: (a) Recovery of Advance Payment		-8,095,000		-8,095,000	
	(b) Recovery of Interim Payment				-34,978,100	
	(c) Others					
4	NET AMOUNT PRORATED		34,978,100		11,342,884	
5	NET AMOUNT PAYABLE		34,978,100		11,342,884	

Source: JICA Study Team

(3) Constuction Photos

The following shows photos of before and after the construction.

No. 0+300		
A narrow, unpaved dirt road with a reddish-brown surface, flanked by tall grass and trees under a blue sky with light clouds.	A group of about ten people, some wearing hard hats, are working on the road surface. They appear to be using tools to break up and level the soil.	The road is now wider and has a more uniform, reddish-brown surface, indicating the completion of the scarifying and re-shaping work.
1-1 Existing Road Condition (Before)	1-2 Scarifying & Re-shaping Work	1-3 After Work
No. 3+550		
A dirt road almost completely obscured by tall, dense grass and brush, with a cloudy sky in the background.	Two people are working in a field of tall grass. One person is bent over, possibly cutting or clearing the vegetation, while the other stands nearby.	A clear, wide dirt road with a reddish-brown surface, bordered by trees and some brush on the right side.
2-1 Existing Road Condition (Before)	2-2 Scarifying & Re-shaping Work	3-3 After Work

The following show photos of the construction sequence.

		
1-1 Bush clearing	2-1 Setting out of road works	3-1 Grubbing Work
		
4-1 Excavation of side drain	5-1 Cutting side trees	6-1 Excavation of Mitre drain
		
7-1 Before Culvert work (1+830)	7-2 Installation of Pipe culvert	7-3 After Culvert work
		
8-1 Before Culvert work(7+800)	8-2 Installation of Pipe culvert	8-3 After Culvert work
		
9. Training	10. Inspection of Pipe Culvert	11. Project boards

17.6 Evaluation of the Pilot Project

17.6.1 Impact

17.6.1.1 Beneficiaries of the project

Six villages and 2 primary schools are located along Awari–Anget Road in Oden Sub-county (Gulu District). Population of the 6 villages is around 8,800 persons, and number of students is around 1,500 persons.

Table 17.6-1 Population and No of Households along Awari–Anget Road

Name of village	Female	Male	Households
Ajan	1000	1200	380
Akoyo	1451	1224	213
Awariwanglobo A	810	760	335
Awariwanglobo B	864	896	286
Otara A	65	72	210
Otara B	70	86	235
Total	4,260	4,238	

Note: The number of household members in Akoyo village seems to be too large and those in Orata A village and Orata B village seem to be too small in comparison with the figures for the other villages. However, the table lists the figures exactly as reported by each village.

Source: Village council offices

Table 17.6-2 No of Students along Awari–Anget Road

Grade	Male	Female	Total
Awari Primary School			
P1	59	65	124
P2	55	60	115
P3	65	54	119
P4	62	59	121
P5	39	32	71
P6	49	35	84
P7	18	10	28
Total	347	315	662
Anget Primary School			
P1	69	78	147
P2	63	75	138
P3	71	82	153
P4	74	85	159
P5	66	74	140
P6	47	29	76
P7	32	20	52
Total	422	443	865

Source: Awari Primary School and Anget Primary School

In regard to the other pilot project in Matisi Sub-county of Kitgum District, 4 villages are located along the project section (6 km) of Jangyat Road. Total population is around 2,000 persons.

Table 17.6-3 Population and No of Households along Jangyat Road

Name of village	No of Households	Population	
		Male	Female
Bobi A	109	258	370
Bobi B	89	232	263
Pakumu A	72	171	200
Pakumu Jangyat	94	266	255
Total	364	927	1,088

Source: Matidi Sub-county Office

17.6.1.2 Benefits from the Pilot Project

The following benefits were observed during and after improvement works.

- Income generation for residents by introduction of labour based technology, and
- Increased convenience for pedestrians and bicycle users

In addition to that, the following benefits are expected from the project.

- Improvement in transport and walking during the rainy season.
- Supporting economic activities along the roads.

(1) Income generation for residents

In the improvement work at Jangyat Road, 60 workers were engaged for 4 weeks. A worker received 5,000 Ushs. per half day or 8,000 Ushs. per whole day. The whole income per a worker was around 120,000 Ushs. to 180,000 Ushs. Normal monthly revenue for a worker is around 60,000 Ushs. to 90,000 Ushs. Therefore, improvement of community access road by use of labour-based technology has a significant positive impact on the residents.

According to the residents, a half-day of work for the road improvement does not have a negative impact on their agricultural activity.

(2) Increased convenience for pedestrians and bicycle users

After the improvement work, pedestrians and bicycle users can travel the roads more easily. This comes from installation and improvement of the culverts and from the mowing.

Before the improvement work, there were puddles at the broken culverts and around small streams. Those were obstacles for pedestrians and bicycle users. Bicycle users had to walk their bicycles. These puddles have disappeared, and pedestrians and bicycle users can pass these points smoothly since the improvement work.



A Puddle at a broken culvert (before improvement)



Overgrown weeds along the road (before improvement)

At Jangyat Road, it is difficult to walk or travel by bicycle in some sections due to overgrown weeds. After mowing, the width of the road was increased from 2.5 meters to 5 meters, and pedestrians and bicycle users travel the road more smoothly and safely.

(3) Improvement in transport and walking during the rainy season

The improvement work was implemented in November 2011, and this impact assessment is being conducted in January 2012. Since this is in the dry season, improvement of road transport in the rainy season could not be observed. However, smoother transport and walking is expected owing to the roadside ditches, drainage and improvement and installation of culverts. There are 2 primary schools near the road, and 1,500 pupils go to the schools along Awari–Anget Road. Such improvements would support their daily commuting.

(4) Supporting economic activities along the roads

Most of the land along the pilot project roads is used for agriculture. Major products are cotton, sunflower, sorghum, millet, cassava, bean, maize, peanuts, etc. As of January 2012 when the impact assessment was conducted, cotton balls ready for harvest were observed along the road. After the improvement work, it is expected that material and harvested products can be transported more easily.



Transport with bicycle (after project)



Cotton field along community access road (after project)

January 2012 is also the season for open burning to prepare for planting in the next rainy season. The open burning was conducted not only on existing farm land but also uncultivated land. Because of improvement of the community access road, the farmers have decided to expand their agriculture production along the road.

17.6.1.3 Negative impacts from the Project

In general, improvement of road condition brings about an increase in the number of traffic accidents, however, such accidents will not occur in the pilot project sections because almost all the traffic is only pedestrians and bicycles.

The other point is the flow of water from the roadside ditches. Since the runoff from roadside ditches flows onto the land along the road for some distance, the total flow of water to the farm land would increase in the rainy season.

17.6.2 Findings

17.6.2.1 Impact of the project

The following positive impacts were observed and expected during and after the pilot project.

- Income generation for residents by introduction of labor based technology, and
- Increased convenience for pedestrians and bicycle users
- Improvement in transport and walking during the rainy season.
- Supporting economic activities along the roads.

No negative impacts caused by the pilot project were observed.

17.6.2.2 Evaluation of the District and Sub-County

- Although the contract of the Pilot Project was between the JICA study team and the contractors, the Sub-county was expected to act as the client and observe the performance of the contractor. The district was expected to support the sub-county, on the technical parts in particular.
- The District found it difficult to inspect and direct the contractor frequently due to the inadequate number of technical staff in the district. Actually, due to his other duties, it was at the limit of the ability of the district inspector to join in the med term and final inspections during the construction. The district does not have enough capacity to take care of CARs, hence it was reconfirmed that the sub-county will be the suitable organization to manage the maintenance.
- The sub-county is presently the organization that maintains the CARs. The budget is approx. 3 million to 5 million Ushs. However, this budget is mostly spent on education and health, and there is nothing left for road maintenance.
- It was confirmed that the parish is the suitable organizational level to manage and direct the labourers who are mostly the people that live in the communities along the road.

