

19. COST ESTIMATION FOR THE HIGH PRIORITY PROJECTS

19.1 Construction Industry in Uganda

19.1.1 Overview of Construction Industry

The construction industry in Uganda has, over the past decade, experienced a boom in activities.

This is as a result of the rapid population growth that is triggering the demand for housing and infrastructure. Despite the surge in activities, the industry continues to exhibit low levels of technology utilisation, contractors have continued to employ old methods of construction culminating in long construction cycles, increased costs of construction and environmental degradation.

There was a study by Makerere University that sought the views of various respondents regarding the factors hindering development of the construction industry in Uganda. Key findings revealed that the level of development in the construction industry is still very low, and the major factors contributing to this in order of priority as per the findings from the study are financial capacity, lack of research and development, economics and costs, corruption, political interference, and general levels of development.

19.1.2 Construction Cost Trends

UBOS provides the construction sector indices for every quarter in the year and the latest information is that of the 4th quarter of 2011.

UBOS highlighted the annual change in construction cost, which showed that the price for the whole construction sector covering material prices, wage rates and equipment hire rate rose by 35.3% in September 2011 compared to September 2010. This followed an increase of 31.4% in August 2011 compared to August 2010. This increase in price in September 2011 was due to:

- 37.5% increase in inputs for Non-Residential buildings
- 33.6% increase in inputs for Residential buildings and
- 32.4% increase in inputs for Civil Works.

Monthly Changes show that in September 2011, the average price of inputs for the Whole Construction Sector rose by 2.5% compared to August 2011 price levels, while in August 2011, prices had risen by 3.3% compared to July 2011.

The inputs for residential buildings and non-residential buildings both experienced price increases of 3% in September 2011 mainly due to increased prices of inputs such as Timber, Cement, Other Iron & Steel and Wage Rates. The price of inputs for Roads Paved increased by 1.9% in September 2011 compared to August 2011, mainly due to an increase in the price of Lime, Diesel and Wages in September 2011.

Table 19.1-1 Basic Construction Material Price Indices

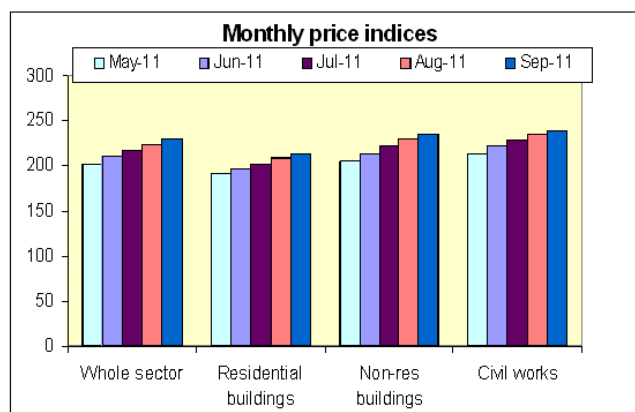
	Timber		Paint		PVC/HDPE pipes		Water tanks		Burnt clay bricks & tiles	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
Year	233		134		138		112		195	
Q1	234	245	126	150	140	139	108	119	196	237
Q2	231	257	131	152	138	148	108	119	199	242
Q3	233	278	136	168	137	164	112	122	191	256
Q4	234		143		137		119		193	
Jan	234	240	130	150	140	137	108	119	188	233
Feb	234	243	124	150	140	137	108	119	200	238
Mar	234	251	125	150	140	141	108	119	201	240
Apr	231	256	125	152	140	148	108	119	201	242
May	231	257	133	152	137	148	108	119	200	242
Jun	231	257	136	154	137	148	108	119	196	242
Jul	233	269	136	161	137	159	108	120	196	250
Aug	234	280	136	171	137	167	108	120	196	260
Sep	234	285	137	171	137	167	119	125	180	259
Oct	234		137		137		119		183	
Nov	232		145		137		119		183	
Dec	237		145		137		119		212	

	Cement		Concrete articles		Steel bars		Roofing sheets		Other Iron & steel	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
Year	134		153		147		178		168	
Q1	128	143	155	151	120	161	172	187	162	179
Q2	130	152	152	162	150	189	178	202	169	196
Q3	137	170	153	164	158	194	180	217	171	225
Q4	142		152		158		182		169	
Jan	123	142	154	152	119	157	168	176	161	175
Feb	123	144	155	151	121	159	173	192	162	179
Mar	138	144	156	151	121	167	175	192	162	183
Apr	133	147	152	162	142	180	176	201	162	187
May	130	153	152	163	155	192	179	201	174	188
Jun	128	157	152	162	154	194	179	205	173	212
Jul	128	162	152	162	155	194	179	211	173	207
Aug	142	169	153	163	160	194	179	220	171	228
Sep	140	180	153	166	160	194	183	220	170	239
Oct	141		152		159		183		170	
Nov	142		152		157		184		170	
Dec	142		152		157		178		169	

	Electrical wire & cable		Aggregate		Lime		Diesel		Bitumen	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
Year	122		109		172		128		153	
Q1	113	139	111	110	152	160	116	155	150	153
Q2	117	153	109	114	164	165	129	186	153	164
Q3	126	198	109	129	184	171	132	199	156	235
Q4	130		108		186		134		153	
Jan	113	136	117	108	152	155	116	138	150	147
Feb	113	134	108	108	135	161	116	162	150	147
Mar	113	146	108	114	170	164	122	167	150	164
Apr	113	145	110	114	160	166	127	177	152	164
May	113	145	110	114	162	164	129	188	152	164
Jun	126	167	108	114	170	165	130	192	155	164
Jul	128	189	110	114	189	169	132	196	156	232
Aug	126	200	110	137	182	165	132	198	156	235
Sep	126	209	108	137	181	181	132	202	156	239
Oct	128		108		194		132		156	
Nov	131		108		181		135		166	
Dec	132		108		184		134		138	

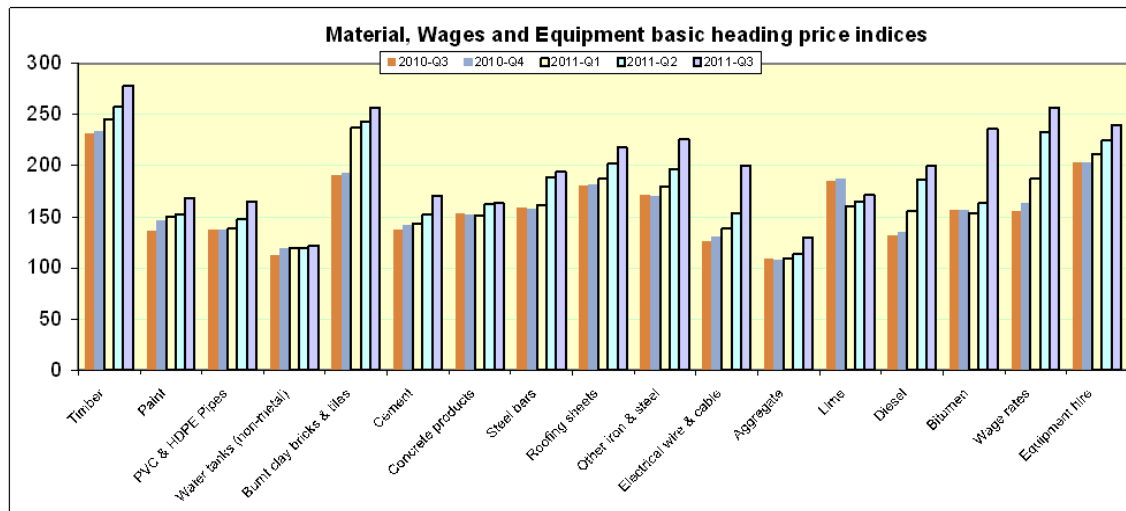
	Labour wage rates		Equipment charge out rates		CPI (rescaled) 2006 Q1 = 100		Cement quantities ('000 tonnes)	
	2010	2011	2010	2011	2010	2011	2010	2011
Year	152		198		144		1489	
Q1	145	187	196	211	143	154	364	139
Q2	149	232	190	225	143	165	330	142
Q3	155	256	201	239	144	177	396	454
Q4	161		203		147		395	
Jan	144	173	196	205	143	150	124	144
Feb	144	194	196	212	144	153	128	131
Mar	145	194	195	216	143	159	113	142
Apr	146	217	187	218	144	164	111	148
May	151	233	192	221	143	166	107	130
Jun	151	248	191	234	143	166	112	147
Jul	154	252	200	234	143	170	137	154
Aug	154	252	202	241	144	174	134	158
Sep	156	264	201	241	145	186	128	143
Oct	154		205		145		130	
Nov	163		202		147		121	
Dec	165		203		149		143	

Source: UBOS



Source: UBOS

Figure 19.1-1 Change of Construction Cost in 2011



Source: UBOS

Figure 19.1-2 Change of Construction Material Prices in 2011

19.2 Preliminary Project Cost Estimation for High Priority Projects

19.2.1 International Trunk Road Improvement

The JICA Study Team carried out the preliminary design for the section and the section is designed to the Asphalt Pavement Standard.

In order to estimate construction, compensation and project administration costs, price investigations were also conducted. Construction cost data is referred from past projects, namely the Pilot Projects for Amuru Bridges and the Project for Social Infrastructure Development for Promoting Return and Resettlement of Internally Displaced Persons (IDP).

The following table shows the project cost summary.

Table 19.2-1 Project Cost Summary for IT1 (USD)

Project ID	Project Name	Civil Work Cost	Other Cost	Total Cost
IT1	Kamdini- Gulu Road Section Improvement	27,459,000	6,597,900	34,056,900

Source: JICA Study Team

19.2.2 Inter-Region Trunk Roads Improvement

This program contains of two national roads, namely Kitgum-Lira Road and Gulu-Acholibur Road and these road sections have been studied and designed by UNRA as explained in Chapter 18.

The cost estimations have also been made in the UNRA study but they, however, were estimated based on market prices in 2010.

As discussed, there is a trend of escalation of construction cost such that the cost in 2011 is approximately 30% more than the cost in 2010.

In consideration of the cost escalation, the project costs were re-estimated as shown in the following table.

Table 19.2-2 Project Costs Summary for IR1 and IR2 (USD)

Project ID	Project Name	Cost in 2010	Re-Estimation in 2011
IR1	Kitgum-Lira Road Section Improvement	82,783,160	96,856,200
IR2	Gulu-Acholibur Road Section Improvement	80,171,455	93,800,700
Total		162,954,615	190,656,900

Source: JICA Study Team

19.2.3 Municipal Road Improvement

Project cost is estimated with the same approach as the IT1 and the result is shown in the following table.

Table 19.2-3 Project Cost Summary for MR1 (USD)

Project ID	Project Name	Civil Work Cost	Other Cost	Total Cost
MR1	Gulu Municipal Roads Improvement	23,600,000	2,785,000	26,385,000

Source: JICA Study Team

20. INITIAL ENVIRONMENTAL EXAMINATION

20.1 Summary of the Priority Project Components within the Scope of the Environmental and Social Considerations Study

20.1.1 Main Components of the National Priority Roads Project

The specifications of the national priority roads project within the scope of the IEE are given according to the roads classes in Table 20.1-1. The width of ROW is set at 30m, which is the current practice for a 2 lane road in Uganda.

The correspondence between the functional road classes proposed by the JICA study team, and used to classify the priority roads, and those of the existing road classification system of Uganda, is explained in Table 20.1-2. This table shows that the IT, IR and ID priority roads are functionally including national or district roads. All the ID priority roads of the project are national roads, managed under the jurisdiction of the UNRA.

The national priority roads project aims at the improvement of the carriageway of the existing roads, the construction of new culverts, and the construction of new bridges. The project design specifications for the priority roads are presently limited to the length of the roads, as established in Table 20.1-3. The number of bridges to be constructed is tentatively set at 15.

Table 20.1-1 provides the geographical distribution of the priority roads among the crossed districts, based on the GPS data recorded during the IEE investigation. Only the investigated priority roads, which do not include IT2, IT3, IR1 and IR2, are provided in the table. The starting and ending points of the roads are the municipal or town council borders or road junction points, as relevant. Figure 11.3-1 and 11.3-2 are the maps of the priority roads.

Table 20.1-1 Specifications of the Priority Roads According to the Adopted Roads Classification

	Width of Carriageway with shoulders (m)	Width of ROW and land clearance (m)	Pavement type	Expected number of vehicles per day in 2018 (PCU)	Expected number of vehicles per day in 2030 (PCU)
IT (international)	9.5m	30	B	2,260	2,540
IR (inter-regional)	8.6m	30	B	1,780	3,720
ID (inter-districts)	10.0m	30	G	110	400

B: Bituminous standard / G: gravel A standard
 Source: JICA Study Team

Table 20.1-2 Classification System of the IT, IR and ID Roads

Integrated classification	Functional classification for rural roads	Functional classification for district roads
IT (international)	International trunk road	-
IR (inter-regional)	National trunk road	-
ID (inter-districts)	Primary trunk road	District Class I road

Source: JICA Study Team

Table 20.1-3 Length Specifications of the Priority Roads and Bridges

Road number	Starting point	Ending point	Length(km)	Number of new bridges to be constructed
IT1	Gulu	Kamdini	58	2*
IT2	Gulu	Atiak	67	-
IT3	Atiak	Nimule	35	-
IR1	Kitgum	Lira	120	1
IR2	Gulu	Acholibur	85	-
ID1	Kitgum	Musingo	70	1*
ID2	Kitgum	Atiak	96	3*
ID3	Gulu	Rackoko	70	1*
ID4	Kilak	Adilang	48	-
ID5	Pajule-Pader	Kwon kic	26	1*
ID6	Gulu	Pabbo	40	2*
ID7	Kitgum	Patongo	125	2*
ID8	Kitgum	Ngomoromo	65	2*
TOTAL			905	15

Source: JICA Study Team

*Subject to change

Table 20.1-4 Recorded Length of the Investigated Priority Roads According to Districts (km)

Road number	Amuru	Guru	Kitgum	Pader	Lamwo	Agago	Total
IT1		31					31
ID1			29.5		34.2		63.7
ID2	10.9	25.8	17.8		49		103.5
ID3		67		19.6			86.6
ID4				11.3		61.2	72.5
ID5				33.6		4.8	38.4
ID6		32.8				9.6	42.4
ID7			19.7			100.7	120.4
ID8			4		58.3		62.3
Total	10.9	156.6	71	64.5	141.5	176.3	620.8

Source: JICA Study Team

20.1.2 Main Components of the City Roads Project

The priority city roads project aims at improving the road conditions in Gulu, Kitgum, and Pader cities. Only the specifications for the Gulu city roads are available. They are provided in Table 20.1-5. The management of the city roads is under the responsibility of the municipal council.

For investigation within the scope of the IEE, the city roads of Gulu have been divided into 2 groups, called the approach roads (total length: 10.20km) and the inner roads (total length:

4.15km). Table 20.1-6 provides the geographical distribution of the city roads according to the municipal divisions, and the current name of each priority city road. Table 20.1-7 is equivalent but more detailed, with geographical distribution according to the wards and subwards.

Table 20.1-5 Main Components of the City Roads Project in Gulu

Project road sections	Length (km)	Present width (m)	Target width of carriageway with shoulders (m)	Walkways or drainage (W/D)	Total target width with walkways or drainage (m)	Pavement type	
Approach city roads	1	5	17	10	W/D	14 / 17	B
	2	3	18	10	D	14	G
	3	1	10	10	D	14	G / B
	13	0.45	12	9	W	14	B
	14	0.45	19	9	W	14	B
	15	0.30	10	9	W	14	B
Total	10.2	-	-	-	-	-	
Inner city roads	4	0.50	10	9	W	14	B
	5	0.40	16	9	W	14	B
	6	0.50	16	9	W	14	B
	7	0.50	15	9	W	14	B
	8	0.50	14	9	W	14	B
	9	0.50	15	9	W	14	B
	10	0.50	17	9	W	14	B
	11	0.50	15	9	W	14	B
12	0.25	15	9	W	14	B	
Total	4.15	-	-	-	-	-	

B: Bituminous standard / G: gravel A standard

Source: JICA Study Team

Table 20.1-6 Name and Geographical Distribution of the Priority City Roads According to the Municipal Divisions

Road number	Corresponding road names	Divisions				
		Layibi	Laroo	Bardege	Pece	
Approach city roads	1	Kampala highway	✓			✓
	2	Lagony road			✓	
	3	Atwal road	✓			
	13	Narrow road		✓		
	14	Dr Mathew lukwiya		✓		
	15	Peter paul opok		✓		
Inner city roads	4	Awere road				✓
	5	Jomo Kinyatta		✓		
	6	Bank lane Market street		✓		
	7	Coronation road	✓			
	8	Narrow road				✓
	9	Awich and Queen avenue		✓		✓
	10	Keyo and Alikor		✓		✓
11	Awere road Labwor road		✓		✓	
12	Olya road				✓	

Source: JICA Study Team

20.1.3 Main Components of the Feeder Roads Project

The priority roads project includes a package for the feeder roads, consisting of the replacement of pipe culverts D600 by pipe culverts D900. There are 290 culverts to replace in total (Gulu 170, Kitgum 30, Pader 40, Lamwo 30, Agago 20). This package is not retained within the scope of the IEE. The feeder roads project consists in the upgrading of the existing culverts, and is basically a long term maintenance project. The feeder road project is not considered as having a potential for significant impacts on the wetlands, and as such, is not subject to an impact assessment approach.

20.1.4 Main Components of the Public Transport Improvement

The public transport improvement project consists of the construction of an integrated bus terminal in Gulu, and in the provision of public bus services between the urban centres of Gulu, Kitgum, and Pader, and the remote agricultural areas. The design of this project needs to be done. The IEE does not include this project component in its scope of study.

Table 20.1-7 Geographical Distribution of the Priority City Roads According to the Sub-wards

Divisions	Wards	Sub-Wards	Approach city roads					Inner city roads											
			1	2	3	13	14	15	4	5	6	7	8	9	10	11	12		
Layibi	Techo	Kirombe custom			✓														
		Go- down	✓																
		Techo	✓																
	Library	Library	✓									✓							
		Industrial area	✓																
		Prison Barracks			✓														
Laroo	Queens	Queens					✓			✓	✓			✓	✓	✓			
	Agwee	Limu, Medical and Flat						✓											
		Ariaga				✓													
Bardege	Kanyagoga	Kanyagoga A		✓															
		Green Valley		✓															
Pece	Labour line	Bus park A											✓	✓					
		Bus park B													✓	✓			
		Bus Park C															✓		
		Nakasero							✓										
	Tegwana	Layibi central	✓																
		Layibi centre A and B	✓																

Source: JICA Study Team

20.2 Present Conditions of the Natural Environment in the Project Area

20.2.1 Road Stretches Defined for the Field Counting Survey

The present conditions of the natural environment in the project area have been investigated through the field counting survey and the villages LC1 survey. The principle of the field counting survey was to count the number of selected environmental and social assets along the road within specific road stretches. The road stretches subject to investigation are defined in Table 20.2-1.

Table 20.2-1 Road stretches Defined along the Priority Roads for the Field Counting Survey

Road number and stretch number		Starting point	Ending point	Total distance (km)
IT1	1	Koro	Barogal Centre	10
	2	Barogal	Bobi Fuel Station	10
	3	Bobi Fuel Station	Minakulu Swamp	11
	Total			31
ID1	1	Pagen	Aringa Bridge	14.1
	2	Aringa Bridge	Kirombe Trading Centre	15.4
	3	Kirombe Trading Centre	Madi Opei Check Point	21
	4	Madi Opei Check Point	Musingo	13.2
	Total			63.7
ID2	1	Bajere North	Lamwo Border	17.8
	2	Lamwo Border	Palabek Gem Trading Centre	7.4
	3	Palabek Gem Trading Centre	Palabek Ogili Trading Centre	23.2
	4	Palabek Ogili Trading Centre	Aswa Bridge	18.4
	5	Aswa River (Apeta Bridge)	Okidi Trading Centre	24.3
	6	Okidi Trading Centre	Atiak Centre	12.4
	Total			103.5
ID3	1	Gulu Municipal Border	Adak Trading Centre	19.7
	2	Adak Trading Centre	Lalogi Trading Centre	19.4
	3	Lalogi Trading Centre	Lagile Trading Centre	36.7
	4	Lagile Trading Centre	Rackoko Trading Centre	10.8
	Total			86.6
ID4	1	Pader Corner kilak	Lamiyo Centre	14
	2	Lamiyo centre	Lira Palwo centre	14
	3	Lira Palwo centre	Patongo Town Council	16.5
	4	Patongo Town Council	Agago River	28
	Total			72.5
ID5	1	Pajule -Pader Junction	Pader Labongo Primary school	10.6
	2	Pader Labongo Primary school	Pader Town Council	18.3
	3	Pader Town Council	Kwon Kic Centre	9.5
	Total			38.4
ID6	1	Laliya (Gulu Municipal Border)	Coope	6.4
	2	Coope	Unyama River (Bridge I)	11.6
	3	Unyama River (Bridge I)	Unyama River (Bridge II)	15.3
	4	Unyama River (Bridge II)	Pabbo Junction	9.1
	Total			42.4
ID7	1	Corner Alango	Kitgum Matidi Health Centre III	19.7
	2	Kitgum Matidi Health Centre III	Wol Trading Centre	22.6
	3	Wol Trading Centre	Kalongo Town Council	23.2
	4	Kalongo Town Council	Agago Town Council	23.5
	5	Agago Town Council	Okwang	31.4
	Total			120.4
ID8	1	Pagen	Lai Trading Centre	18.4
	2	Lai Trading Centre	Ayago Primary School	20.2
	3	Ayago Primary School	Ngomoromo Trading Centre	19.7
	4	Ngomoromo Trading Centre	Place name undetermined (GPS coordinates : N3 43.195 / E32 34.230)	4
	Total			62.3
TOTAL				620.8

Source: JICA Study Team

20.2.2 Protected Areas

20.2.2.1 Protected Areas in the Priority Roads Project Area

As shown in the checklist Table 20.2-2, the protected areas have been classified according to 4 categories. The rivers included in the Sixth Schedule to the National Environment (Wetlands, River Banks and Lake Shores Management) are the rivers which have a protection zone of 100m width from the highest mark of the river (Part III Article 29 of the Regulations). The Aswa River belongs to this category. The areas declared by district councils as mountainous and hilly areas, under the National Environment (Mountainous and Hilly Areas Management) Regulations 2000, are subject to restriction rules about the use and occupation of land, grazing and agricultural activities, and to protection rules for soil and vegetation.

Table 20.2-2 Checklist of the Protected Areas in the Priority Roads Project Area

Priority road number	Central or local forest reserve	Wildlife conservation area	River in the 6 th schedule list (Aswa)	Mountainous and Hilly Area
IT1	✓	-	-	-
IT2	-	-	-	-
IT3	-	-	-	-
IR1	-	-	-	-
IR2	✓	-	✓	-
ID 1	-	-	-	-
ID 2	✓	-	✓	-
ID 3	✓	-	✓	-
ID 4	-	-	-	-
ID 5	-	-	-	-
ID 6	-	-	-	-
ID 7	✓	-	-	-
ID 8	✓	-	-	-

Source: JICA Study Team

20.2.2.2 Forest Reserves

Table 20.2-3 provides the list of the forest reserves located roadside. The major central natural forest reserves at less than 5km from the priority roads are included as an indicator of sensitivity to the potential impacts of the road project in terms of possible depletion of forest products. The specifications of each forest reserve are given in Table 20.2-4 for the central forests and in Table 20.2-5 for the local forests.

Table 20.2-3 Central and Local Forest Reserves along the Priority Roads

Road number	District	Local forest reserve roadside	Central forest reserve roadside	Central forest reserve at less than 5km from the road
IT1	Gulu	-	1.Opaka	-
IR2	Gulu	-	2.Abera	-
	Pader	-	3.Ogom	-
ID 2	Kitgum	-	4.Pajimu	-
	Lamwo	-	5.Aswa river	-
ID 3	Gulu	-	6.Opok	-
		-	7.Opit	-
ID 7	Kitgum	11.Kitgum Matidi	-	8.Kitgum Matidi
	Agago	-	-	9.Ogiri
ID 8	Kitgum	-	-	-
	Lamwo	12.Padibe	10.Lukung	-

Source: JICA Study Team

Table 20.2-4 Specifications of the Central Forest Reserves Roadside and at less than 5km

	Central forest reserves	Sub-county	Surface area (ha)	Priority road	Objective of protection	Degraded or encroached
1	Opaka	Koro	210	IT1	Forestry plantation, forest products	
2	Abera	Paicho	1212	IR1		
3	Ogom	Atanga	800			
4	Pajimu	Akwang	158	ID2		✓
5	Aswa river	Ogili	8459	ID2	Forest conservation	
6	Opok	Koro	536	ID3	Forestry plantation, forest products	
7	Opit	Lalogi	5102			
8	Kitgum Matidi	Acholibur / Lagoro	236	ID7		
9	Ogiri	Omiya / Anyima	5348	ID7		
10	Lukung	Lukung	1427	ID8	Forest conservation (Bamboos)	

Source: JICA Study Team

Table 20.2-5 Specifications of the Local Forest Reserves Roadside

Central forest reserves	Priority road	District	Surface area (ha)	Objective of protection	Present condition
11. Kitgum Matidi	ID7	Kitgum	5	Conservation and forestry	Preserved
12. Padibe	ID8	Lamwo	6	Conservation and forestry (eucalyptus)	More than 60% encroached by settlements and crop land
Palabek (near the road but not roadside)	ID2	Lamwo	5	Conservation and forestry (eucalyptus)	100% encroached by settlements of the trading centre

Source: JICA Study Team

20.2.3 Natural Habitats

(1) Forest cover and physical conditions

The natural habitats observed along the investigated priority roads are described in Table 20.2-6.

**Table 20.2-6 Categories of Natural Habitats Observed
along the Investigated Priority Roads**

Road number	Open and bushy grassland savannah		Woodland savannah		Hilly area	
	With dense use for subsistence crops	With low use for subsistence crops	With dense natural vegetation cover	With open land used for subsistence crops	With steep slopes	With gentle slopes
IT1	1		✓			
	2		✓			
	3		✓			
ID1	1	✓				
	2		✓			
	3		✓			
	4			✓		
ID2	1	✓				
	2		✓			
	3		✓			
	4			✓		
	5			✓		✓
	6	✓			✓	
ID3	1		✓			
	2			✓		
	3	✓				
	4	✓				
ID4	1	✓				
	2	✓				
	3	✓				
	4	✓				
ID5	1	✓				
	2	✓				
	3	✓				
ID6	1		✓			
	2		✓			
	3			✓		✓
	4	✓				
ID7	1	✓				
	2		✓			✓
	3		✓			
	4	✓				
	5	✓				
ID8	1	✓				
	2		✓			
	3				✓	
	4			✓		

Source: JICA Study Team

20.2.4 Wetlands

The wetlands crossed by the investigated priority roads have been identified through field observation with the forest and environment district officers. The list of the wetlands is provided in Table 20.2-7. The map of the wetlands is available in an attachment.

20.2.5 Forestry and Forest Products

Road improvement is likely to affect the forest cover directly or indirectly. The counting of the tree plantations in the road reserve of the priority roads, and the counting of charcoal points, in combination with the natural habitat conditions provide an indication of the sensitivity of the areas crossed by the priority road if the projects are implemented. Results of counting are given in Table 20.2-7. The total average of charcoal points and bags per distance is based on the data of the ID roads only, because the road IT1 had already been improved at bituminous standards and is not representative of the conditions before improvement.

Table 20.2-7 List of the Wetlands Crossed by the Investigated Priority Roads

Road number	Name of the wetland
ID3	Pece
	Ludok
ID4	Acuku
	Gugu
	Otaka
	Oguti
	Wabgcol
ID5	Matrom
	Paiwula
	Ogan
	Pagweri
ID7	Kulukwac
	Oryang Lalano
	Odyeka
	Lyan Lakop
	Atem (Wilalyec)
	Bulugi
	Lokole
	Ngudi
	Alela
	Kalego
	Wiora Kuywe
	Rogo
	Odyaka

Source: JICA Study Team

Table 20.2-8 Forest and Forest Products along the Priority Roads

Road number / stretch number	Number of alignment plantations	Number of plot plantations			Total number	Number / Km x10	Charcoal		
		P	E	O			a	b	
IT1	1	4	6	10	2	22	22	0	0
	2	1	7	5	2	17	15	0	0
	3	3	2	2	1	11	7.2	(9)	(502)
	Total	8	15	17	5	45	14.5	(3.2)	(178)
ID1	1	0	0	0	0	0	0	0	0
	2	0	0	0	2	2	1.3	1.9	8.4
	3	1	1	0	1	3	1.4	0.5	0.9
	4	0	0	0	0	0	0	0	0
	Total	1	1	0	3	5	0.8	0.6	2.3
ID2	1	8	0	0	3	11	6.2	0.6	1.7
	2	1	0	1	2	4	5.4	2.7	8.1
	3	3	0	1	1	5	2.1	0.4	0.4
	4	0	0	0	2	2	1.1	2.2	5.4
	5	0	1	0	0	1	0.4	2.8	19.3
	6	0	0	1	1	2	1.6	2.4	4
	Total	30	1	37	25	130	2.4	1.7	7
ID3	1	5	7	4	0	16	8.1	0	0
	2	4	3	2	0	9	0.5	0	0
	3	2	1	0	4	7	0.2	1.9	15.5
	4	0	1	0	1	2	1.8	0.9	51.8
	Total	11	46	80	55	34	0.4	0.9	13
ID4	1	0	0	0	1	2	0.7	2.1	12.8
	2	2	0	1	0	5	2.1	0.7	5.7
	3	3	0	3	4	13	6	0	0
	4	1	0	4	3	12	2.8	0	0
	Total	88	0	168	118	374	0.3	0.5	3.6
ID5	1	0	0	0	1	2	0.9	4.7	50
	2	0	0	0	1	3	0.5	1	1
	3	1	1	2	0	7	4.2	0	0
	Total	177	93	338	238	846	1.5	1.8	14.3
ID6	1	0	2	9	0	11	17.1	0	0
	2	0	4	4	0	8	6.9	0	0
	3	0	0	0	0	0	0	1.3	5.2
	4	0	0	0	0	0	0	0	0
	Total	0	192	689	0	1611	4.5	0.5	1.9
ID7	1	31	1	2	5	40	19.7	0	0
	2	5	1	0	4	12	4.4	3	4
	3	3	0	0	6	12	3.9	0	0
	4	6	0	0	1	11	3	0	0
	5	4	0	0	1	10	1.6	0.3	0.3
	Total	403	2	2	493	900	5.8	0.7	0.8
ID8	1	5	0	0	0	5	2.7	0	0
	2	10	1	0	1	12	5.9	0.5	0.5
	3	0	1	0	2	3	1.5	0	0
	4	0	0	0	0	0	0	0	0
	Total	15	2	0	3	20	3.2	0.2	0.2
TOTAL	836	392	1382	992	4247	4	0.8	4.8	

P. Pines / E. Eucalyptus / O. Others

Number of charcoal selling places per 10km / b. number of charcoal bags at selling places per 10km

Source: JICA Study Team

20.2.6 Reserved Trees and Important Trees in the Road Reserve

The number of reserved trees and important trees found in the road reserve of the national priority roads is summarized in Table 20.2-9 below.