17.6.2.3 Evaluation of the Contractors

- Construction was undertaken using machinery in Gulu. In Kitgum a purely labour based method was adopted. It was confirmed that the capability of the foreman which the contractor dispatches will determine the quality of the construction. At both sites, the foreman which the contractor dispatched did not have adequate capability and eventually an engineer from MELTC had to do their work.
- In Kitgum, almost all the works were done using a Labour based method, and any difficulty such as procurement of material or directing the labourers could be solved on site.
- On the other hand, the pilot project in Gulu was partially done using machinery. While the machinery was functional the construction had much better efficiency compare with

the labour based method. However, the machine frequently broke down and a mechanic had to be hired to repair it or they had to swap for a new machine from Kampala. This affected the contractors account seriously as well as the construction schedule.

- Eventually, the delay caused by mechanical trouble was caught up by using labour based methods. Hence it was found that a service station or workshop shall be needed nearby when operating construction machinery. Since there are no such facilities in Northern Uganda, the use of the Labour based method has a great advantage in this area.
- In this Pilot Project, the JICA team has allowed the contractor to partially use machinery since the contractor did not have confidence that he could complete the 13km length within the contract period which was 60 days. Therefore, in order to apply a Labour based method to the construction work it was found that choosing an appropriate construction period, including seasonal weather conditions will be essential.

17.6.2.4 Evaluation of the Community

- The construction started with a two day LBT training programme for the labourers. The trainees mastered the technique from the training and actual practice through the construction. From this, the capability to acquire knowledge through training in Northern Uganda was confirmed.
- By joining the LBT construction, the labourers had obtained from 2 to 3 times more income than in a regular month, and since it was the Christmas season, it was confirmed that the income was spent in the community, which is one of the advantages of applying LBT.

17.6.2.5 Evaluation of MELTC

- In this pilot project, MELTC worked as the actual foreman for the contractor. From this it was confirmed that MELTC has adequate skill to provide training in the field and make up for the lack of capability of the local contractors.
- Currently, the training courses in MELTC are operated in Mbale and none of them are in the field. And also it was confirmed that there is no monitoring system to look after the training to determine if anything is missing from the curriculum or syllabus.

17.6.3 Recommendation

17.6.3.1 Impact of the project

As described in the previous section, positive impacts during and after projects could be observed in a very short time period after the improvement work was completed. Improvement of community access roads by use of labor-based technology is highly beneficial for the local people. They can receive income during the improvement work, and enjoy benefits directly and indirectly after the improvement work is completed. An example of the indirect effect is to support their agriculture activity in terms of easy and effective transport of materials and products, and expanding the cultivated land.

17.6.3.2 Establishment of Road Maintenance System Applying Community Workers

- Currently, the sub-county is the authority that is charged with taking care of CARs. However through the Pilot Project, it was found that the parish is the most suitable level to manage the casual workers. Hence, the parish shall be involved in CARs maintenance and the maintenance shall be done by purely LBT to reduce the cost of the construction.
- Following are the major issues found at the site and can be said to be common issues for the entire Northern Uganda. (1) The Sub-County does not have the capability to eliminate the bottle necks, (2) Most of the Communities are still in the restoration process due to

historical reasons, (3) there is misunderstanding among the people regarding use of LBT and eventually this technology does not last long.

- To solve the above mentioned issues, the following shall be recommended. (1) Elimination of bottlenecks by asking for donor support, (2) Providing mobile training by MELTC targeting sub-county, parish and local contractors.
- The Parish can be a leader of the casual workers where most of them are people living along the road. However, it is difficult for the parish to give technical advice to the workers, and therefore, local contractors can be the only organizations to take that part.

17.6.3.3 Strengthening the Sub-County Administration Capacity

- The company of the LBT contractor is usually small. For these contractors, it is crucial to have payment without delay. Hence, the procurement division of the authorities has to manage the disbursement without any errors, therefore, strengthening the procurement division of the sub-county shall be recommended.

17.6.3.4 Establishment of an Equipment Centre

- The Pilot Project in Gulu was allowed to use machinery for part of the project. However, mechanical trouble occurred frequently and while the problem was being repaired the construction had to wait. From this, it was found that when there is a strict construction schedule, using machinery does not always benefit the contractor. At this Pilot Project, the contractor eventually had to catch up its schedule by using labour based methods.
- From the above, there was a lesson that to use machinery a service station /workshop shall be established near by the site. The establishment of a regional equipment centre is now under planning with the force account policy. However, while the funding to bring this policy into operation is expected from the Chinese government, this negotiation is still underway. The equipment centre is planned to be operated by the private sector, and so there are some difficulties for donors to support this centre. However, it is very sure that this center will be the core of the machinery based construction in northern Uganda. Therefore, when its establishment comes to the detail stage, the range of the role should be discussed carefully.

17.6.3.5 Strengthening of MELTC

- The following strengthening of MELTC shall be recommended in order for it to conduct the above mentioned recommendations. (1) Establish a mobile training unit, (2) establish a donou method training curriculum and syllabus and (3) establish a monitoring and promotion unit.

18. PRELIMINARY DESIGN FOR THE HIGH PRIORITY PROJECTS

18.1 Road Design in Uganda

18.1.1 National Roads

18.1.1.1 Design Standards

(1) Road Design Manual in Uganda

Uganda has a road design manual, which is composed of four volumes; the Geometric design manual, Hydrology and hydraulics design manual, Pavement design manual and Bridge design manual. The Geometric design manual is one part of the revised and developed version of the road design manual, which was published in 1994. The manual has been used by all road planners and engineers to design rural roads in Uganda. In terms of urban roads, only few and limited explanations can be observed. In addition, it is noted that the manuals are general rules so that some modifications may be required in some special cases.

(2) Other Manuals

Southern Africa Transport and Communications Commission (SATCC) prepares books of codes of practice consisting of Geometric, Pavement, Bridge and Rehabilitation Design which are prepared for the road design work in SADC countries (Southern Africa Development Community; Tanzania, Zambia, Botswana, Mozambique, Angola, Zimbabwe, Lesotho, Swaziland, Malawi, Namibia, Mauritius, Congo and Madagascar and S.A.). Applying SATCC standards for the road design is common practice even in the countries which do not belong to SADC. It is also recognized that the above-mentioned Ugandan road design manuals are prepared based on the SATCC standards so that SATCC standards are available to apply to the road design for the project approach road when necessary. In addition, AASHTO which has been recognized as the most popular and authorized design standard for road designers is also referred to in some cases.

18.1.1.2 Functional Road Class

Since there is no urban road standard in Uganda the road classifications are prepared for rural roads only. The rural roads in Uganda are divided into the following 5 classes according to their major function in the road networks.

Table 18.1-1 Functional Road Class

Class	Roads	Function
A	International Trunk Road	Roads that link Internationally Important Centres. Connection between the national road system and those of neighbouring countries. Major function is to provide mobility
B	National Trunk Road	Roads that link provincial capitals, main centres of population and nationally important centres. Major function is to provide mobility
C	Primary Roads	Roads linking provincially important centres to each other or to a higher class road (urban/rural centres). Linkage between districts' local centres of population and development areas with higher class roads. Major function is to provide both mobility and access
D	Secondary Road	Roads linking locally important centres to each other, to more important centres, or to a higher class road (rural/market centres) and linkage between locally important traffic generators and their rural hinterland. Major function is to provide both mobility and access.
E	Minor Road	Any road linking to minor centre (market/local centre) and all other motorable roads. Major function is to provide access to land adjacent to the secondary road system.