Table 20.2-9 Number of Reserved Trees and Important Trees in the Road Reserve of the Investigated Priority Roads

Road number / stretch number	Reserved trees					Important trees				
	SB	Tb	Pa	Total	Number / Km x10	M	O	Total	Number / Km x10	
IT1	1	0	2	1	4	3	6	4	21	10
	2	0	3	0	5	3	5	0	18	5
	3	0	0	4	7	3.6	17	2	36.6	17.2
	Total	0	5	5	10	3.2	28	6	57.2	10.9
ID1	1	0	3	6	9	6.4	29	3	57.4	22.7
	2	0	0	3	3	1.9	39	13	61.9	33.8
	3	0	0	1	1	0.5	6	13	24.5	9
	4	0	0	0	0	0	0	0	0	0
	Total	0	3	20	23	2	130	41	219	16.2
ID2	1	36	2	11	50	27.5	17	4	148.5	11.8
	2	70	0	0	72	94.6	24	21	283.6	60.8
	3	6	0	1	10	30.2	28	33	111.2	26.3
	4	8	0	0	12	4.3	20	21	69.3	22.3
	5	11	0	1	17	4.9	6	1	45.9	2.9
	6	16	0	2	24	14.5	60	0	122.5	48.3
	Total	147	18	55	247	15.9	415	162	1276.6	22.8
ID3	1	0	0	14	15	7.1	31	2	33	16.7
	2	0	45	5	52	25.8	51	1	52	26.8
	3	2	2	12	19	4.3	56	1	57	15.5
	4	13	0	0	17	12	5	0	5	0.5
	Total	309	83	141	533	10.7	973	328	2700.2	17
ID4	1	45	0	0	4646	32.1	17	0	4741.1	12.1
	2	15	9	0	26	17.1	8	1	78.1	6.4
	3	0	1	6	10	4.2	18	2	44.2	12.1
	4	35	9	1	49	16	13	2	129	5.3
	Total	713	185	289	5861	16.7	2002	661	9727.7	8.4
ID5	1	25	0	0	25	23.6	21	1	96.6	20.7
	2	7	0	1	8	4.4	17	1	40.4	9.8
	3	0	0	0	0	0	2	2	7	4.2
	Total	1458	0	579	11755	8.6	4044	1326	20264.5	11.4
ID6	1	1	4	44	50	76.5	42	3	221.5	70.3
	2	0	2	135	139	118.1	49	0	445.1	42.2
	3	11	0	446	460	298.7	3	1	1222.7	2.6
	4	0	0	91	95	10	0	0	200	0
	Total	2928	376	1874	5178	173.1	8182	2656	21367.1	23.1
ID7	1	33	3	19	56	27.9	154	132	425.9	145
	2	114	0	0	116	50.4	23	103	408.4	55.7
	3	151	1	18	173	73.3	37	68	524.3	45.2
	4	161	0	1	166	68.9	6	40	446.9	19.6
	5	321	0	6	332	104	29	79	876	34.4
	Total	6636	756	3792	11184	68.8	16613	5734	44783.8	55.7
ID8	1	1	0	4	5	2.7	15	8	36.7	12.5
	2	1	2	8	11	5.4	16	12	57.4	13.8
	3	0	0	11	11	5.6	54	8	92.6	3.1
	4	0	0	0	0	0	0	0	4	0
	Total	2	2	7607	7611	4.3	33311	11496	60033.3	18.1
TOTAL	13276	1516	15214	49097	32.6	66622	22992	171674.7	24.3	

SB. Shea Butter tree / Tb. Timber tree (Mahogany, Mvule) / Pa. Palm tree (African Palmyra) / M. Mango tree / O. Others

Source: JICA Study Team

20.3 Present Conditions of the Human and Social Environment in the Project Area

20.3.1 Population

The population data collected by the villages LC1 survey are summarized for sub-counties and parishes in Table 20.3-1, and for villages LC1 in Table 20.3-2. For the villages LC1, the data are mainly issued by the LC1 Households Registry Books 2011, the Data tracking register July 2011, and the Sanitation data Sep 2011. The population of the sub-counties is given by the same sources, and eventually by the 2011 Sub-counties development plan 2010-2011, and the Sub-counties development plan 2011/2015. The population of Patiko in Gulu (ID6) is based on the VHT HH Survey 2010-2011.

The survey collected the population data of 286 villages, representing 86% of the total number of villages crossed by the priority roads (333). The total population of the 286 villages for which data is available amounts to 183,439 persons, giving an average of 295 persons / km / road. Table 20.3-3 provides the summary of the distribution of population per km of road, showing the highest value for ID6, and the lowest for ID7. Based on these population data, the average number of persons per household is 4.67.

Table 20.3-1 Population of Sub-Counties and Parishes Crossed by the Priority Roads

Road number	Sub-counties		Parishes		
	Name	Population (number of persons)	Name	Population (number of persons)	Number of H/H
IT1	Koro	N/A	Labwoch	N/A	N/A
	Bobi	19845	Palwo	3100	612
			Paidwe	1152	299
	Total	(19845)	-	4252	911
ID1	Labongo Layamo	12929	Pagen	3574	696
			Paibwor	2942	451
			Pamolo	4081	582
			Ocettoke	2332	424
	Mucwini	30825	Pachua	1757	-
			Pudo	3107	311
			Bura	4981	686
			Yepa	2873	546
			Pubech	3481	706
			Ogwapoke	2526	526
			Okol kal	3067	309
	Madi opei	13462	Okol	4189	808
			Kal	2254	431
			Lawiye oduny	1618	437
	Total	13462	-	51286	(4760)
ID2	Akwnag	17146	Lamit	5049	0
			Pajimo	7762	-
			Lugwa	0	-
	Palabek gem	18004	Moroto	4190	1209
			Patanga	3033	677
	Palabek kal	17704	kal	5804	-
			Labigiryang	4996	-
	Palabek Ogili	13296	Lugwa	2293	-
			Apyeta	3198	-
	Palaro (GULU)	8500	Mede	2900	-
	Atiak (AMURU)	33000	Okidi	-	-
			Pupwonya	4155	869
		Kal	4725	972	
	Total	41500	-	8880	-

Road number	Sub-counties		Parishes		
	Name	Population (number of persons)	Name	Population (number of persons)	Number of H/H
ID3	Koro	23400	Acoyo	2300	525
			Ibakara	2300	515
			Laipainant	5700	916
	Lalogi	18433	Lukwir	3455	1165
			Jaka	2511	840
			Gem	4395	1512
	Odek	31400	Palaro	6300	1338
			Lukwor	6100	1322
			Lamola	10400	2237
	Awere (PADER)	28000	Bolo	5970	N/A
			Angole	115	N/A
			Lagile	0	N/A
			Rackoko	1582	N/A
	Total	28000	-	68888	-
ID4	Kilak	15843	Tyer	4631	513
			Kilak	3774	478
	Lamiyo	14241	Otaka	5514	512
			Ojur	4772	743
			Polcani	2724	537
			Paicam	2571	533
	Lira Palwo	25000	Lanyirinyiri	1226	205
			Omongo	1365	263
			Lutome	3349	722
	Omot	16186	Tenge	4908	1007
	Patongo	-	Lakwa	0	0
	Patongo Town Council	28536	Oporot	7568	976
			Pece	8875	1095
			Forest	6838	702
			Akomu	5261	679
	Adilang	27064	Kulaka	4200	802
		Orina	6820	1527	
		Ligiligi	2764	598	
		Lalal	4024	1350	
	Total	27064	-	218960	13242
ID5	Pajule	N/A	Palwo	5885	1196
			Paiula	4564	951
	Pader Town Council	N/A	Acoro	0	0
			Lagwai	0	0
			Luna	0	0
	Lamiyo	14241	Paicam	2571	533
	Total	(14241)	-	(450940)	(29164)
ID6	Bungatira	29700	Laliya	9677	1350
			Agonya	5518	1499
			Punea	3211	694
			Atiaba	10776	764
	Patiko	11127	Kal	4241	870
	Pabbo	42000	Gaya	8309	1761
		Total	53127	-	41732
ID7	Kitgum matidi	18609	Oryang	3242	-
			Ibakara	5535	0
	Lagoro	16198	Laber	1449	284
			Lalano	3624	733
			Pawidi	0	0

Road number	Sub-counties		Parishes		
	Name	Population (number of persons)	Name	Population (number of persons)	Number of H/H
	Wol	30900	Rogo	2466	505
			Guda	0	0
			Kalagom	1250	174
			Lamit	0	0
			Paloti	2401	388
	Parabongo	18000	Pabala	5151	858
	Lukole	33090	Kiteny	3745	668
			Ngudi	1782	355
			Olung	3586	647
	Patongo	1464	Kal	1016	224
			Odong kiwinyo	448	91
		Kotomor	18000	1209	
	Total	18000	-	122699	-
ID8	Labongo Layamo	12929	Pagen	3574	696
			Ocettoke	2332	424
	Padibe east	2885	Alaa	4486	538
			Kuluyee	2196	684
	Padibe west	1880	Lagwel	1672	338
			Abagadyak	3838	969
	Lokung	24523	Pobel	2836	572
			Olebi	3005	528
			Pangira	0	0
			Pawor	2823	571
			Licwa	2664	436
	Total	24523	-	274824	5756
TOTAL		24523	-	350864	-

Source: JICA Study Team – Villages LC1 survey 2011

Table 20.3-2 Population of Villages LC1 Crossed by the Priority Roads

Road number	Parishes	Number of villages LC1		Population of villages LC1 having provided data	
		Crossed by the priority road	Having provided population data	Number of persons	Number of households
IT1	Labwoch	3	3		
	Palwo	3	2		
	Paidwe	1	1		
	Total	7	6		
ID1	Pagen	3	3		
	Paibwor	3	3		
	Pamolo	4	4		
	Ocettoke	6	6		
	Pachua	1	1		
	Pudo	3	3		
	Bura	1	1		
	Yepa	2	2		
	Pubech	1	1		
	Ogwapoke	4	4		
	Okol kal	5	5		
	Okol	2	2		
	Kal	3	3		
	Lawiye Oduny	2	2		
Total	54	52			

Road number	Parishes	Number of villages LC1		Population of villages LC1 having provided data	
		Crossed by the priority road	Having provided population data	Number of persons	Number of households
ID2	Lamit	3	0		
	Pajimo	5	1		
	Lugwa	1	0		
	Moroto	3	3		
	Patanga	3	3		
	kal	1	0		
	Labigiryang	2	2		
	Lugwa	4	4		
	Apyeta	4	4		
	Mede	2	2		
	Okidi	1	1		
	Pupwonya	2	2		
	Kal	1	1		
	Total	140	127		
ID3	Acoyo	2	0		
	Ibakara	4	0		
	Laipainant	3	0		
	Lukwir	4	2		
	Jaka	2	2		
	Gem	3	3		
	Palaro	4	0		
	Lukwor	2	0		
	Lamola	1	0		
	Bolo	3	3		
	Angole	3	3		
	Lagile	4	4		
	Rackoko	6	6		
	Total	321	277		
ID4	Tyer	4	4		
	Kilak	3	3		
	Otaka	2	2		
	Ojur	2	2		
	Polcani	5	5		
	Paicam	1	1		
	Lanyirinyiri	3	3		
	Omongo	3	3		
	Lutome	2	2		
	Tenge	3	3		
	Lakwa	2	2		
	Oporot	2	2		
	Pece	3	2		
	Forest	2	2		
	Akomu	2	2		
	Kulaka	1	1		
	Orina	4	4		
	Ligiligi	9	9		
Lalal	5	5			
Total	700	611			

Road number	Parishes	Number of villages LC1		Population of villages LC1 having provided data	
		Crossed by the priority road	Having provided population data	Number of persons	Number of households
ID5	Palwo	4	4		
	Paiula	6	6		
	Acoro	3	3		
	Lagwai	3	3		
	Luna	4	4		
	Paicam	6	6		
	Total	1426	1248		
ID6	Laliya	2	2		
	Agonya	3	3		
	Punea	2	2		
	Atiaba	2	2		
	Kal	4	4		
	Gaya	1	1		
	Total	2866	2510		
ID7	Oryang	3	0		
	Ibakara	7	0		
	Laber	4	4		
	Lalano	3	3		
	Pawidi	3	1		
	Rogo	4	4		
	Guda	5	0		
	Kalagom	2	2		
	Lamit	1	0		
	Paloti	6	6		
	Pabala	4	4		
	Kiteny	4	4		
	Ngudi	3	3		
	Olung	8	8		
	Kal	3	3		
	Odong kiwinyo	1	1		
	Lukee	7	7		
	Total	5800	5070		
ID8	Pagen	3	3		
	Ocettoke	5	5		
	Alaa	5	5		
	Kuluyee	6	6		
	Lagwel	4	4		
	Abagadyak	7	7		
	Pobel	5	5		
	Olebi	3	3		
	Pangira	3	3		
	Pawor	1	1		
	Licwa	5	5		
	Total	11647	10187		
TOTAL		333	286	183439	-
Total / Population and correlated households				182002	38948

Source: JICA Study Team – Villages LC1 survey 2011

Table 20.3-3 Summary of Population and Social Environment Data

Road number	Total number of villages LC1	Number of villages with health centre	Number of villages with school	Population Number of persons / km road
IT1	7	1	3	302
ID1	40	4	15	311
ID2	32	6	11	228
ID3	41	7	16	225
ID4	58	7	17	327
ID5	26	3	6	414
ID6	14	3	10	669
ID7	68	6	12	147
ID8	47	4	16	410
Total	333	41	106	295

Source: JICA Study Team

20.3.2 Drinking Water Sources

The drinking water sources results are reported in Table 20.3-4. Among the 333 investigated villages, 192 have reported to have a water source near the priority road. The total number of water sources reported to be located near the roads amounts 424 points, 86% of them being boreholes. There are however, 50 river water sources for drinking use near the road, which may need a more detailed investigation according to the project design features. The drinking surface water sources are particularly sensitive to the water quality impacts of the project works. Almost 65% of these roadside surface water sources are located along the roads ID2, ID3, and ID7. The number of public fountains and boreholes observed during the survey along the roads is given in Table 20.3-6.

Table 20.3-4 Functional Drinking Water Sources Roadside (Number)

Road number	Parishes	Villages LC1	Water source category				Specifications (distance from road, place name)
			1	2	3	4	
IT1	Palwo	Idobo			1		
		Obaliwat			1		
	Paidwe	Pato			1		
		Total			3		
ID1	Pagen	Pagen west			2		8m Lacor
		Pagen central			3		50m Central
		Lemo gweng ajut			1		10m Mulamula
	Paibwor	Paibwor west			2		65m West
		Paibwor central			3		100m Teekworo
		Paibwor east			3		
	Pamolo	Pamolo central			1		50m
		Pamolo east/ olet			2		
		Atura			1		40m
	Ocettoke	Obem			2		55m
					2		55m
		Ocettoke central			3		100m
			Ocettoke north			5	
	Ocettoke west			3		500m	
		Tumatoo			2		400m
	Pachua	Pakuba west			2		13m
	Pudo	Pudo central			1		15m
			Kabete			1	
		Mugila			1		10m
	Bura	Pudura			1		
Yepa	Obiya			5		10m	

Road number	Parishes	Villages LC1	Water source category				Specifications (distance from road, place name)
			1	2	3	4	
		Mucwini central			3		
	Pubech	Paryeko			4		9m
	Ogwapoke	Likol B			1		6m Teeolam
		Ikoromo			1		12m Oyamo
		Pukure			1		10m Society
	Okol kal	Biwang east			1		
		Biwang west			1		
		Araa		1	1		
		Ayom olola A			1		
		Ayom olola B		1			
	Okol	Kakira			1		
		Kapeta			1		
	Kal	Gem			1		
		Poyamo			3		
		Central			7		8m
	Lawiye oduny	Dog tangi			1		7m
		Locimdik			1		350m
		Total		2	73		-
ID2	Lamit	Bajere north			1		25m
		Bajere south			3		200m
		Liba			4		40m
	Pajimo	Pajimo east			2		
		Pajimo west			1		
		Pajimo central			1		
		Ateng			2		
	Lugwa	Lubene			1		
	Moroto	Labworo yeng			5	2	
		Yaapacoro			2	2	
		Kamama central			10	2	
	Patanga	Dyang bi				1	
		Oboke olot				1	
		lakwar			4	2	
	Labigiryang	Alimotiko east			3		30m
	Lugwa	Lugwa central			5		10m
		Lagot opuk			14		10m
		Akworo east			1		15m
		Akworo central			3		15m
	Apyeta	Apyeta central			2		1Km
		Apyeta south			1		3Km
		Apyeta west			3		8 m
	Apyeta east			1		3Km	
Mede	Oroko				2	15m (Oroko)	
	Total			69	12		
ID3	Ibakara	Lakwatomer			1		15m (Lakwatomer)
	Lukwir	Idure			1		15m (Idure)
	Jaka	Wang lobo			1		10m (Wanglobo)
		Ayom lony			1		15m (Ayom lony)
	Gem	Lagode			1		7m (Lagode)
		Pawach			3	4	10m borehole & 7m watercourse (Pawach)
		Otal			2		5 meters (Otal)
	Palaro	Odek Centre			3		10m Lamur (Oratido)
		Olam			2		10m (Olum)
		Opongoga			1		10m (Opongoga)
	Lukwor	Oratido			1		10m (Oratido)
	Oryang			1		10m (Oryang)	

Road number	Parishes	Villages LC1	Water source category				Specifications (distance from road, place name)
			1	2	3	4	
	Angole	Latira			1	0	15m (Latira)
	Lagile	Lukwor			0	2	
		Bolo Wigweng			0	1	4m (Bolo Wigweng)
		Parwee Luker			0	1	20m (Parwee Luker)
	Rackoko	Rackoko Central B			3	0	5m (Rackoko CentralB)
		Rackoko A			2	0	10m (Lalya Laro)
		Lunyiri West			1	0	15m (Lunyiri West)
		Bolo Opette			1	1	10m (Bolo Opette)
		Lunyiri East			1	0	5m (Lunyiri East)
		Total			27	9	
ID4	Ojur	Omodum			3		8m (Omodum)
		Lamiyo			3		5m (Lamiyo)
	Otaka	Buluji			1		5m (Buluji)
	Polcani	Labongedero			1		7m Labongedero)
	Lanyirinyiri	Lapilyet			1		5m (Lapilyet)
	Omongo	Bulotwomo			1		15m (Bulotwomo)
	Lutome	Alokolum			1		5m Alokolum)
		Labima			0	1	Across the Road
	Oporot	Modege			2		Across the Road
		County Head			2		10m
	Pece	Old Patongo			1		21m (old Patongo)
	Orina	Karoko West			1		130m (Tekworo)
		Kanyipa West			1		100m (Gang Pa Agol)
		Kanyipa East			1		10 metres (Kanyipa East)
	Ligiligi	Lingoto Central			2		6 metres (Ligiligi)
		Ligiligi Central			2		20 metres (Ligiligi Central)
	Lalal	Lalal West			2		100 metres (kabamba)
		Lalal Central			4		30 metres (Gang Pa PhiliP) 20 metres (Teowu)
		Total			29	1	
ID5	Palwo	Ogan Ayila East				1	
		Ogan Ayila West			1	1	5 metres (Ogan)
		Kanakok West			1		
	Paiula	Mekor			1		20 metres (Mekor)
		Lacur			2		10 metres (Lacur)
		Tokodo			2		10 metres (Tokodo)
	Acoro	Kiteng East			3		10 metres (Kiteng)
		Pagwari East			2		
		Olworngu West			3		30 metres(Olworngu)
	Lagwai	Lagwai Zone A		4	3		10 metres(Lagwai A)
		Lagwai Zone B			2		10 Metres (Lagwai B)
		Lagwai East			2		20m (Lagwai East)
	Paicam	Lalira Gem			2		5m (Lilira)
		Gem			1		
	Kwonkic			1			
	Kwonkic Labwor			1	5		
		Total		4	27	7	
ID6	Laliya	Dwol			1		15m (Owor)
	Punea	Lagwing			3		15m (Lukodi)
		Lukodi			3		10m (Lukodi)
	Atiaba	Ayac			1		10m (Ayac)
		Panykworo			1		10m (Panykworo)
	Kal	Patalira			1	2	5m borehole in Patalira & 5m watercourse in Taweyakwa,Chai)
	Anyadwe			2		5m (Anyadwe)	

Road number	Parishes	Villages LC1	Water source category				Specifications (distance from road, place name)
			1	2	3	4	
		Angany			3		10m (Angany)
	Gaya				1	1	10m borehole & Unyama River
	Total			2	14	3	
ID7	Pawidi	Adjumani			5	2	
		Lajanga			2	2	
		Akuna			10	2	
	Rogo	Okwadoko				1	
		Nja east				1	
		Rogo central			4	2	
	Pabala	Opwony			1		150M
		Abilonino east			1		300M
	Kiteny	Katolit dognam				1	
		Katolit central			1		50M
		Lacan kweri central			1		300M
	Ngudi	Acamtoo			1		200M
		Wii dwol			1		5KM
	Olung	Wot ki wii					
		Alunga teekworo			1		30M
		Lwala south			2		
		Lwala central			1		
		Kweyo central			1		
	Kal	Labwo oryemo south			1		
		Nota			1		
		Opyelo central			2		
	Odong kiwinyo	Miciri		1	1		
	Total			1	37	11	
ID8	Pagen	Pagen west			2		8 M Lacor
		Pagen central			3		50 M Central
		Lemo gweng ajut			1		10 M Mulamula
	Ocettoke	Ocettoke central			3		20 M
		Ocettoke north			5		1 KM
		Ocettoke west			3		500 M
		Tumatoo			2		
	Alaa	Ayago west			3	2	Tuluka & Lamwodngo ayago
		Ayago east				1	Ayago
		Loi agolo				1	Kamanding & Lagwel
		Loi oryang			3		
		Kamama east			1		
	Kuluyee	Loi bide south			1		10M
		Loi bide north			3		
		Mission			1		100m Padibe primary school
		Atwol			5		
		Lotibol			5		
		Kakira south			1		
	Lagwel	Lomura			4		
		Tolpolo			1		
		Kamama central			1		
		Bwola			5		
	Abagadyak	Anyibi			2		
		Ngomoromo south			1		
		Ngom orom north			1		
		Larom east			2		
		Storebor			1		
	Latic odokogwok			1			
Pobel	Ongalo				1		

Road number	Parishes	Villages LC1	Water source category				Specifications (distance from road, place name)
			1	2	3	4	
		Pobel			2		
		Wigot		1	2		
		Karatac		1	3		
	Olebi	Langwidi yika			3		
		Ododo central			2		3 M
		Okukwene			2		18M
	Pangira	Pagada			2		30 M
		Okora central			1		
		Okora west			1		
	Pawor	Latida			1		300 M
	Licwa	Licwa central			2	2	6M and 4M respectively
		Lakawala west			1		5 M
		Ngomoromo			1		10 M
		Total		2	84	7	
	TOTAL		0	11	363	50	

1. Protected spring / 2. Shallow well / 3. Borehole / 4. Watercourse

Source: JICA Study Team – Villages LC1 survey 2011

20.3.3 Sites of Cultural Value

The sites of cultural value have been classified into 5 categories: Place of worship, place of social importance, monument, grave, and others. There was no historical place recorded, except for the monuments. Table 20.3-5 provides the list of the sites of cultural value along the priority roads, according to the results of the villages LC1 survey. There are 48 villages that have reported one of the several sites of cultural importance near the priority road.

The total number of sites amounts 78, most of them being graves and places of social importance. Almost 68% of these roadside sites of cultural value are located along the roads ID3 and ID4. These data cannot, however, be considered as exhaustive, and a more detailed investigation is necessary for getting a reliable view of the existing conditions.

Table 20.3-5 Sites of Cultural Value for the Local Community (Number)

Road number	Parishes	Villages LC1	Number and category of site					Specifications (distance from road, place name)
			1	2	3	4	5	
IT1	-	-	-	-	-	-	-	No site
ID1	Pamolo	Atura		1				Nyaramolo mountain
		Obem		1				Kibu tree
	Ocettoke	Ocettoke north		1				Wang jok forest
		Ocettoke west		1				Hill
	Pudo	Kabete					1	Church
	Bura	Pudure				2	1	
	Pubech	Paryeko				2		Approx 14m
	Ogwapoke	Ikoromo			1			2m Tee obee
	Okol	Kapeta				1		Grave
		Total	0	4	1	5	2	
ID2	Pajimo	Ateng			1			20m
	Kal	Kal central					1	10m
		Total	0	0	1	0	1	
ID3	Bolo	Ayom Central				5		10m (Ayom Central)
	Angole	Latira	1					15m (Latira)
		Latek West				4		20m (Latek west)
		Latek East	1					1m (Latek East)
	Lagile	Lukwor		1				15 meters (Lukwor)

Road number	Parishes	Villages LC1	Number and category of site					Specifications (distance from road, place name)
			1	2	3	4	5	
		Bolo Wigweng		2				25 meters (Bolo Wigweng)
		Parwee Luker				1		15 meters (Parwee Luker)
	Rackoko	Rackoko CentralB				1		50m (Rackoko CentralB)
		Rackoko A				4		12 meters (Rackoko A)
		Lunyiri West				1		20 meters Lunyiri West)
		Bolo Opette				3		15 meters (Bolo Opette)
		Lunyiri East				3		15 meters Lunyiri East)
		Total	2	3	0	22	0	
ID4	Lanyirinyiri	Gemodwong			3			14 Meters (Gemodwon)
	Omongo	Pyer gweng				3		12 meters (Pyer Gweng)
		Bulotwomo				3		10 meters (Bulotwomo)
		Abonegangkal				3		10 meters (Abonegang)
	Tenge	Labima				1		2 Meters (Labima)
	Kulaka	Kukaka Central		2				2 meters (Kituba Tree)
	Orina	Karoko West		2				3 meters (Big Trees)
		Kanyipa East		5				3 meters (Mango Trees& Shea Butter trees)
	Ligiligi	Loi		1				4m Bur Owak, Kworo-Agole, Temondwong
		Ligiligi Central		1				Tamarin Tree (Ligilgi Central)
	Lalal	Lalal East		1				3m Big Tree for Meeting Place (Lalal East)
		Total	0	13	3	10	0	
ID5	Paicam	Lalira Gem	1	0	0	0	0	10m
		Total	1	0	0	0	0	
ID6	Kal	Patalira				1		10 Meters (Patalira)
		Akwii				1		5 Meters (Akwii Olet)
		Total	0	0	0	2	0	
ID7	Pabala	Opwony			1			LRA victims / 200m
		Total	0	0	1	0	0	
ID8	Ocettoke	Ocettoke north		1				Wang jok forest / stream 2.5km
		Ocettoke central						
		Ocettoke west		1				Hill 2 KM
	Kuluyee	Loi bide south						100 M
		Loi bide north				1		
		Mission						
		Atwol		1				
	Lagwel	Kamama central					1	Alukudel
	Olebi	Ododo central			1			1km Gang kal pa rwot
	Pangira	Okora central				1		
		Total	0	3	1	2	1	
TOTAL			0	3	4	3	3	

1. Place of worship / 2. Place of social importance / 3. Monument / 4. Grave / 5. Others

Source: JICA Study Team – Villages LC1 survey 2011

20.3.4 Health Centres and Schools in Villages

The results of the villages LC1 survey for schools and health centres have been summarized in Table 20.3-3 above. The coverage rate is 12% for health centres and 30% for schools. Similar data are given in Table 20.3-6 for the observed number of schools and health centres located roadside, according to the counting survey. The first table gives an indication of the availability of health and school services in close proximity. The second table gives an indication of the most sensitive points during the construction works, as regards the risk of traffic accidents.

20.3.5 Borrow Pits and Selected Settlements

The number of borrow pits observed along the investigated priority roads has been recorded by road stretch and summarized by road as provided in Table 20.3-6. The recording of the borrow pits provides information on the actual conditions of the physical environment along the road.

Table 20.3-6 Number of Borrow Pits and Selected Roadside Settlements along the Investigated Priority Roads

Road number / stretch number	Borrow pits	Schools	Health Centres	Public fountain or borehole
IT1	0	1	1	0
ID1	12	9	4	1
ID2	8	18	5	8
ID3	8	12	6	8
ID4	8	15	6	7
ID5	2	4	3	2
ID6	3	4	2	0
ID7	20	22	9	22
ID8	5	10	2	15
Total	66	95	38	63

Source: JICA Study Team

20.3.6 Housing and Commercial Settlements in the Road Reserve

The number of housing and commercial settlements in the road reserve is provided in Table 20.3-7 and 20.3-8, respectively. On the whole, there are 521 housing facilities in the road reserve, but most of them are part of a housing compound, instead of just a house by itself. The number of houses that are likely to be directly affected by the ROW of the project roads reaches 153 units, distributed into 3 categories of construction quality: The hut type (125), the unburned brick wall type (9), and the burned brick wall type (19). The number of shops identified amounts to 1207, but 75% of them are located in a trading centre where the road width will be adapted to the local conditions. The 190 shops in the road reserve and outside a trading centre are mostly semi-permanent (143).