Source: Geometric Design Manual in Uganda

18.1.1.3 Road Design Class

In addition to the above Functional Class the Geometric Design Manual prepares the Design Class which is divided into 7 classes, as follows.

Table 18.1-2 Design Class

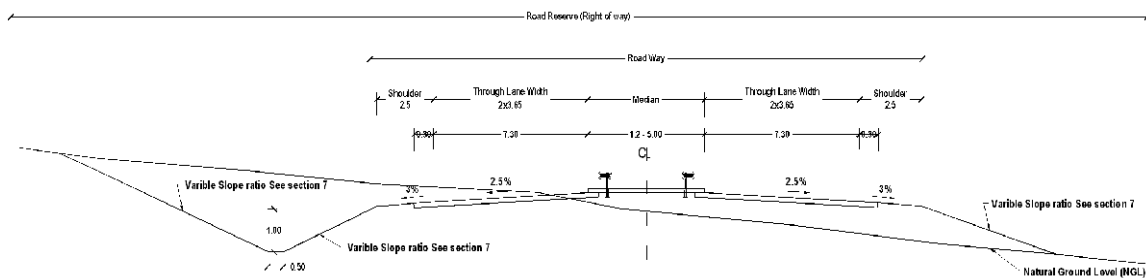
Design Class	Capacity [PCU x 1,000/day]	Road-way width[m]	Maximum Design speed Km/h			Functional Classification				
			Level	Rolling	Mountainous	A	B	C	D	E
Ia Paved	12 – 20	20.80-24.60	120	100	80	√				
Ib Paved	6 – 10	11.0	110	100	80	√	√			
II Paved	4 – 8	10.0	90	70	60	√	√	√		
III Paved	2 – 6	8.6	80	70	50	√	√	√		
A Gravel	4 – 8	10.0	90	80	70		√	√	√	
B Gravel	2 – 6	8.6	80	60	50				√	√
C Gravel		6.4	60	50	40					√

Source: Geometric Design Manual in Uganda

As shown above, the design class is decided by road capacity (i.e. traffic volume).

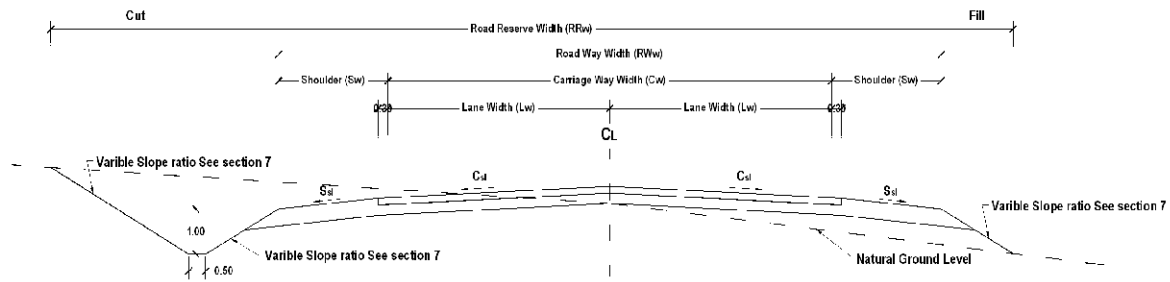
18.1.1.4 Typical Cross Sections

The Geometric Design Manual prepares the typical cross sections by the design classes.



Source: Geometric Design Manual in Uganda

Figure 18.1-1 Typical Normal Cross Section and Value of Cross Section Elements for Ia Road



Design Class of Road	Dimension(m)						Slope (%)	
	RRw	RWw	Cw	No of Lane	Lw	Sw	Csl	Ssl
Paved Ib	40.0	11.0	7.0	2	3.5	2.0	2.5	4.0
Paved II	30.0	10.0	6.0	2	3.0	2.0	2.5	4.0
Paved III	30.0	8.6	5.6	2	2.8	1.5	2.5	4.0
Gravel A	30.0	10.0	6.0	2	3.0	2.0	4.0	4.0
Gravel B	25.0	8.6	5.6	2	2.8	1.5	4.0	4.0
Gravel C	15.0	6.4	4.0	1	4.0	1.2	4.0	4.0

Source: Geometric Design Manual in Uganda

Figure 18.1-2 Typical Normal Cross Section and Value of Cross Section Elements for the Other Roads

18.1.2 District and Urban Roads

18.1.2.1 Design Standards

The Ministry of Works, Housing and Communication (former MoWT) prepared the District Road Works Manual in October 2003 which was for the designs of district and urban roads.

The Manuals are composed of the following volumes.

- Volume 1: Planning Manuals
- Volume 2: Contract Documentation Manuals
- Volume 3: Implementation and Monitoring Manuals
- Volume 4: Technical Manuals
- Volume 5: District Administrative and Operation Guidelines

Volume 4, Technical Manuals discusses the design matters.

18.1.2.2 Functional Classification System

The Technical Manuals introduces the functional road classification systems for the district road networks as follows.

District Class I Roads

- Serve national interests in that they satisfy criteria established for secondary and tertiary road systems within the Trunk Road System,
- Quality is adequate for upgrading to Trunk Road system provided they are engineered and constructed to Ministry of Works, Housing and Communication standards

District Class II Roads

- Provide the basic internal transport needs of the district,
- Connect to the trunk road network and district class I roads,
- Interconnect the district capital and country administrative centres
- Provide direct access for district population centres to district service facilities
- Earth or gravel surface carrying 20 or more vehicles per day

District Class III Roads

- Low volume traffic extending into discretely populated peripheral areas of the districts,
- May serve as connectors to and/or between district class II roads, but generally do not provide direct routings to major public activity centres.
- Earth or gravel surface carrying 20 or more vehicles per day

18.1.2.3 Road Design Class

In addition to the above Functional Class the District Road Work Manual introduces the Design Class which is divided into 3 classes, as follows.

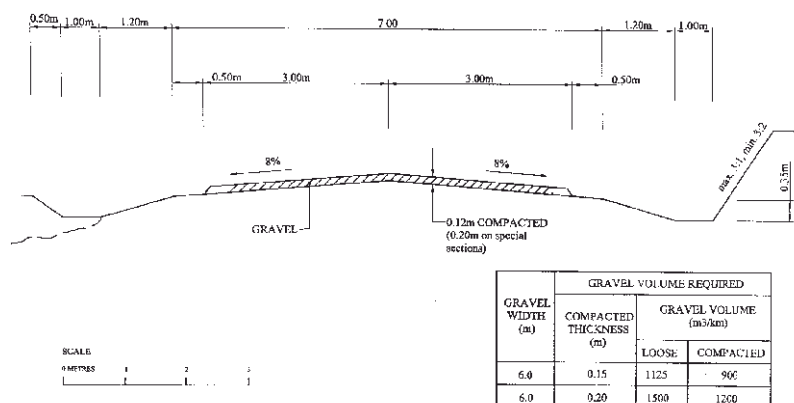
Table 18.1-3 Design Classes for District Roads

Design Class	Traffic Volume (vpd)	Max Grade (%)	Design Speed by Terrain Condition (km/hr)			Carriageway Width (m)	ROW (m)
			Flat	Rolling	Hilly		
I	>50	10	70	60	50	6.0-7.4	15-30
II	20-50	12	60	50	40	4.5-5.8	15-25
III	<20	15	50	40	30	4.0-5.4	15-18

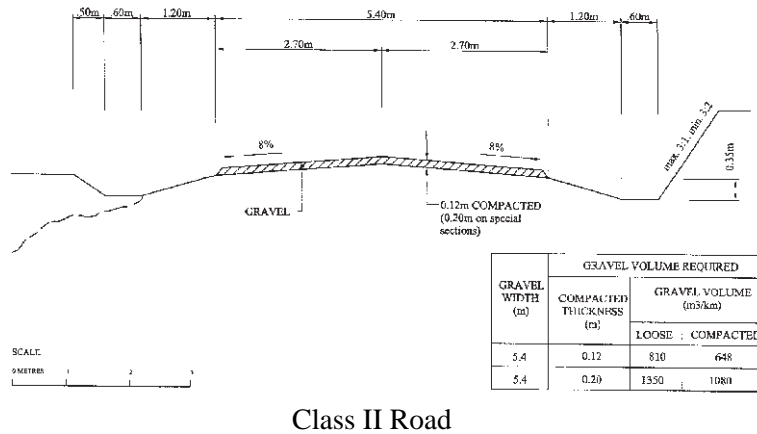
Source: District Road Works Manuals

18.1.2.4 Typical Cross Sections

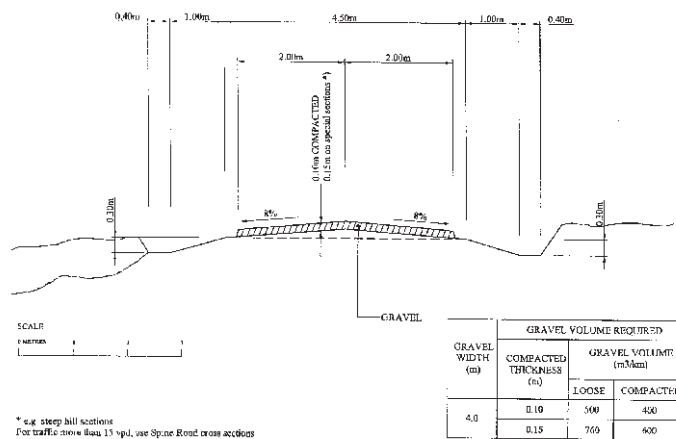
The District Road Works Manual prepares the typical cross sections by the design classes.



Class I Road



Class II Road



Class III Road

Source: District Road Works Manuals

Figure 18.1-3 Typical Cross Sections for District Roads

18.2 Preliminary Road Design

18.2.1 International Trunk Road Improvements

(1) IT1 Kamdini-Gulu Road Section Improvement

1) Description of the Road Section

The starting point of the road section is Kamdini, which is a branching point to Lira and Kampala to the east and southwards.

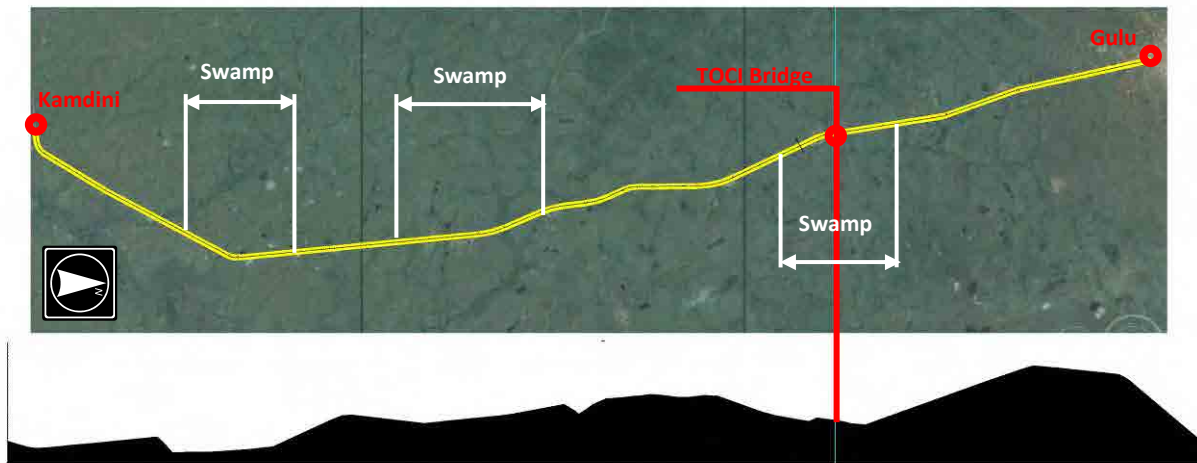
The road to Lira was recently rehabilitated to bituminous standard (DBST) and the road eventually reaches Mombasa via Nairobi. The improved road has a 3.0m carriageway and a 1.2m shoulder for one direction that does not meet any typical cross section standard in the Ugandan Geometric Road Design Manual although the road section is identified as an international trunk road because most of the freight traffic from Kenya to South Sudan uses the road section.

On the other hand, there are some sections with the rehabilitation being to the asphalt pavement standard and there are also some sections with the ongoing rehabilitation to asphalt pavement standard on the road to Kampala. The rehabilitation works have been progressing from the Kampala side.

The two roads meet and unite into one road at Kamdini.

The road runs through a swampy area after Kamdini and there are many points with eroded shoulders and potholes caused by standing storm water on the pavement that makes the road capacity low.

As for the tentative and urgent repair for those damages, UNRA provides marrum to fill potholes and eroded shoulders, which otherwise would result in road being worse and dangerous.

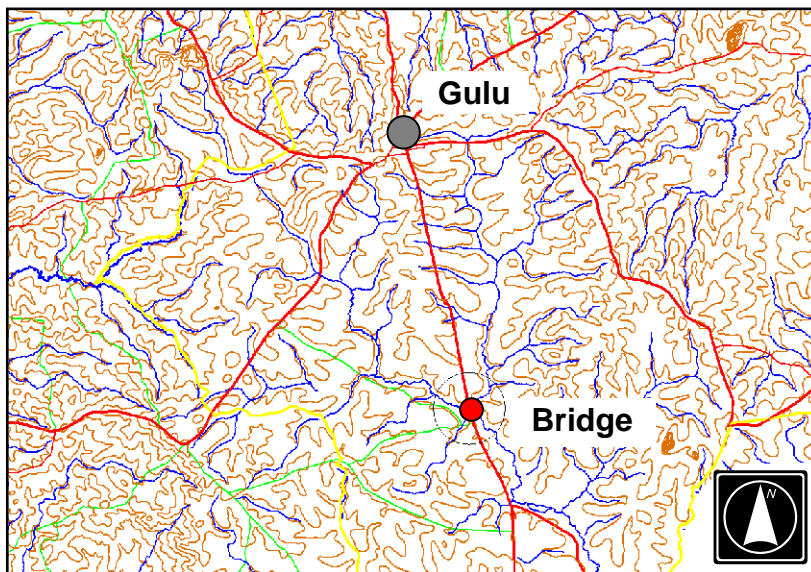


Source: JICA Study Team

Figure 18.2-1 Profile of Kamdini-Gulu Road Section

There are no existing major structures other than the TOCI Bridge located at a point 17.5km from Gulu by road. The bridge has an 18m long span and its girder is metal. Its condition can be identified as fair but no regular maintenance works seems to be provided.

Although the structure appears to be fair, there is settlement before and after the bridge that indicates that no approach slab was provided during the construction.



Source: JICA Study Team

Figure 18.2-2 Location of TOCI Bridge and its Photographs

The road composition appears to have no pavement foundation (i.e. aggregate base course) and it is, however, observed that there are a few defects caused by lack of pavement strength and most of them were caused by standing storm water on the pavement.

Taking account of the observations, the improvement option is decided to be b. Surface Overlay and shoulder improvement (widening and provision of pavement on the shoulder area).

4) Typical Cross Section

As explained, the same typical cross section as on the Gulu –Atiak –Nimule Road is applied.

5) Pavement Surface Type Options

As explained, the rehabilitation work to the asphalt pavement standard is progressing from the Kampala side towards the north while the surface type of the Gulu –Atiak –Nimule Road was designed to be DBST.