Table 20.3-7 Number of Houses or Housing Compounds in the Road Reserve

Road number	Stretch Number	Hut	House with unburned brick walls	House with burned brick walls	Housing compound (but not a lone house)	TOTAL
IT1	1	0	0	0	7	8
	2	1	0	0	3	6
	3	0	0	0	22	25
	Total	1	0	0	32	33
ID1	1	0	0	0	0	0
	2	4	2	11	4	23
	3	0	0	0	2	2
	4	0	0	0	0	4
	Total	6	2	11	70	89
ID2	1	2	0	0	2	5
	2	3	0	0	8	13
	3	0	0	0	4	7
	4	4	0	0	10	18
	5	12	0	0	8	25
	6	1	0	1	0	8
	Total	34	0	1	172	207

Road number	Stretch Number	Hut	House with unburned brick walls	House with burned brick walls	Housing compound (but not a lone house)	TOTAL
ID3	1	0	0	0	23	24
	2	1	0	0	9	12
	3	1	0	0	9	13
	4	0	3	0	3	10
	Total	2	3	0	388	532
ID4	1	1	0	0	22	24
	2	3	0	0	12	17
	3	5	0	0	29	37
	4	3	1	0	4	12
	Total	84	1	0	843	928
ID5	1	0	0	0	5	6
	2	6	1	0	9	18
	3	0	2	0	5	10
	Total	6	3	0	1705	1714
ID6	1	1	0	1	2	4
	2	0	0	3	0	3
	3	0	0	1	0	1
	4	1	0	0	0	1
	Total	2	0	29	2	33
ID7	1	4	0	0	22	27
	2	21	0	1	15	39
	3	5	0	0	31	39
	4	34	0	0	36	74
	5	7	0	0	42	54
	Total	255	0	59	3560	3874
ID8	1	0	0	1	3	5
	2	5	0	0	11	18
	3	0	0	0	5	5
	4	0	0	0	1	1
	Total	5	0	119	7140	7264
TOTAL		520	18	238	14280	15056

Source: JICA Study Team

Table 20.3-8 Number of Shops and Workshops in the Road Reserve

Road number	Stretch Number	Number of shops inside a trading centre		Number of shops outside a trading centre		Number of graining mills	TOTAL
		Permanent type	Semi-permanent type	Permanent type	Semi-permanent type		
IT1	1	0	4	0	0	0	4
	2	0	4	0	0	0	6
	3	0	0	0	0	0	3
	Total	0	8	0	0	0	8
ID1	1	8	26	0	0	1	36
	2	13	37	0	4	1	57
	3	37	50	0	0	0	90
	4	0	0	0	0	0	4
	Total	58	129	0	4	2	193
ID2	1	0	5	0	3	0	9
	2	11	27	16	0	0	56
	3	0	4	8	5	1	21
	4	0	0	0	4	0	8
	5	0	7	0	0	0	12
	6	0	2	0	0	0	8
	Total	127	303	24	20	1	475

Road number	Stretch Number	Number of shops inside a trading centre		Number of shops outside a trading centre		Number of graining mills	TOTAL
		Permanent type	Semi-permanent type	Permanent type	Semi-permanent type		
ID3	1	20	0	0	2	0	23
	2	0	30	0	0	1	33
	3	0	4	0	0	2	9
	4	2	2	0	0	0	8
	Total	276	642	0	2	3	923
ID4	1	0	15	0	0	0	16
	2	2	16	0	0	0	20
	3	1	0	0	0	0	4
	4	0	1	0	2	0	7
	Total	3	1316	0	2	0	1321
ID5	1	0	10	1	2	0	14
	2	2	22	0	0	0	26
	3	0	27	0	4	0	34
	Total	2	2691	1	6	0	2700
ID6	1	23	7	0	0	1	32
	2	6	23	0	0	1	32
	3	1	0	0	0	2	6
	4	0	33	0	0	0	37
	Total	592	5445	0	0	16	6053
ID7	1	0	3	18	22	4	48
	2	69	62	0	14	1	148
	3	3	44	0	10	1	61
	4	5	27	6	13	0	55
	5	17	12	4	10	0	48
	Total	1278	11038	78	129	38	12561
ID8	1	7	5	0	1	0	14
	2	86	44	0	9	0	141
	3	28	5	4	38	2	80
	4	0	0	0	0	0	4
	Total	2677	22130	160	306	78	25351
TOTAL		5354	44260	320	612	156	50702

Source: JICA Study Team

20.4 Present Conditions of the Natural and Social Environment in the Gulu City Roads Project Area

20.4.1 Population

The population data is available for divisions and wards based on the population census of 2002. These data are provided in Table 20.4-1 and Table 20.4-2. The latter shows the population data and population projection for the municipal divisions.

Table 20.4-1 Population according to the Municipal Divisions

Divisions (LCIII)	Geographical location in Gulu municipality	Population in 2002 (number of persons)	Projected population for 2009 (number of persons)
Layibi	SW	25426	30122
Laroo	NE	21214	25132
Bardege	NW	36657	43427
Pece	SE	36133	42807
TOTAL	-	119430	141488

Source: JICA Study Team

Table 20.4-2 Population according to the Municipal Wards of Concern

Divisions (LCIII)	Wards (LCII Parish)	Population in 2002 (number of persons)
Layibi	Techo	6607
	Library	6273
Laroo	Queens	3591
	Agwee	5894
Bardege	Kanyagoga	10500
Pece	Labourline	6646
	Tegwana	13918

Source: JICA Study Team

20.4.2 Environmental Conditions

Table 20.4-3 and Table 20.4-4 provide a general statement of environmental conditions for wards and subwards of concern, prepared based on the information quoted from the 5 year rolled development plans for 2011 of the Gulu municipality divisions (Layibi, Laroo, Bardege, Pece), and from discussions with the LCIII chairman of each division and with the environmental officers of Gulu municipality.

Table 20.4-5 and Table 20.4-6 summarize the data available for traffic accidents in relationship to the bad spots in the roads, and for citizens' complaints on the living environment, respectively.

Table 20.4-3 Main Environmental Issues Raised by the Municipal Division Development Plans and Relationship with the City Roads Project and the City Approach Roads

Environmental quality criteria (wards or subwards of concern)	Approach city roads					
	1	2	3	13	14	15
HIGH POVERTY LEVEL Layibi central / Kirombe custom / Library	✓		✓			
LACK OF SAFE SUPPLY OF DRINKING WATER Layibi central / Kanyagoga A / Queens / Kirombe custom	✓	✓		✓		
SOLID WASTE DUMPING AND LITTERING IN STREETS Layibi central / Layibi centre A and B / Green valley	✓	✓				
LACK OF STREET DRAINAGE / SEWERAGE PROBLEMS Layibi centre A and B / Queens / Green valley	✓	✓		✓		
DEGRADED ROADS NETWORK Prison barracks / Kirombe custom		✓	✓			
FLOODS Kirombe custom		✓				
NOISE NUISANCE Layibi centre / Green valley	✓	✓				
HIGH DENSITY POPULATION Green valley		✓				
SLUM AREA Industrial area / Library	✓					
CHILD LABOUR Library / Prison barrack	✓			✓		

Source: JICA Study Team

Table 20.4-4 Main Environmental Issues Raised by the Municipal Divisions Development Plans and Relationship with the City Roads Project and the Inner City Roads

Environmental quality criteria (wards or subwards of concern)	Inner city roads									
	4	5	6	7	8	9	10	11	12	
HIGH POVERTY LEVEL Layibi central / Kironde custom / Library										
LACK OF SAFE SUPPLY OF DRINKING WATER Labour line					✓	✓	✓	✓	✓	✓
SOLID WASTE DUMPING AND LITTERING IN STREETS Queens			✓							
LACK OF STREET DRAINAGE / SEWERAGE PROBLEMS Queens			✓			✓				
DEGRADED ROAD NETWORK										
FLOODS Labour line	✓									
NOISE NUISANCE Green valley				✓						
HIGH DENSITY POPULATION										
SLUM AREA										
CHILD LABOUR Labour line					✓		✓			

Source: JICA Study Team

Table 20.4-5 Checklist of Bad Spots Roads in Terms of Traffic Accidents

Road number	Corresponding road names	Bad spots roads
Approach city roads	1 Kampala highway	
	2 Lagony road	
	3 Atwal road	✓
	13 Narrow road	✓
	14 Dr Mathew Lukwiya	
	15 Peter paul opok	
Inner city roads	4 Awere road	
	5 Jomo Kinyatta	✓
	6 Bank lane / Market street	✓
	7 Coronation road	✓
	8 Narrow road	✓
	9 Awich and Queen avenue	
	10 Keyo and Alier	
	11 Awere road / Labwor road	✓
12 Olya road		

Year 2010 - Death: 2 / Major injuries: 200 / Minor injuries: 110 / TOTAL: 312,

Year 2011 - Death: 9 / Major injuries: 124 / Minor injuries: 70 / TOTAL: 203

Source: Report by the OC traffic-Gulu District

Table 20.4-6 Checklist of Categories of Complaints of Gulu Citizens about the Living Environment

Road number	Corresponding road names	A	B	C	D	E
Approach city roads	1 Kampala highway					
	2 Lagony road					
	3 Atwal road					
	13 Narrow road		✓			
	14 Dr Mathew Lukwiya					
	15 Peter paul opok					
Inner city roads	4 Awere road					
	5 Jomo Kinyatta	✓	✓	✓	✓	✓
	6 Bank lane / Market street	✓	✓	✓		
	7 Coronation road					
	8 Narrow road					
	9 Awich and Queen avenue					
	10 Keyo and Alier					
	11 Awere road / Labwor road				✓	✓
12 Olya road						

A: Dirty town / B: Poor drainage / C: pot holes / D: Poor engineering quality / E: Lack or inadequacy of road signs

Source: JICA Study Team from discussion with municipality

20.4.3 Results of the Gulu City Road Counting Survey

The target of the counting survey done in November 2011 included settlements and trees. The results of the counting survey provided the baseline data regarding the social and natural environment of the city roads.

Table 20.4-7 and Table 20.4-8 present the results of the counting survey for settlements.

Table 20.4-9 and Table 20.4-10 present the results of the counting survey for trees. The categories of settlements and their respective numbers are given for each city road section. The settlements partly encroaching on the road reserve are mostly built terraces or platforms between the buildings and the carriageway. Table 20.4-7 shows in grey the 3 spots that have been retained for undertaking a questionnaire survey, due to their potential sensitivity. They are:

- Industrial Area workshops (Pabbo area / 18)
- Cerelendu market (15)
- Kanagyoga shops (8)

Table 20.4-7 Number of the Human Settlements along the Approach City Roads Sections

Number of settlements		1	2	3	13	14	15	Total
Total number roadside	House	7	40	8	0	2	1	58
	Guest House	9	0	1	0	0	0	10
	Workshop	23	0	3	0	1	0	27
	Shop Permanent	113	0	0	1	40	0	154
	Shop Temporary	125	10	12	1	2	0	150
	Restaurant	1	0	0	0	1	0	2
	Health service	1	1	1	0	1	3	7
	Office	14	5	3	4	1	0	27
	Bank	1	1	1	1	0	0	4
	Electricity poles	0	0	17	0	0	0	17
	Schools	5	4	2	0	0	0	11
	church	0	0	1	0	0	0	1
	Open land	3	2	1	1	1	1	9
	Abandoned building	0	0	1	0	0	0	1
	Reformatory centre	0	0	1	0	0	1	2
TOTAL	302	63	52	8	49	6	480	
Number with extension or location partly or entirely in the road reserve	House	0	0	2	0	0	0	2
	Guest house	3	0	1	0	0	0	4
	Workshop	18	0	0	0	0	0	18
	Shop Permanent	5	0	0	0	0	0	5
	Shop Temporary	15	8	2	0	0	0	25
	Restaurant	1	0	0	0	0	0	1
	Health service	0	0	0	0	0	3	3
	Office	0	3	0	3	0	0	6
	Bank	1	1	0	1	0	0	3
	Electricity poles	0	0	17	0	0	0	17
	Petrol station	4	0	0	0	0	0	4
	School	0	2	0	0	0	0	2
	Abandoned building	0	0	1	0	0	0	1
	TOTAL	47	14	23	4	0	3	91

Source: JICA Study Team

Table 20.4-8 Number of the Human Settlements along the Inner City Roads Sections

Number of settlements		4	5	6	7	8	9	10	11	12	Total
Total number roadside	House	2	0	3	4	0	0	0	0	0	9
	Guest house	0	0	6	10	0	0	0	2	4	22
	Workshop	0	0	2	2	0	2	4	1	0	11
	Shop Perm.	56	67	49	12	65	83	95	56	24	507
	Shop Temp.	10	8	3	18	0	2	2	1	1	45
	Restaurant	0	1	0	1	3	5	2	5	4	21
	Health service	0	0	1		2	3	0	4	2	12
	Office	2	0	1		1	0	0	0	2	6
	Banks	4	1	3	1	3	2	0	4	0	18
	Distributors	0	0	0	3	0	0	0	0	0	3
	Open land	0	0	1	1	1	0	0	0	0	3
	Fuel station	2	0	0		2	0	0	0	0	4
TOTAL	76	77	69	52	77	97	103	73	37	661	
Number in the road reserve only	House	0	0	1	0	0	0	0	0	0	1
	Guest house	0	0	3	4	0	0	0	1	2	10
	Shop Perm.	6	5	0	0	0	3	2	0	2	18
	Shop Temp.	0	3	2	1	0	0	0	0	1	7
	Restaurant	0	0	0	1	1	2	1	2	0	7
	Office	0	0	0	0	0	0	0	1	1	2
	Banks	1	0	1	0	2	1	0	1	0	6
	TOTAL	7	8	7	6	3	6	3	5	6	51

Source: JICA Study Team

Table 20.4-9 Number of Trees along the Approach City Roads Roadside

Location and species of trees roadside		1	2	3	13	14	15	Total
Total number roadside	Mvule		59	48				107
	Mahogany	6						6
	Mango	9	9	3	5			26
	Eucalyptus	27	70				5	102
	Pines	2			4			6
	Palmyra	6						6
	Others	18	20	1	10	1	6	56
	TOTAL	68	158	52	19	1	11	309
Number estimated to be in the road reserve	Mvule		45	47				92
	Mahogany	1						1
	Mango	1	6	2	5			14
	Eucalyptus	6		17				23
	Pines				4		4	8
	Palmyra	4						4
	Others	2		16	9	1	1	29
	TOTAL	14	51	82	18	1	5	171

Source: JICA Study Team

Table 20.4-10 Number of Trees along the Inner City Roads and all Located in the Road Reserve

Tree species	4	5	6	7	8	9	10	11	12	Total
Others	0	3	4	7	3	1	0	4	0	22

Source: JICA Study Team

20.4.4 Results of the Gulu City Roads Questionnaire Survey

A questionnaire survey has been executed for 10 selected business units roadside. The results are summarized in Table 20.4-12, Table 20.4-13, and Table 20.4-14. Table 20.4-11 gives the background information on the selected interview targets. The results show that:

- All the respondents estimate that the project will have a positive impact on them
- Reduced accidents, improved business, and easier access / transport are the most expected positive impacts of the project
- Improved drainage, road width expansion, improved carriageway, and high quality of the engineering works are the most expected actions to be considered for guarantying the best conditions of improvement of the roads
- The female owned businesses (4 units) are all in the retail trade and produce only low income, representing the main part or the significant part of the household income, and show a high sensitivity to a potential loss of business
- The workshop activities are family businesses (3 units), that produce a higher income which is the main source of income of the household, sustaining a large number of persons in the same household.
- The male owned retail trade businesses (3 units) provide a low income for large households that are without additional income, and is highly sensitive to a potential loss of business

Table 20.4-11 Background Information of the Targets of Interview Survey

Road Number	Place name	Target of the interview			Question sheet Number
		Activity	Age of the person	Gender of the person	
1	Industrial area (Pabbo quarters)	Furniture	42	Male	1
		Concrete moulding (culverts, bricks and slabs)	26	Male	2
		Retail shop	31	Female	3
		Metal fabrications (agricultural processing machines)	40	Male	4
	Cerelendu market	Drug shop (medicines)	28	Female	5
		Butchery (meat)	35	Male	6
2	Kanyagoga	Repair and sell bicycle parts	46	Male	7
		Bicycle and motor cycle repair	34	Male	8
	Gorwans Quarters	Beverages	54	Female	9
		Meals	35	Female	10

Source: JICA Study Team

Table 20.4-12 Opinions about the Project

Opinion about the project		Road 1						Road 2			
		Industrial area				Market		Kanyagoga		Gorwans	
		1	2	3	4	5	6	7	8	9	10
Positive impact expected from the project		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Expected benefits from the project	Reduced accidents			✓	✓	✓	✓	✓	✓	✓	✓
	Improved business	✓	✓	✓	✓		✓	✓			✓
	Easier access / transport	✓		✓				✓	✓	✓	✓
	Improved sanitation						✓				
Expected actions for improving conditions	Fixing potholes					✓	✓				✓
	Improved drainage	✓		✓	✓	✓	✓	✓	✓		✓
	Road width expansion		✓				✓	✓	✓		
	Speed governors / humps	✓			✓						

Opinion about the project		Road 1						Road 2			
		Industrial area				Market		Kanyagoga Gorwans			
		1	2	3	4	5	6	7	8	9	10
	Improved carriageway	✓	✓	✓							
	High quality work	✓		✓						✓	✓
	Street lighting		✓								
	Distance signboards			✓							
	Keep roadside trees							✓			
	Local community involved										✓

Source: JICA Study Team

Table 20.4-13 Shop Activities

	Road 1						Road 2			
	Industrial area				Market		Kanyagoga Gorwans			
	1	2	3	4	5	6	7	8	9	10
Year of starting the activity	1992	2010	2011	2000	2006	1996	2001	1992	1995	2011
Number of persons employed in activity	6	8	1	5	2	2	7	4	1	2
Persons employed from the same household	6	1	1	2	2	1	2	1	1	2
License obtained from the municipality	yes	yes	yes	no	no	yes	no	no	yes	no
Activity is the main source of income	yes	yes	no	yes	yes	yes	yes	yes	yes	yes
Monthly income generated by the activity (1000 Ushs.)	800	2000	300	1500	300	600	200	200	150	930
Land ownership of the shop or workshop place	yes	no	no	no	no	no	no	no	no	no
Distance to home residence (or ward) (m)	10	20	2000	4000	Pece	4000	1000	100	1000	2000

Source: JICA Study Team

Table 20.4-14 Living Conditions

	Road 1						Road 2			
	Industrial area				Market		Kanyagoga Gorwans			
	1	2	3	4	5	6	7	8	9	10
TV set at home	yes	yes	no	yes	no	no	no	no	yes	no
Electric power at home	yes	no	no	no	no	no	no	no	yes	no
Solar power at home	yes	no	no	no	no	no	no	no	no	no
Number of persons in household	20	4	5	16	6	12	14	13	12	5
Number of persons in household with regular income	14	2	2	2	1	1	2	1	1	1
Number of children under 18 in the home	8	2	3	8	5	9	8	6	4	3
Number of elders above 55 in the home	0	0	1	3	0	0	0	1	0	0
Person with disability in the home	yes	no	yes	no	no	no	yes	no	no	yes
Land ownership of the home place	yes	no	no	yes	no	no	yes	yes	yes	no
Monthly income of the household (x1000 Ushs.)	1500	2250	640	1500	300	600	200	200	300	930

Source: JICA Study Team

20.4.5 Results of Interviews

The JICA study team has undertaken interviews of the most important road users or roadside stakeholder associations, which are the Gulu motorcycle association (Boda-boda), and the Gulu business community association. The purposes of these interviews were to present the

project, to get their opinions about the project and their opinions regarding the expected actions likely to contribute to the improvement of the project itself, and to understand the problems encountered by the associations in relationship to the road conditions. The results of these interviews are summarized in Table 20.4-15.