Since the road section from Kamidini to Gulu runs through a swampy area, the flexibility and ability of the drain of the material shall be seriously taken into account in the selection. Because of these aspects, the asphalt pavement is preferable; however, the final decision shall be made based on the results of further study, which is expected to be carried out during the basic design.

6) Major Structures

As explained, there is a TOCI Bridge that appears to be in fair condition, the bridge can be left as it is even when the rehabilitation work is implemented. The provision of an approach slab and walkway might be considered in the rehabilitation design.

18.2.2 Inter-Region Trunk Road Improvements

(1) IR1 Kitugum-Lira Road Section Improvement

1) Introduction

The UNRA has completed a feasibility study and detailed engineering design on the road section as part of the Lot A, Rwenkuuye-Apac-Lira-Kitgum-Musingo project consigned to Prome Consultants Ltd. The study and design was recently completed in May 2010.

Since the road section has been studied and designed with the approval of the UNRA, this JICA Study shall review and analyze the design contents.

2) Description of the Road Section

The road generally runs through hilly areas and there are two major rivers, the Achwa and the Agago along the road section. The existing road is made of marrum except for the section that is 5km from Lira which is bituminous standard (DBST). The existing road width varies from 4-6m.

The existing road condition is passable for the entire section during the dry season, however the section around Rackoko becomes impassable in the rainy season.

The routine maintenance work such as adding and compacting marrum is regularly undertaken by UNRA.

In terms of traffic characteristics, the majority of traffic is pick ups which drive short to middle distances and a large number of bicycles are also seen, which also travel 10- 30km.

3) Design Criteria

According to the traffic forecast by this JICA Study, the daily traffic volume in 2018 will be 1,500-1,600 PCU and that puts it in design class III by the Ugandan Geometrical Design Manual while the design report by the UNRA suggested the design class of II paved in spite of the low traffic estimation of 739 PCU in 2019.

The UNRA report indicated the geometrical design parameters as follows.

Table 18.2-2 Geometrical Design Parameters for Lira- Kitgum Road

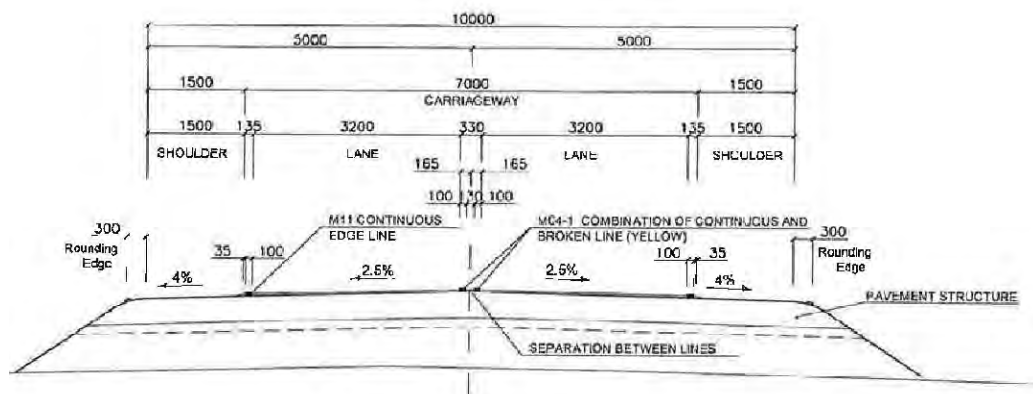
Design Element	Unit	Flat	Rolling	Mountainous	Urban/ Peri-Urban
Design Speed	Km/	90	70	60	50
Min. Stopping Sight	M	135	95	75	58
Min. Passing Sight Distance	M	605	485	410	345
Min. Horizontal Curve	M	320	185	130	100
Max. Gradient (desirable)	%	3.5	5.5	6	6
Max. Gradient (absolute)	%	5.5	7.5	8	8
Minimum Gradient in cut	%	0.5	0.5	0.5	0.5
Maximum Superelevation	%	7	7	7	4
Crest Vertical Curve	K _{min}	43	22	14	9
Crest Vertical Curve passing	K _{min}	307	246	176	126
Sag Vertical Curve stopping	K _{min}	30	20	15	11
Normal Cross fall	%	2.5	2.5	2.5	2.5
Shoulder Cross fall	%	4	4	4	4
Right of Way	M	50	50	50	30

Source: Lot A, Rwenkuuye-Apac-Lira-Kitgum-Musingo Detailed Engineering Design Report

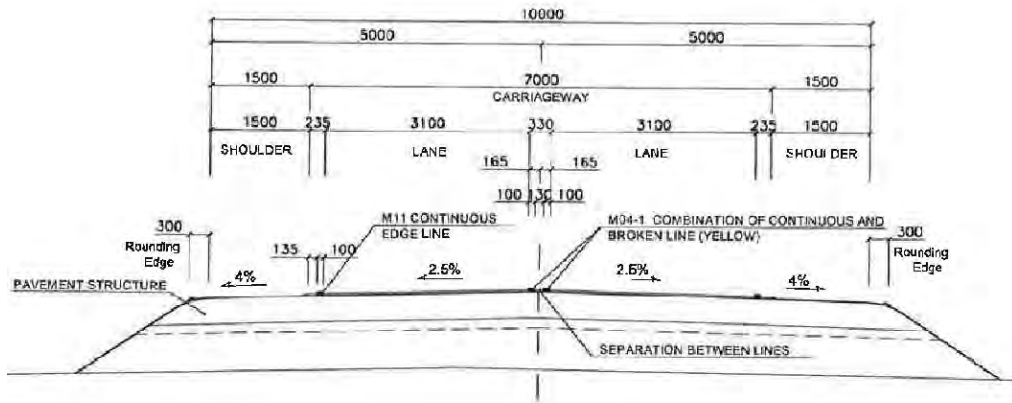
The above parameters meet with these of the Ugandan Geometric Road Design Manual.

4) Typical Cross Section

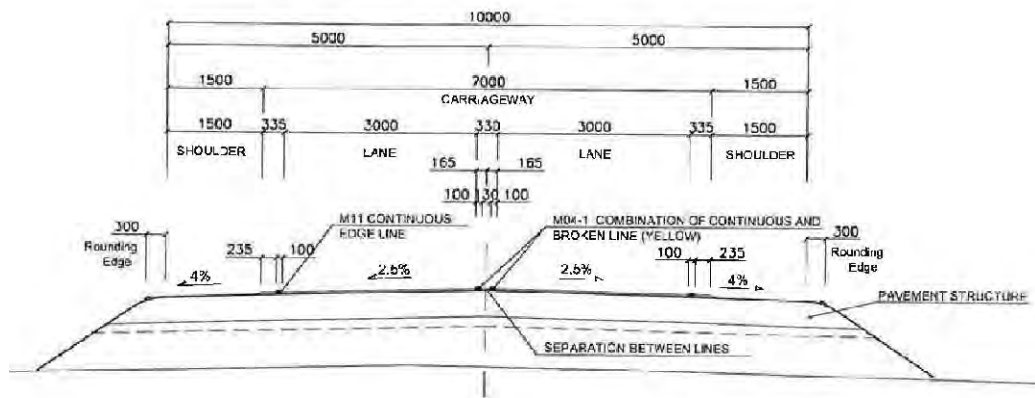
In the detailed engineering report there were options for the typical cross section as shown in the following figures.



TYPICAL CROSS SECTIONS OPTION 3
 (3.2 m net lane width and 1.5 m net shoulder width) Scale 1:100



TYPICAL CROSS SECTIONS OPTION 2
 (3.1 m net lane width and 1.5 m net shoulder width) Scale 1:100



TYPICAL CROSS SECTIONS OPTION 1
 (3.0 m net lane width and 1.5 m net shoulder width) Scale 1:100

Source: Lot A, Rwenkuuye-Apac-Lira-Kitgum-Musingo Detailed Engineering Design Report

Figure 18.2-4 Typical Cross Section Options

There was no conclusion or recommendation regarding the typical cross section options in the report.

This JICA Study considers that option 1 is reasonable and explainable as compared to the typical cross section of the Gulu –Atiak – Nimule and that of the Ugandan Geometrical Design Manual.

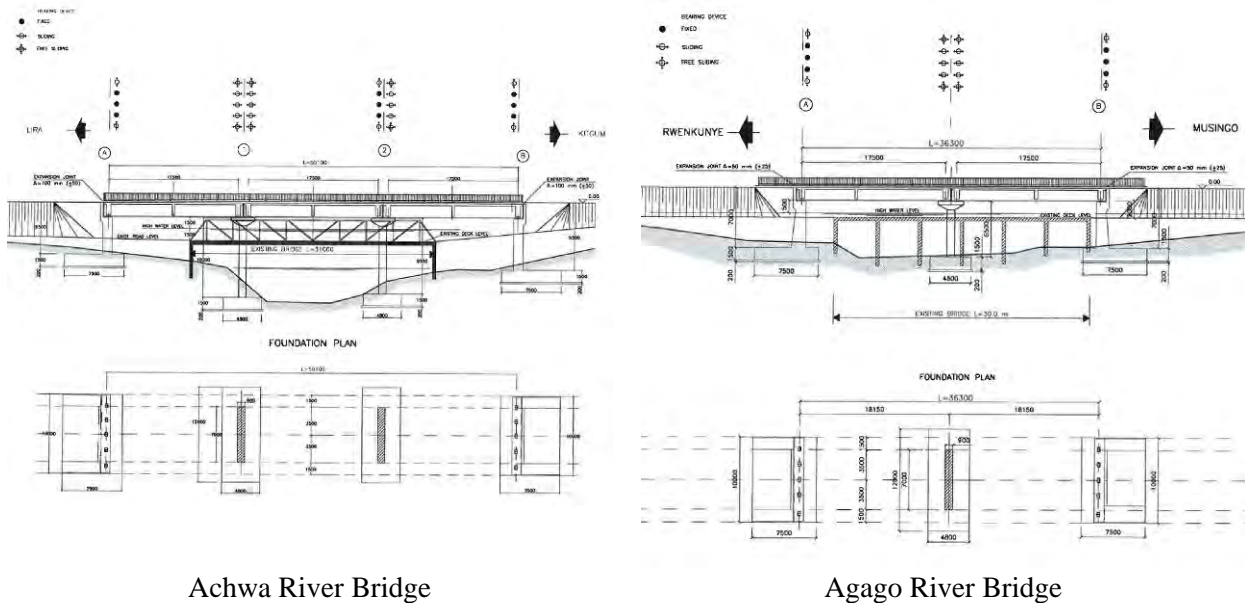
5) Pavement Surface Options

The detailed engineering design report studied the pavement surface options as to whether asphalt pavement or DBST are preferable and it reached a conclusion that DBST was to be applied eventually.

This JICA Study also concurs that the DBST is the best pavement surface type for the road section because of the traffic volume.

6) Major Structures

As explained, there are two major rivers in the road section. The detailed engineering design report studies the bridge types with different span configurations. The RC concrete girder was eventually selected for the bridges over the Achwa and Agago Rivers.



Achwa River Bridge

Agago River Bridge

Source: Lot A, Rwenkuuye-Apac-Lira-Kitgum-Musingo Detailed Engineering Design Report

Figure 18.2-5 Bridge Designs on Kitgum-Lira Road Section

This JICA Study also concurs that the RC girder is the best selection for the bridge type from the view point of constructability by the local contractors.

(2) IR2 Gulu-Acholibur Road Section Improvement

1) Introduction

This section was also included in the aforesaid detailed engineering design study by UNRA.

The design criteria, typical cross section and surface pavement type are the same as those of the aforesaid section.

2) Description of the Road Section

The road section starts in front of Uganda Bank in Gulu, which is just outside of the town centre. The road passes through a residential area which was developed recently and runs towards Kitgum but its length is only 5km. The terrain along the road section is generally hilly with many undulations in vertical alignment.

There are two major rivers, the Achwa and the Ajan and a new bridge construction across the Achwa River is underway with GOU budget as of December, 2011. The bridge type is RC Girder Bridge which is the same type of proposal made for the bridges at the road section from Kitgum to Lira.

The existing surface of the road is also marrum and it is passable during the dry season. The road section is rather well-maintained as compared to the other roads in the region; however some minor culverts have been left out of the maintenance work.

In terms of traffic characteristic, the traffic of medium to large sized buses is rather large as compared to other networks and this shows that passenger movement from the northern part of the region to either Gulu or Kampala is frequent.

18.2.3 Municipal Road Improvement

(1) MR1 Gulu Municipal Roads Improvement

1) Introduction

As discussed in Chapter 9, Regional Development Plan, Gulu is expected to be a development centre and Gulu, certainly, appears to be developing at this time and the speed is very high.

One of the indications of the developments is that there are many ongoing building constructions in the town centre and they are higher than four stories. The growth of the town is multi storied and that can cause a remarkable concentration of humans and goods in the town centre, which is expected to occur.

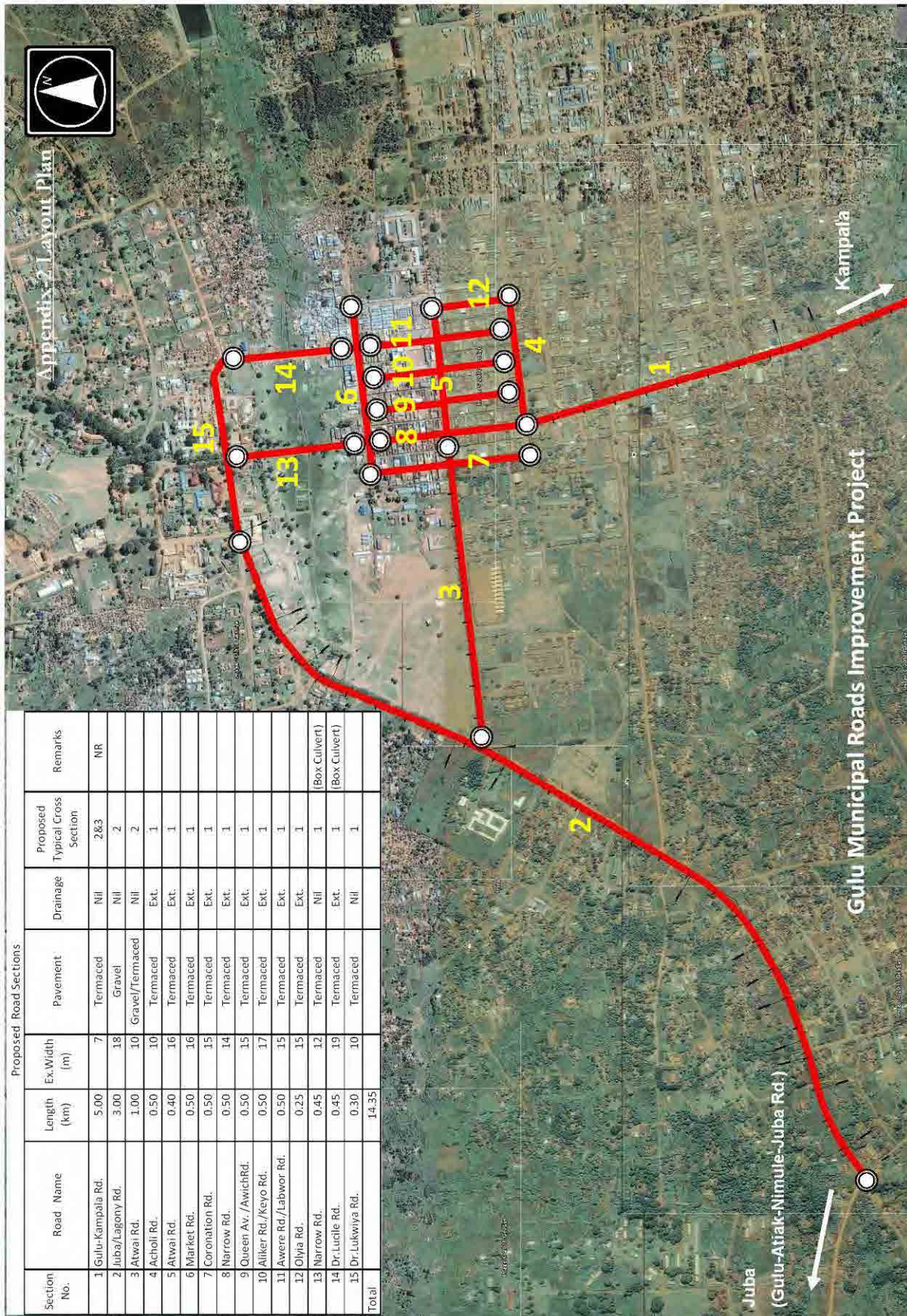
In order to accommodate the development trend and speed, the construction and upgrading of basic infrastructures such as electricity and water are very essential. The improvement of road conditions is one of the biggest critical goals to attain for further development in Gulu.