The Gulu municipal motorcycle association is a body consisting of 5 associations, created to collectively address their operational and socio-economic problems. Each of the 5 associations' representatives have been interviewed by the JICA study team. The number of association members is not certain, but an estimation is given in Table 20.4-16. The members are in most cases illiterate, and subject to prejudice from society. In an accident situation, they are presumed guilty until proven otherwise. The association is acting to denounce the road related problems, such as causes of accidents involving motorcyclists. In August 2011 the association protested against the lack of municipal action for improvement of the Gulu roads (Source: Rupiny Figure 20.4-1 which was an article in the Rupiny weekly local newspaper about this protest, dated 24 August 2011).

The Gulu business community association was formed in the year 2000, and is an umbrella body consisting of assorted merchandise dealers in groceries and agricultural produces. The number of members in this association is not certain. The Gulu business community is confronted with serious road related problems, which are perceived as directly affecting their business.

Table 20.4-15 Results of Interviews with the Concerned Associations

Association	Issues	
Gulu municipal motorcycle association	Road issues raised by the association as causing damage to their business activities	Road pot holes
		Narrow carriage way
		Lack of road guide signboards
		Insufficient road traffic operation knowledge
		Poor road drainage system
		Lack of street lights
		Dust pollution leading to ailments like coughs and influenza
		Lack of speed governors (humps)
		Sub standard work from shoddy contractors who are responsible for the poor urban road condition
	Expected actions to improve the roads	The contract process for road work should change to ensure quality roadwork
		Eradicate the problems of pot holes, poor drainage, and dust pollution.
		Streetlights should be erected to mitigate crimes and accidents
		Proper road signs should be put in place
		Where possible the road carriage width should be expanded
Gulu business community association (shop keepers, vendors)	Road issues raised by the association as causing damage to their business activities	Roads are narrow with no space for further extension, which will pose a challenge in the process of upgrading the roads
		Poor road conditions are largely attributed to the poor quality of the work done by the contractors
		Poor drainage caused by the lack of garbage collection by the municipal services
	Expected actions to improve the roads	The process of selecting the contractor must be transparent and clear, and the contractor provide good quality works and roads
		Involvement of the business community in the process of road rehabilitation would be of great importance
		There is a great need for strict monitoring and supervision of the contractors to ensure the quality of the works on the roads

Source: JICA Study Team

Table 20.4-16 Estimated Number of Members in the Motorcycle Rider's Associations

Associations Name	Number of members
Gulu United Motorcycle Riders Associations	1500
Golden Youth Motorcycle Riders Associations	840
Bardege Motorcycle Riders Associations	267
Independent Motorcycle Riders Associations	200
Layibi Motorcycle Riders Associations	700

Source: Motorcycle rider's associations



Source: Rupiny

Figure 20.4-1 Article in the Rupiny Weekly Local Newspaper, about the Gulu Motorcyclers' Protest, Dated 24 August 2011

20.5 Land Ownership along the National Priority Roads

The complete results of the villages LC1 survey as regards to the land tenure system along the priority roads are provided in Table 20.5-1. This table shows that customary hold tenure with individual ownership is largely predominant. There are however isolated cases of communal and leasehold tenure. The table shows the villages for which a list of the roadside landowners has been collected from the LC1 representatives, through the parish / sub-county authorities. Most of the LC1 have provided such list. The total number of landowners within the list amounts to 3409 persons. The complete list has been compiled according to roads and parishes, and scanned (available in attachment).

Table 20.5-1 Land Tenure System along the Priority Roads

Road number	Villages LC1	CUSTOMARY HOLD TENURE		LEASEHOLD TENURE		List of roadside land owners		
		Individual ownership	Communal use	Individual holding (ranches)	Group or company holding	A	B	C
IT1	Abili	●●	○	●	○	✓	0	49
	Barogal	●●	○	○	●	✓	0	44
	Angaba	●●	○	○	○	✓	0	14
	Awimon	●●	○	○	○	✓	0	27
	Idobo	●●	○	○	○	✓	0	35
	Obaliwat	●●	○	○	○	✓	0	26
	Pato	●●	○	○	○	✓	0	71
ID1	Pagen west	●●	●	○	○			
	Pagen central	●●	●	○	○			
	Lemo gweng ajut	●●	●	○	○			
	Paibwor west	●●	●	○	○			
	Paibwor central	●●	●	○	○			
	Paibwor east	●●	●	○	○			
	Pamolo central	●●	●	○	○			
	Pamolo east	●●	●	○	○			
	Atura	●●	●	○	○			
	Obem central	●●	●	○	○			
	Ocettoke Central	●●	●	○	○			
	Ocettoke west	●●	●	○	○			
	Ocettoke north	●●	●	○	○			
	Tumatoo	●●	●	○	○			
	Pakuba west	●	○	○	○	✓	0	8
	Pudo central	●	○	○	○	✓	0	27
	Kabete	●	○	○	○	✓	0	23
	Mugila	●	○	○	○	✓	0	13
	Pudure	●	●●	○	○	✓	0	28
	Obiya	●	●	○	○	✓	0	20
	Mucwini central	●●	○	○	○	✓	0	43
	Paryeko	●●	●	○	○	✓	0	43
	Likol A	●●	●	○	○	✓	0	7
	Likol B	●●	●	○	○	✓	0	7
	Ikoromo	●●	●	○	○	✓	0	15
	pukure	●●	●	○	○	✓	0	7
	Biwang east	●●	○	○	○	✓	0	8
	Biwang west	●●	○	○	○	✓	0	8
	Araa	●●	○	○	○	✓	0	10
	Ayom olola A	●●	○	○	○	✓	0	5
Ayom olola B	●●	○	○	○	✓	0	5	
Kakira	●●	○	○	○	✓	0	38	
Kapeta	●●	○	○	○	✓	0	19	
Gem	●●	○	○	○	✓	0	22	
Poyamo	●●	○	○	○	✓	0	5	
central	●●	○	○	○	✓	0	49	
Dog tangi	●●	○	○	○	✓	0	14	
Locimdik	●●	○	○	○	✓	0	9	
ID2	Bajere north	●●	○	○	○	✓	0	64
	Bajere south	●●	○	○	○	✓	0	16
	Liba	●●	○	○	○		-	-
	Pajimo east	●●	○	○	○	✓	0	45
	Pajimo west	●●	○	○	○	✓	0	22
	Pajimo central	●●	○	○	○	✓	0	14

Road number	Villages LC1	CUSTOMARY HOLD TENURE		LEASEHOLD TENURE		List of roadside land owners		
		Individual ownership	Communal use	Individual holding (ranches)	Group or company holding	A	B	C
	Ateng	●●	○	○	○	✓	0	23
	Abudere	●●	○	○	○			-
	Lubene	●●	○	○	○	✓	0	9
	Labworo yeng	●●	○	○	○			
	Yaapacoro	●●	○	○	○			
	Kamama central	●●	○	○	○			
	Dyang bi	●●	○	○	○			
	Oboke olot	●●	○	○	○			
	lakwar	●●	○	○	○			
	Kal central	●	●●	○	○			
	Alimotiko east	●	●●	○	○			
	Lanyawang east	●	●●	○	○			
	Lugwa central	●	●●	○	○	✓	0	69
	Lagot opuk	●	●●	○	○	✓	0	23
	Akworo east	●	●●	○	○	✓	0	9
	Akworo central	●	●●	○	○	✓	0	20
	Apyeta central	●	●●	○	○			
	Apyeta south	●	●●	○	○	✓	0	99
	Apyeta west	●	●●	○	○			
	Apyeta east	●	●●	○	○			
	Oroko	●●	○	○	○	✓	0	22
	Mede Centre	●●	○	○	○		0	0
	Okidi South	●●	○	○	○	✓	0	20
	Pupwonya North	●●	○	○	○	✓	0	20
	Pupwonya South	●●	○	○	○	✓	0	20
	Kal West	●●	○	○	○	✓	0	20
ID3	Pudyek	●●	●	○	○	-	-	-
	Okeyomero	●●	●	○	○	-	-	-
	Lakwatomer	●●	●	○	○	-	-	-
	Atede	●●	○	○	○	-	-	-
	Wanglobo	●●	○	○	○	-	-	-
	Lamindera	●●	○	○	○	-	-	-
	Adak	●●	●	○	○		-	48
	Lakwaya	●●	●	○	○		15	37
	Ingula	●●	○	○	○	-	-	-
	Idure	●●	○	○	○	-	-	-
	Wang lobo	●	●●	○	○	✓	-	48
	Ayom lony	●	●●	○	○	✓	-	23
	Lagode	●●	○	○	○	✓	-	36
	Opawach	●●	○	○	○	✓	-	56
	Otal	●●	○	○	○	✓	-	81
	Lamur Oratido	●●	○	○	○	-	-	-
	Odek Centre	●●	○	○	○	-	-	-
	Olam	●●	○	○	○	-	-	-
	Opongoga	●●	○	○	○	-	-	-
	Oratido	●●	○	○	○	-	-	-
	Oryang	●●	○	○	○	-	-	-
	Ajan	●●	○	○	○	-	-	-
	Got Olal	●●	●	○	○	✓	-	9
	Lopeta	●●	●	○	○	✓	-	2
	Ayom Central	●●	●	○	○	✓	-	23
	Latira	●●	○	○	○	✓	-	7
	Latek West	●●	○	○	○	✓	-	17

Road number	Villages LC1	CUSTOMARY HOLD TENURE		LEASEHOLD TENURE		List of roadside land owners		
		Individual ownership	Communal use	Individual holding (ranches)	Group or company holding	A	B	C
	Latek East	●●	○	○	○	✓	-	1-
	Lukwor	●●	●	○	○	✓	1	14
	Bolo Wigweng	●●	○	○	○	✓	-	22
	Oloko Tum	●●	○	○	○	✓	-	9
	Parwee Luker	●●	○	○	○	✓	-	25
	Rackoko CentralB	●●	●	○	○	✓	-	27
	Lalya Laro	●●	●	○	○	✓	-	5
	Rackoko A	●●		○	○	✓	-	18
	Lunyiri West	●●	●	○	○	✓	-	2
	Bolo Opette	●●	●	○	○	✓	-	5
	Lunyiri East	●●	●	○	○	✓	-	13
ID4	Tyer	●●	○	○	○	✓	0	45
	Akemokoch	●	○	○	○	✓	0	6
	Wangol	●	○		○	✓	0	3
	Agweng East	●	○	○	○	✓		6
	Kilak Central A	●	○	○	○	✓	0	2
	Kilak Central B	●	○	○	○	✓	0	3
	Ora-Luka	●	○	○	○		0	0
	Omodum	●●	○	●	○	✓	0	26
	Lamiyo	●●	○	●	○	✓	2	12
	Alyek Central	●●	○	○	○	✓	0	10
	Alyek Ribbo	●●	○	○	○	✓	0	15
	Labongedero	●●	○	○	○	✓	0	27
	Polcani Bunga	●●	○	○	○	✓	0	20
	Aiam Central	●●	○	○	○	✓	0	17
	Ayam Bunga	●●	○	○	○	✓	0	8
	Kwonkic	●●	●	○	○	✓	0	24
	Lapeta	●●	○	○	○	✓	0	16
	Gemodwong	●●	○	○	○	✓	0	24
	Lapilyet	●●	○	○	○	✓	0	13
	Pyer gweng	●●	●	○	○	✓	0	43
	Bulotwomo	●●	●	○	○	✓	0	17
	Abonegangkal	●●	●	○	○	✓		27
	Alokolum	●●	○	○	○		0	0
	Beajoka	●●	○	○	○		0	0
	Lajokena	●●	○	○	○	✓	0	4
	Labima	●●	○	○	○	✓	0	18
	Geregere	●●	○	○	○	✓	0	12
	Agirikaca	●●	○	○	○	✓	0	20
	Lagwedola	●●	○	○	○	✓	0	16
	Modege	●●	○	○	○	✓	4	12
	County Headquarters	●●	○	○	○	✓	2	4
	Ajali Qauters	●●	○	○	○		0	0
	Pece	●●	○	○	○	✓	0	11
	Old Patongo	●●	○	○	○	✓	0	25
Forest Central	●●	○	○	○	✓	0	7	
Forest	●●	○	○	○	✓	0	44	
Dog Olupe	●●	○	○	○	✓	12	24	
Kidoipeoo	●●	○	○	○	✓	0	13	
Kukaka Central	●●	○	○	○	✓	0	19	
Karoko West	●●	○	○	○	✓	0	5	
Karoko East	●●	○	○	○	✓	0	15	
Kanyipa West	●●	○	○	○	✓	0	8	