However, the existing road conditions in town remain poor and deterioration of its pavement is progressing day by day and no effective maintenance works have been implemented due to the insufficient budget of Gulu Municipality.

The idea of the municipal road improvement is to improve the roads in the town centre so as to solve the current vicious problems and to increase the effectiveness of urban transport movement.

2) Determination of Scope of Project

Existing roads in the urbanized area form a grid pattern and their widths vary from 10-17m and the pavement type is asphalt. There are no walkways along side of the roads. Road side drainage systems have been provided, however, they seem to be too small to drain storm water during peak times and that makes the roads impassable.



Source: JICA Study Team

Figure 18.2-7 Project Road Sections for MR1

3) Design Standard

No urban road design standard exists in Uganda; however the road horizontal alignments shall not be changed so as to avoid creating adverse social impacts (i.e. land acquisition and compensation). It is, therefore, considered that no geometrical design standard needs to be applied in the designing of the horizontal alignments.

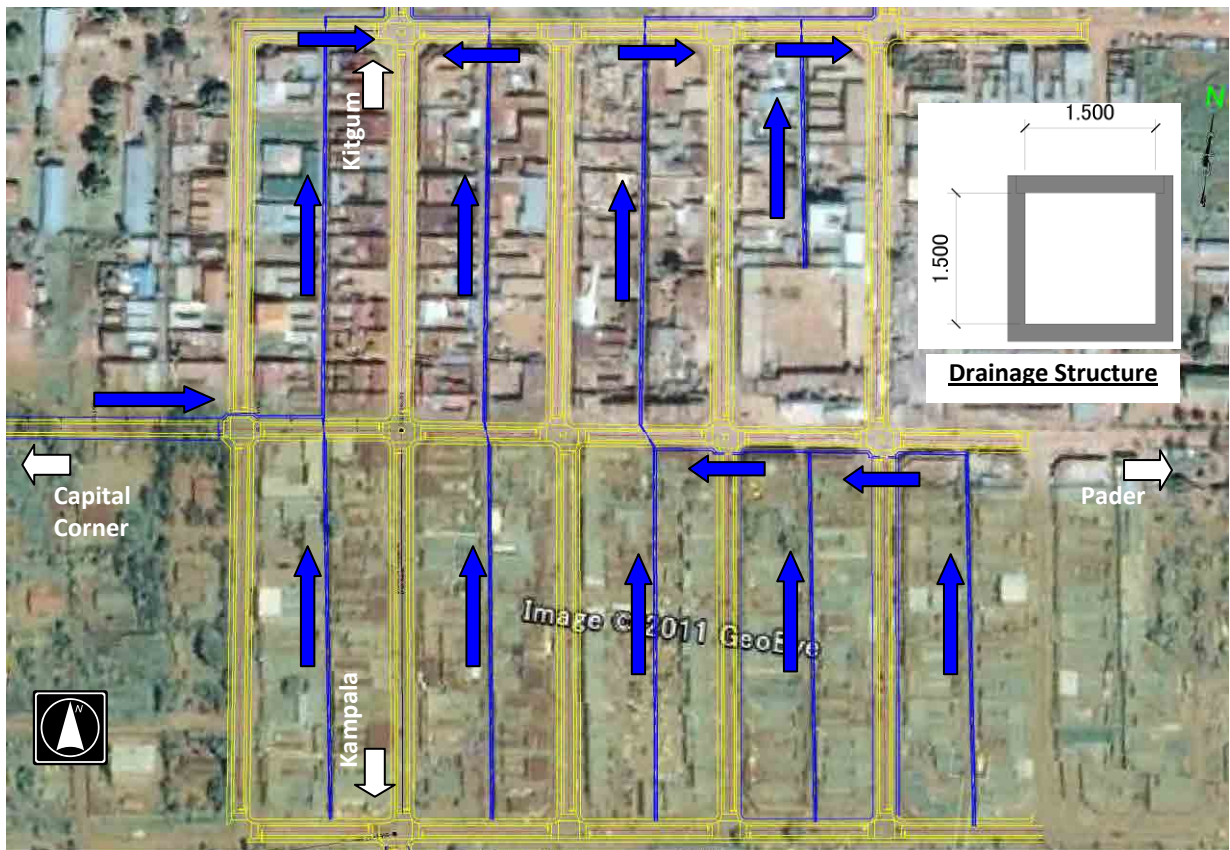
Ugandan pavement and drainage design manuals shall be applied in designing.

4) Design Policy

As discussed, the objective of the road improvement is to attain efficiency in road transport. The land within the existing road area is all the land that will be required for the road improvement, therefore, no widening is needed for the design.

The major element that results in the low efficiency of the road transport in town is that there is no clear demarcation between motorized and non-motorized traffic. Hence, shoulders and walkways shall be provided.

Moreover, insufficient capacity and lack of maintenance of the drainage system in town make the road network impassable; therefore road drainage and town drainage, which has been provided in the middle of the residential blocks shall be improved.



Source: JICA Study Team

Figure 18.2-8 Proposed Drainage Network in Town Area

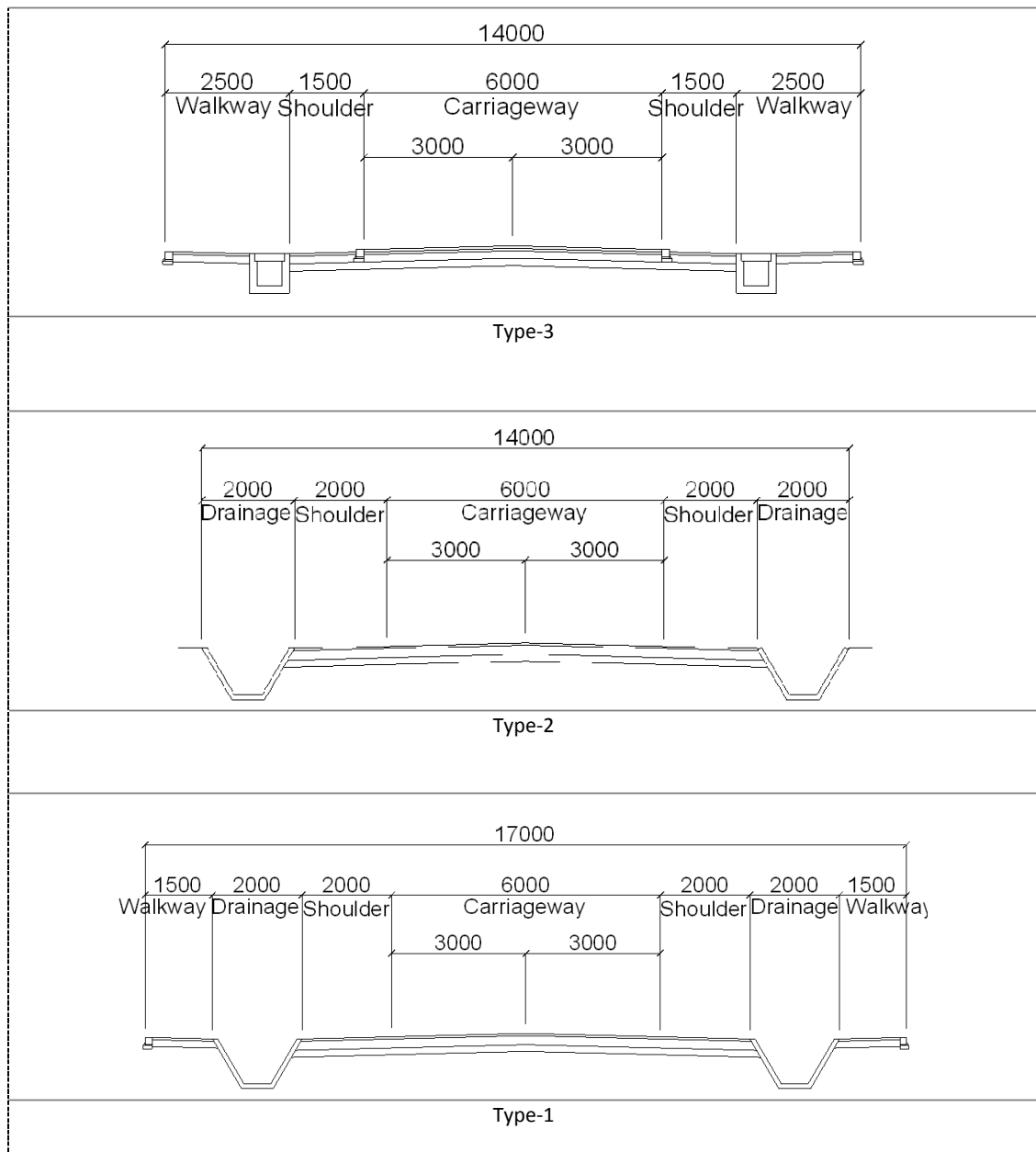
5) Cross Sectional Design

Basic policy in cross sectional designing is to keep the road cross section within the available road areas. In other words, no land acquisition is expected.

Wider shoulders are designed to allow for temporary parking of vehicles when on and off loading goods and passengers and to provide travel ways for bicycles and motor bikes.

Walkways are to be provided in the urbanized areas and drainage systems shall also be provided in all sections.

The following figures show the typical cross sections depending on the sections.



Source: JICA Study Team

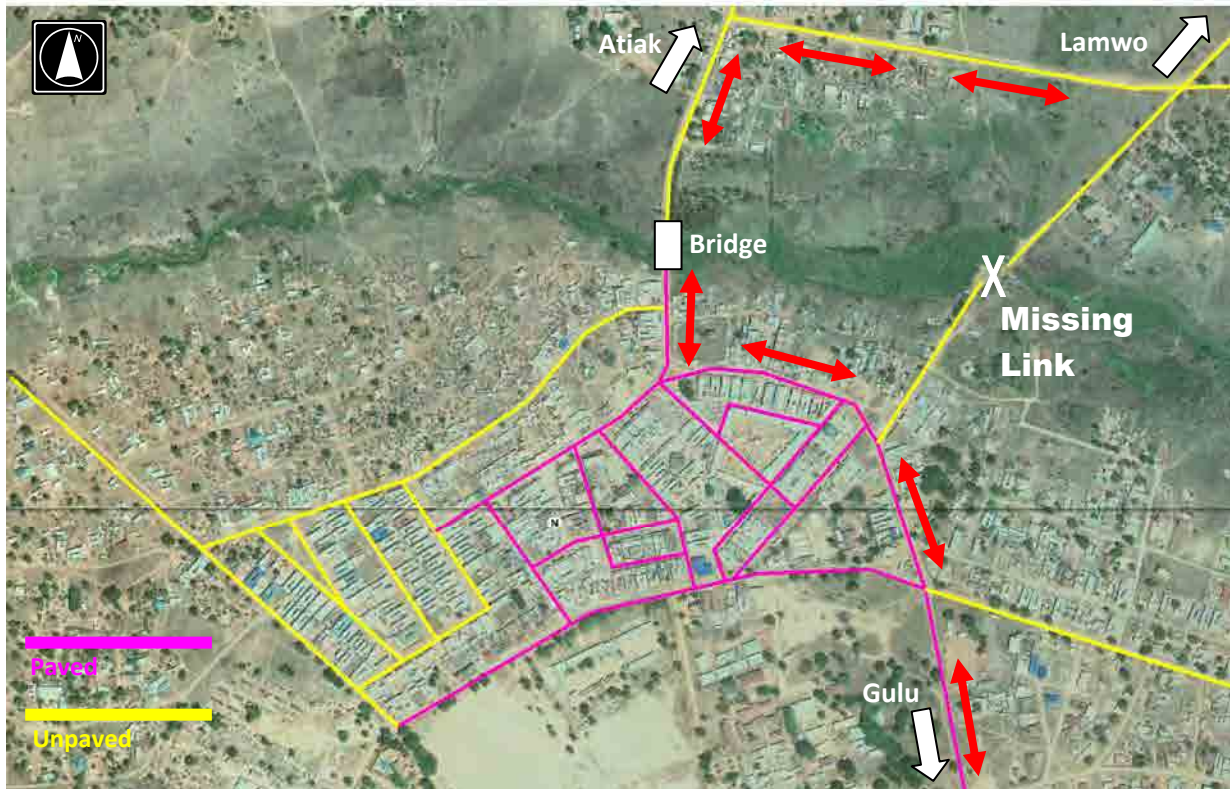
Figure 18.2-9 Project Road Typical Cross Sections for MR1

18.2.4 Other Considerable Road Sections

(1) Kitgum Municipal Roads

As discussed in Chapter 9, Kitgum is also expected to be a development centre in the northern part of Acholi Sub-region. The future road network must accommodate the development.

The existing road network forms a grid pattern and the roads in the town centre have been partially paved. No traffic congestion is observed so far even in peak times.



Source: JICA Study Team

Figure 18.2-10 Road Network in Kitgum Town Centre

The existing bridge width is narrow as compared to road width in both approaches and that results in a bottleneck of the road network since all the traffic to the north passes the bridge as red arrows indicate in above figure.

Moreover, all through traffic passes through the industrial area and a small roundabout which is located before the bridge.

UNRA have designed Rwenkuuye-Apac-Lira-Kitgum-Musingo road that includes the Kitgum town centre section. According to the design, the improvements follow the current route, which allows through traffic in the town.

As shown in Figure 18.2-10, there was a missing link between the road from Gulu to Lamwo. Diversion of the through traffic would be possible, if a road, as shown in Figure 18.2-11, were constructed so that there would no longer be a missing link and the roads leading to it are improved.



Source: Rwenkuuye-Apac-Lira-Kitgum-Musingo Detailed Engineering Design Report added by JICA Study Team

Figure 18.2-11 Diversion Plan for Kitgum Town