Road number	Villages LC1	CUSTOMARY HOLD TENURE		LEASEHOLD TENURE		List of roadside land owners		
		Individual ownership	Communal use	Individual holding (ranches)	Group or company holding	A	B	C
	Kanyipa East	●●	○	○	○	✓	0	24
	Loi	●●	○	○	○	✓	0	42
	Kamading	●●	○	○	○	✓	0	7
	Labworronguru	●●	○	○	○	✓	0	13
	Dog Dago	●●	○	○	○	✓	0	5
	Ongany	●●	○	○	○	✓	0	7
	Lingoto	●●	○	○	○	✓	0	13
	Lingoto Central	●●	○	○	○	✓	0	9
	Ligiligi Central	●●	○	○	○	✓	0	16
	Ligiligi East	●●	○	○	○	✓	0	9
	Gangkal	●●	○	○	○	✓	0	8
	Lalal West	●●	○	○	○	✓	0	3
	Lalal Central	●●	○	○	○	✓	0	20
	Lalal East	●●	○	○	○	✓	0	22
	Kona Adek	●●	○	○	○	✓	0	13
ID5	Kanakok West	○	●●	○	○		-	-
	Kanakok East	○	●●	○	○		-	-
	Ogan Ayila West	○	●●	○	○		-	-
	Ogan Ayila East	○	●●	○	○		-	-
	Bunga	●●	○	○	○	✓	0	8
	Mekor	●●	○	○	○	✓	0	10
	Lakoklil	●●	○	○	○	✓	0	6
	Lwala A	●●	○	○	○	✓	0	23
	Lacur	●●	○	○	○	✓	0	5
	Tokodo	●●	○	○	○	✓	0	19
	Kiteng East	●●	●	●	x	✓	0	3
	Pagwari East	●●	●	●	x	✓	0	26
	Olworngu West	●●	●	●	x	✓	0	21
	Lagwai Zone A	●●	●	●	○	✓	0	28
	Lagwai Zone B	●●	●	●	○	✓	0	35
	Lagwai East	●●	●	●	○	✓	0	6
	Ogwaleng valley	●●	●	●	○	✓	9	0
	Ogutu	●●	●	●	○	✓	6	0
	Lubelle South	●●	●	●	○	✓	3	0
	Amor Ward	●●	●	●	○	✓	4	0
	Lalira Gem	●●	○	●	○	✓	0	14
	Gem	●●	○	○	○	✓	0	8
	Kwonkic	●●	○		○	✓	0	9
	Kwonkic Labwor	●●	○	●	○	✓	0	6
	Kwonkic Dognam	●●	○	○	○			
	Olokoleb	●●	○	○	○			
ID6	Dwol	●●	○	○	○	✓	0	32
	Oguru	●●	○	○	○	✓	0	31
	Layik	●●	○	○	○	✓	0	24
	Owak	●●	○	○	○	✓	0	21
	Twonokun	●●	○	○	○	✓	0	8
	Lagwing	●●	○	○	○	✓	0	47
	Lukodi	●●	○	○	○	✓	0	14
	Ayac	●●	○	○	○	✓	0	14
	Panykworo	●●	○	○	○	✓	0	30
	Patalira	●●	○	○	○	✓	0	8
	Anyadwe	●●	○	○	○	✓	0	24
	Akwii	●●	○	○	○	✓	0	17

Road number	Villages LC1	CUSTOMARY HOLD TENURE		LEASEHOLD TENURE		List of roadside land owners		
		Individual ownership	Communal use	Individual holding (ranches)	Group or company holding	A	B	C
	Angany	●●	○	○	○	✓	0	6
	Pukwany	●●	○	○	○	✓	1	96
ID7	Labongodonyo	●●	○	○	○			
	Langii	●●	○	○	○			
	Labigiryam	●●	○	○	○			
	Parwech alango	●●	○	○	○			
	Parwech lojulu	●●	○	○	○			
	Parwech tee gweng	●●	○	○	○			
	Pagwa layamo	●●	○	○	○			
	Bobi .B.	●●	○	○	○			
	Bobi central	●●	○	○	○			
	Bobi .A.	●●	○	○	○			
	Akecha	●●	○	○	○		✓	4
	Atem	●●	○	○	○		✓	3
	Buluzi	●●	○	○	○		✓	5
	Raakun	●●	○	○	○		✓	2
	Lalano central	●●	○	○	○		✓	4
	Kulukwach	●●	○	○	○		✓	2
	Lagweekonya	●●	○	○	○		✓	6
	Adjumani	●	●●	○	○			
	Lajanga	●	●●	○	○			
	Akuna	●	●●	○	○			
	Okwadoko	●●	○	○	○			
	Nja east	●●	○	○	○			
	Rogo central	●●	○	○	○			
	Logila	●●	○	○	○			
	Dagobany	●●	○	○	○			
	Wol central	●●	○	○	○			
	Kico	●●	○	○	○			
	Lakoba central	●●	○	○	○			
	Lakoba east	●●	○	○	○			
	Torama north	●●	○	○	○			
	Cilon	●●	○	○	○			
	Masai	●●	○	○	○			
	Kuywee central	●●	○	○	○			
	Kuywee east	●●	○	○	○			
	Kuywee west	●●	○	○	○			
	Apil west	●●	○	○	○			
	Apil east	●●	○	○	○			
	Apil central	●●	○	○	○			
	Opwony	●●	○	○	○			
	Manwoko	●●	○	○	○			
Alela	●●	○	○	○				
Abilonino east	●●	○	○	○				
Katolit dognam	●●	○	○	○				
Katolit central	●●	○	○	○				
Lacan kweri south	●●	○	○	○				
Lacan kweri centr.	●●	○	○	○				
Acamtoo	●●	○	○	○				
Timlee	●●	○	○	○				
Wii dwol	●●	○	○	○				
Wot ki wii	●●	○	○	○				
Alunga teekworo	●●	○	○	○				

Road number	Villages LC1	CUSTOMARY HOLD TENURE		LEASEHOLD TENURE		List of roadside land owners		
		Individual ownership	Communal use	Individual holding (ranches)	Group or company holding	A	B	C
	Kiwaro	●●	○	○	○			
	Kwila	●●	○	○	○			
	Lwala south	●●	○	○	○			
	Lwala central	●●	○	○	○			
	Kweyo central	●●	○	○	○			
	Aruna	●●	○	○	○			
	Labwo oryemo S.	●●	○	○	○			
	Nota	●●	○	○	○			
	Opyelo central	●●	○	○	○			
	Miciri	●●	○	○	○			
	Apado	●	●	●		✓	0	7
	Awong	●●	●	●	○	✓	0	15
	Adagamone	●●	○	●	○	✓	0	22
	Odkomit east	●●	○	●	○	✓	0	38
	Odkomit west	●●	●	○	○	✓	0	22
	Corner Aliro	●●	●	○	○	✓	0	18
	Dog okee	●●	●●	○	○	✓	0	15
ID8	Pagen west	●●	●	○	○			
	Pagen central	●●	●	○	○			
	Lemo gweng ajut	●●	●	○	○			
	Ocettoke north	●●	●	○	○			
	Ocettoke central	●●	●	○	○			
	Ocettoke west	●●	●	○	○			
	Tumatoo	●●	●	○	○			
	Ayago west	●●	●	○	○			
	Ayago east	●●	●	○	○			
	Loi agolo	●●	●	○	○			
	Loi oryang	●●	●	○	○			
	Kamama east	●●	●	○	○			
	Loi bide south	●●	○	○	○			
	Loibide north	●●	○	○	○			
	Mission	●●	●	○	○			
	Atwol	●●	○	○	○			
	Lotibol	●	○	○	○			
	Kakira south	●●	○	○	○			
	Lomura	●	●●	○	○			
	Tolpolo	●	●●	○	○			
	Kamama central	●●	●●	○	○			
	Bwola	●●	●	○	○			
	Larom west	●	●●	○	○			
	Anyibi	●●	●	○	○			
	Ngom oromo S	●	●●	○	○			
	Ngom oromo N	●●	●	○	○			
	Larom east	●	●●	○	○			
	Storebor	●	●●	○	○			
	Latic odokogwok	●	●●	○	○			
	Ongalo	●●	○	○	○			
	Ngora	●●	○	○	○			
	Pobel	●●	○	○	○			
	Wigot	●●	○	○	○			
	Karatac	●●	○	○	○			
	Langwidi yika	●●	○	○	○			
	Ododo central	●●	○	○	○	✓	0	11

Road number	Villages LC1	CUSTOMARY HOLD TENURE		LEASEHOLD TENURE		List of roadside land owners		
		Individual ownership	Communal use	Individual holding (ranches)	Group or company holding	A	B	C
	Okukwene	●●	○	○	○	✓	0	23
	Pagada	●	●●	○	○			
	Okora central	●	●●	○	○			
	Okora west	●	●●	○	○			
	Latida	○	●●	○	○			
	Kilakonypaco	●	●●	○	○	✓	0	17
	Licwa central	●	●●	○	○	✓	0	11
	Licwa west	●	●●	○	○			
	Lakawala west	●	●●	○	○	✓	0	11
	Ngomoromo	●	●●	○	○			

●● Majority / ● Few / ○ none / x Unknown

A: Checklist of availability of the list of the land owners along the road in attachment

B: Number of land owners with land titles

C: Number of land owners without land titles

Source: JICA Study Team

20.6 Institutional System regarding the Environment, Land Acquisition and Compensation in Projects in Uganda

20.6.1 Summary of the Regulatory Environmental Impact Assessment Requirements

Projects which are subject to a mandatory EIA in Uganda are listed in the Third Schedule to the Environmental Impact Assessment Regulations 1998. Projects may also be subject to impact assessment according to the laws on management of the natural environment, such as the laws related to wetlands and forests. The MoWT environmental impact assessment guidelines for the road sector provide more detailed criteria regarding decisions about the conditions of requirement of impact assessment for road projects. The standpoint of the environmental district officers is also important when deciding if a project should be or not be subjected to an impact assessment.

Table 20.6-1 provides a summary of the laws and guidelines which require a social and natural environment assessment of projects. The relevant articles and stipulations of the laws and relevant guidelines are stated in relationship with road projects. The results with regards to the environmental assessment needs for the priority roads and for the city roads are explained in the table. The table shows that:

- The improvement of the priority roads is subject to an impact assessment procedure
- The improvement of the city roads is subject to an impact assessment procedure according to cases III or IV. The full procedure of case IV should be given the priority because of the potential negative impacts and the needs for compensation measures and public consultation.

The 3 alternatives of impact assessment procedures mentioned as cases II, III and IV in Table 20.6-1 are:

- Project brief (corresponding to the case II, and not required if the following are done)
- Environmental impact review (EIR / corresponding to the case III)

- Environmental impact assessment (EIA / corresponding to the case IV). The report of an EIA is called an EIS (Environmental impact statement). The EIS reports of the UNRA are called ESIA (Environmental social impact assessment report).

The priority road projects are subject to an EIA procedure with submission of the ESIA reports by UNRA to the National Environment Management Authority (NEMA) for environmental approval. The same procedure for the Gulu city roads project seems to be appropriate with submission by the municipal council to NEMA.

Table 20.6-1 Summary of Legislative and Regulatory Requirements for Environmental Assessment of Projects

Legislative background and ministerial guidelines of relevance	Stipulations in relationship to road projects	Impact assessment needs for the priority roads and city roads
Environmental Impact Assessment Regulation 13/1998 (under section 107 of the National Environmental Act Cap 153)	<u>Article 3 / Application of these regulations :</u> To all projects included in the third schedule to the act. The third schedule to the act provides the following cases: <u>General stipulations:</u> Activity out of character with its surroundings <u>Transportation related stipulations:</u> All major roads All roads in scenic, wooded or mountainous areas	Since the national priority roads are functionally considered as national roads, they are major roads. The city roads do not belong to any of the project categories of the Third schedule.
	<u>Article 3 / Application of these regulations:</u> To any major repairs, extensions or routine maintenance of any existing project which is included in the third schedule to the act	THE NATIONAL PRIORITY ROADS PROJECT BELONGS TO THIS CASE. Improvement works are basically subject to an impact assessment procedure
National Forestry and Tree Planting Act 8/2003	<u>Article 38 / Environmental impact assessment:</u> A person or organization intending to undertake a project or activity, which may, or is likely to have a significant impact on a forest shall undertake an environmental impact assessment.	The national priority road projects are likely to belong to this case. The Gulu city roads project does not belong to this case.
National Environment (wetlands, river banks and lake shores management) Regulations 2000	<u>Article 34 / Environmental impact assessment:</u> A developer desiring to conduct a project which may have a significant impact on a wetland, river bank or lake shore, shall be required to carry out an environmental impact assessment	The national priority road projects are likely to belong to this case when they cross wetlands or major rivers.
Uganda Wildlife Act 1996 (ch 200)	<u>Article 15 / Environmental impact assessment:</u> Any developer desiring to undertake any project which may have a significant effect on any wildlife species or community shall undertake an environmental impact assessment in accordance with the national environment act.	The national priority road projects and the Gulu city road projects are not likely to belong to this case.
MoWT Guidelines 1) Environmental Impact Assessment Guidelines for road projects 2) Environmental Guidelines for District Engineers, Volume 5B of the District Administrative and Operational Guidelines, 2003 (District Road Works Manuals series)	<u>The MoWT guidelines provide 4 cases that guide the decisions regarding the EIA requirements for a project :</u> <u>Case I</u> Projects that certainly do not have any significant impact on the environment	Neither the national priority road projects nor the Gulu city road projects are likely to belong to this case, because the no-impact scenario is not applicable.
	<u>Case II</u> Projects likely to have some minor impacts on the environment but for which adequate and sufficient mitigation measures have been identified	The national priority road projects are not in this category II because they are in a project category which is subject to a full EIA procedure. The Gulu city road projects could have been in this case if the potential impacts were minor, but the IEE study has shown that significant impacts could be induced by the project.
	<u>Case III</u> Projects that have some significant environmental impacts, where adequate mitigation measures are readily available	The national priority road projects are not in this case because they are a project category which is subject to a full EIA procedure THE GULU CITY ROAD PROJECTS ARE LIKELY TO BELONG TO CATEGORY III OR IV.
	<u>Case IV</u> Projects having a number of (very) significant impacts on the environment (whether adequate mitigation measures can be identified or not)	THE NATIONAL PRIORITY ROAD PROJECTS BELONG TO THIS CASE because improvement works of major roads are subject to an EIA procedure THE GULU CITY ROAD PROJECTS ARE LIKELY TO BELONG TO CATEGORY III OR IV.

Source: JICA Study Team

20.6.2 Land Acquisition and Compensation for National Priority Roads

(1) Road reserve

The construction of a new road or rehabilitation and upgrading of an existing road requires the acquisition of land for the protection of the road reserve. The road reserve is mandatory under the Road Act 1964, and Roads Act, Cap 358 Laws of Uganda 2000. The roads Act authorises a road authority to excavate and remove materials required for the construction and maintenance of roads in any part of a road reserve approved by the district commissioner, without payment or compensation.

Road reserves are specified according to the Road Reserves Declaration (Statutory Instruments 345-1), and the District Administrative and Operational Guidelines, 2003. The width of a road reserve for a District road of class 1 has been set at 30m (15m from the centre line of the road on each side).

(2) Legal requirements for acquisition of land

The Land Act 1998 (Article 42) requires that land acquisition has to be done in compliance with the Articles 26 and 237 of the Constitution. These articles stipulate the following conditions:

- Compulsory deprivation of property is not possible except for public use.
- Compulsory taking must be done with fair and adequate compensation with payment prior to acquisition
- Conditions of acquisition are the same whatever the land tenure system
- Furthermore, the conditions of land acquisition of the road reserve are the same whatever the case of the road project: existing road alignment, new alignment or new road.

The territorial system established under the Land Act gives the control of land to the districts. Each district has a District Land Board supported by a District Land Office for registration, surveying, valuation, and planning, and a District Land Tribunal for major land claim disputes. Each Sub-county has a recorder responsible for keeping records of certificates of customary ownership, and a land tribunal for minor land claim disputes. Each parish has a land committee to determine, verify, and adjudicate the land boundaries, and to advise the District Land Board.

(3) Legal Requirements for Compensation

The Land Act 1998 refers to the Constitution of the Republic of Uganda 1995 for the need for compensation in case of compulsory acquisition of land. Neither the Land Act 1998 nor the Land Regulations 2004 provide the conditions of compulsory acquisition of land and compensation. Compensation refers to the land and to the land supported assets, like crops, trees, and buildings. The later is designated by the term “improvements”. The compensation for the improvements is required within the scope of compensation for land acquisition.

Article 59 of the Act details the functions of the district Land Board and provides that it shall compile and maintain a list of rates of compensation payable in respect of crops, buildings of a non-permanent nature and others. It should also review this list each year. There is no explicit mention of compensation rates for the land itself or for the permanent buildings. In practice, it seems that the District Land Board of Amuru has no specific list and refers to a list of the Ministry of Land if needed.

In case of disputes arising from compensation for land, Article 77 of the Act stipulates that the District Land Tribunals have jurisdiction to determine the compensation amount to be paid. The criteria for evaluation of the compensation rates are:

-
- The value of land based on the open market value for customary land tenure;
 - The value of buildings at depreciated replacement cost in rural areas;
 - The value of standing crops, excluding the annual crops which could be harvested during the period of notice;
 - The payment of a disturbance allowance, at the rate of 15% of the assessed compensation fee, and 30% in case of notice to give up the possession within 6 months.

(4) Land Acquisition and Compensation Guidelines

The MoWT has not set up a land acquisition and land compensation policy for road projects. The UNRA is preparing a country wide land acquisition management system (LAMS) document (final draft June 2009), in line with its strategy for land acquisition of road reserve. This document is the only existing guideline document for implementing land acquisition and land compensation for national road projects. The LAMS document applies to the land acquisition managed by UNRA for the national road network.

(5) Land Acquisition and Compensation Procedure

The land acquisition procedure according to the LAMS guidelines comprises 3 technical steps:

- An initial assessment based on consultations with the local communities, field surveys, development of mitigation measures, compensation strategy, implementation plan, and cost estimates. The output is an initial assessment report. This step is also designated as a walk-over survey because each property is visited. The initial assessment is performed at the level of the feasibility study. In the case of resettlement, a resettlement action plan is required as part of the initial assessment.
- A survey and valuation study, which is a detailed evaluation of the persons affected and of the compensation values. The output is a valuation report for the land, its improvements, and the compensation values, as well as a strip map document. This survey and valuation study is performed at the level of the design of the project.
- Implementation of compensation and expropriation, which is based on the registration of transaction forms (mutation form in the case of titled land, transfer forms, and compensation valuation assessment form), approvals, payment of the compensation fees, and expropriation of the land.

20.6.3 Land Acquisition and Compensation for the City Roads

City roads are managed under the municipal council. Basically, the municipality does not provide any compensation for facilities or activities in the road reserve. The implementation of the JICA project can, however, be facilitated by integrating the possibility of compensation for specific cases or spots, when the widening of the road is likely to induce a severe impact on a vulnerable population. According to a discussion between the JICA Study Team and the mayor of Gulu held on the 2nd of December 2011, the municipal council will discuss the appropriate compensation measures based on the recommendations given as a result of assessment of the impact conditions.

20.7 Scoping

20.7.1 Potential Sources of Impacts

The priority road projects are rehabilitation and improvement projects with no opening of any new road. The sources of impacts of the project on the environment are summarized in Table 20.7-1. The evaluation of the scoping study is done based on these impact sources.

Table 20.7-1 Potential Impacts Sources of the Priority Road Projects

Sources of Impacts	Road	Bridge
Acquisition of land properties and land rights	✓	
Acquisition of land improvements	✓	
Vegetation clearance	✓	✓
Works in the river bed / temporary diversion of the river		✓
Design of fill and cut earth sections along the alignment	✓	
Earth works		✓
Occupation of land for campsites	✓	✓
Use of haulage vehicles and heavy equipment	✓	✓
Generation of construction / demolition waste	✓	✓
Generation of domestic waste	✓	✓
Generation of waste oil		
Increase of traffic volumes during and after construction	✓	✓
Greater accessibility throughout the project area	✓	✓
Extraction and transportation of murrum / sand / stone materials	✓	✓
Use of water for the preparation of concrete		✓
Discharge of wastewater from concrete preparation facilities		✓
Labor recruitment of skilled and unskilled workers	✓	✓

Source: JICA Study Team

20.7.2 Scoping Study

The scoping study provides a preliminary identification of the potential impacts of the project on the environment. This preliminary statement makes it possible to define the objectives of the environmental and social considerations study and the methods of investigation (terms of reference of the study in the next step). The scoping study is presented in Table 20.7-2 and Table 20.7-3, in agreement with the JICA criteria.

Table 20.7-2 Scoping of the Physical and Natural Environmental Considerations the Study

Impact criteria	Ranking		Justification
	Constr.	Oper.	
Air pollution, dust	B-	A+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ Exhaust gases of trucks and heavy machines during construction are sources of air pollutants. ➤ The increased traffic during construction will generate more dust along the road, directly affecting the pedestrians and motorcyclists. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The present road conditions are a factor contributing to dust pollution for the pedestrians. The improvement of the road will strongly contribute to reduce this kind of pollution.
Water pollution	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The residual cleaning water used for the preparation of concrete in bridge construction is a factor of surface water pollution. ➤ The conditions of storage of engine oils, lubricants and fuels and the collection and elimination of the waste oils are factors of surface water and groundwater contamination if not done properly.

Impact criteria	Ranking		Justification
	Constr.	Oper.	
Soil contamination and top soil	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The main possible source of soil contamination is the excavation of contaminated materials pre-existing on the construction site. This potential risk must be considered. ➤ The management condition of oils and fuels in the campsite are a possible factor of soil contamination during the works, in case of accidental spill. ➤ Top soil is an important natural resource that should not be wasted. Land clearance along the improvement section of the project road and around the bridge construction sites will generate the loss of important quantities of top soil.
Solid waste	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The project is likely to generate quantities of construction and demolition waste. Their proper elimination will be one of the major tasks of environmental management of the project. ➤ The discharge of solid waste in the river beds or along the river banks is a potential source of water pollution and landscape degradation.
Noise	B-	B-	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ Noise can be significant when the works are implemented near housing settlements. The impact will be strongly dependent on local conditions of exposure. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ Noise can create a nuisance after works due to traffic increase
Bad odours	-	-	<ul style="list-style-type: none"> ➤ Not appropriate
Land subsidence	-	-	<ul style="list-style-type: none"> ➤ Not appropriate
Water resources, water supply, water use	C	D	<p>Design phase</p> <ul style="list-style-type: none"> ➤ The project is likely to have a significant impact on the existing access to river water users, if not designed properly. <p>Construction phase</p> <ul style="list-style-type: none"> ➤ The construction of bridges is likely to induce a major impact on the water resources during the period of the works. It is possible that the river water is used downstream by the local residents. The control of water pollution generated by the construction activities could be insufficient. ➤ The water withdrawal needs for construction of bridges during the dry season are a factor of water shortage downstream.
Morphology, Soil stability, erosion	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The project cannot be a significant cause of morphological change. The fill and cut sections should not be important in most cases. ➤ The bridge construction sites can contribute to strongly modify the river bed morphology on site. Restoration after the works will be a requirement for landscape and soil stability reasons. ➤ The supply of murram materials from the borrow pits will be important for the improvement works. The restoration of the borrow pits to their initial state is a requirement of the ministerial environmental guidelines to avoid the morphological and landscape damages, and prevent the factors of proliferation of mosquitoes. ➤ The risk of gully erosion is important in the hilly areas with steep slopes and on the river banks. Appropriate drainage and a reseeded of the roadside embankments will contribute to control the risk of erosion.
Protected natural areas	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The protected areas in the project area are the forest reserves. The impact of the project on them is likely to be minor. ➤ The river banks should also be considered as protected areas, with a protected buffer zone of 30m to 100m width according to the case. Their preservation is a priority, making the restoration works after construction a priority measure of the environmental management plan.
Natural habitats	C	B-	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ Direct impact of the project on the natural areas is possible, depending on the local conditions, therefore, this must be investigated. The natural habitats that could be affected by the project are the woodland savannah, the wetlands, and the river banks, and possibly riparian forests.

Impact criteria	Ranking		Justification
	Constr.	Oper.	
			Operation phase <ul style="list-style-type: none"> ➤ The impact can be indirect, through the improved accessibility to remote areas. ➤ The increased marketing of wood products, like charcoal, is the main factor of indirect impact on the woodland.
Biological diversity and protected species (wildlife)	D	D	Construction phase <ul style="list-style-type: none"> ➤ The diversity of wildlife in the project area is poor. ➤ The wildlife along the rivers (birds, aquatic ecosystem) is more likely to be affected during the construction works. The impact of the project on the riparian habitat will be minor and concentrated on the bridge crossing points. The possible function of the rivers as biological corridors for wildlife will not be affected by the project after construction.
Biological diversity and protected species (plants)	C	D	Construction phase <ul style="list-style-type: none"> ➤ The project can induce a loss of reserved trees for widening the carriageway. The extent of this impact depends on the local conditions. ➤ There are also important trees for the local communities, like fruit trees or trees used for medicinal purposes. The loss of such trees is a potential negative impact for the people. The extent of such impact from the project and the countermeasures must be investigated.
Runoff, changes in drainage patterns, floods	B-	A+	Construction phase <ul style="list-style-type: none"> ➤ The project is basically positive for the improvement of drainage along the roads and in the trading centres. The bridges and culverts will considerably improve the conditions of accessibility during floods. ➤ Negative impacts are possible on a small scale during construction in relationship with river diversion or works in the trading centres. These impacts are to be mitigated by technical measures on the work site.

Impact categories :

A+/-: The project is likely to have a significant positive / negative impact

B+/-: The project is likely to have a moderate positive / negative impact

C+/-: The extent of the positive / negative impact of the project is not known (an additional examination is necessary to better identify the impact)

D : The project is not likely to involve any positive / negative impact on the environment

Source: JICA Study Team

Table 20.7-3 Scoping of the Human and Social Environmental Considerations Study

Impact	Ranking		Details
	Constr.	Oper.	
Involuntary resettlement of population	C	D	Construction phase <ul style="list-style-type: none"> ➤ The widening of the road is likely to affect the roadside settlements. It is possible that the project will involve an involuntary resettlement of households.
Loss of standing crops and plantations	B-	D	Construction phase <ul style="list-style-type: none"> ➤ The loss of standing crops and tree plantations in the road reserve due to the improvement works could be the main direct impact of the project. Its scale is, however, limited to a few meters along the roadside, and compensation measures can sufficiently mitigate this kind of impact.
Livelihood, poverty, vulnerability	C	A+	Operation phase <ul style="list-style-type: none"> ➤ The impact of the project on livelihood is likely to be a major positive one in the long term through increased accessibility inducing an intensification of the marketing activities of local crops and products. ➤ The project is a strong factor contributing to the alleviation of poverty and reduction of vulnerability in the long term.
Ethnic minorities	C	C	Construction phase <ul style="list-style-type: none"> ➤ The presence and the role of the ethnic minorities in the impacts of the project on the environment are not known.

Impact	Ranking		Details
	Constr.	Oper.	
Local economy, employment	B+	A+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ One of the expected advantages of the project for the local communities is job opportunities during maintenance and construction works. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The project improves the road access infrastructures, which induces positive effects on the local economy.
Land use and use of the local resources	D	B-	<p>Operation phase</p> <ul style="list-style-type: none"> ➤ The opening of new access to remote areas will induce an intensified use of land for agriculture and for the use of forest products. This impact can be positive in terms of the economic productivity of the land, but it is mainly negative in terms of natural habitat conservation.
Public infrastructure and social services	B-	A+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The project can have temporary negative impacts on the local access during the works. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The project will strongly contribute to facilitate the access to the existing social services in the area which are still outside reasonable distances from health centres and schools. ➤ The impact of the project on public health will be positive because of better health care resulting from improved access.
Risk of traffic accidents	B-	B-	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ During construction, the risk of traffic accidents is higher than usual. The secure circulation of the pedestrians and bicycles will then be an important task during the works. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ After construction, the traffic volume is expected to rise, leading to an increased risk of traffic accidents in sensitive points like trading centres and schools or health centres.
Distribution of benefits, social equity	C	C	<p>Construction / operation phase</p> <ul style="list-style-type: none"> ➤ The role of the project in the field of social equity and distribution of benefits is not known.
Local conflicts of interest	C	C	<p>Construction / operation phase</p> <ul style="list-style-type: none"> ➤ The possible impact of the project on the local conflicts of interest should be limited to the land ownership or compensation issues.
Historical and cultural assets, landscape	C	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The impact of the project on historical and cultural assets, and on the landscape is site specific and needs to be investigated.
Gender equity, children	C	B+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ It is possible that the project will have negative side effects on gender equity, during the construction works for example. This kind of impact cannot be identified without a detailed investigation on a case by case basis. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ Basically and in the long term, the project contributes to gender equity, because the improved access to markets, health care services, and schools will contribute to alleviate the tasks and the work load of the women and children.
Occupational health	C	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The impact of the project in terms of work safety and occupational health must be mitigated according to the environment management plan, based on a business as usual approach. ➤ Basic hygiene facilities will be provided in the work camps in compliance with the occupational safety and health act requirements (2006).

Impact categories :

A+/-: The project is likely to have a significant positive / negative impact

B+/-: The project is likely to have a moderate positive / negative impact

C+/-: The extent of the positive / negative impact of the project is not known (an additional examination is necessary to better identify the impact)

D : The project is not likely to involve any positive / negative impact on the environment

Source: JICA Study Team

20.8 Terms of Reference of the Environmental and Social Considerations Study

20.8.1 Summary of the Methods of Investigation

The methods of investigation for the execution of the IEE study have been identified according to the checklist in Table 20.8-2 and Table 20.8-3, in 20.8.2, for each relevant impact criteria within the scope of the JICA guidelines for IEE, and summarized in Table 20.8-1, below. Each of the methods identified in the tables is explained from section 20.8.3 to section 20.8.8.

Table 20.8-1 Summary of the Methods for the Execution of the IEE Study

Priority projects	Method	Means of execution
National priority road projects	<u>Field observation and field counting survey</u> Baseline data on the roadside and road reserve areas that can only be collected through field observation	Establishment of the relevant indicators and field testing of the counting survey sheet for finalization Execution of the field counting survey Processing of the data and analysis according to the impact criteria and indicators of the JICA guidelines Integration of the results of the preliminary field survey done within the scope of the SEA
	<u>Villages LC1 survey</u> Baseline data on the roadside and road reserve areas that cannot be collected through field observation and need the support of the local authorities	Establishment of the relevant indicators and field testing of the counting survey sheet for finalization Execution of the villages LC1 field survey, with the support of the LCIII, Parish chiefs, and LC1 representatives Processing of the data and analysis according to the impact criteria and indicators of the JICA guidelines
	<u>Survey and analysis of similar projects</u> Data collected from the pilot projects and urgent projects during / after construction about the environmental management issues	Field observation and discussion with the district officers, work site contractor, and related local people Integration of the results of a similar approach done in 2010 within the scope of the preparation of project briefs for the urgent projects, in particular a detailed analysis of the pilot project for Bridge 1 in Amuru Processing of the data and analysis according to the impact criteria and indicators of the JICA guidelines with a focus on environmental management and monitoring issues
	<u>Review of the UNRA ESIA reports</u> Compilation and analysis of the existing ESIA environmental reports of the priority roads IR1 and IR2, which are complementary to the investigated priority roads for IEE	Discussing with UNRA to understand the progress of environmental studies and approval of the IT and IR priority roads Understanding and analyzing the results of the ESIA reports for a summary in the IEE, and identifying the need for investigation of the road sections insufficiently represented in the ESIA reports (case of IT1)
	<u>Mapping of the GIS study team data</u> Mapping of the JICA study team GIS data of the priority roads area and of the collected environmental data is used as a method of presentation of results and as a method of explaining the project to the stakeholders	Preparation by the GIS specialist of the JICA study team of a set of maps of the priority roads used as support material for discussions with the administrative stakeholders Maps of the GPS field survey data collected with the district officers during the field surveys, regarding the wetlands, the borrow pits, and the forest reserves. Maps of the GPS field survey data collected during the preliminary field survey within the scope of the SEA study in August 2011: Trading centres and streams Integration of the GIS data of the JICA study team with the GPS data collected from the field surveys

Priority projects	Method	Means of execution
Gulu city roads project	<u>Baseline data collection</u> Collecting the relevant data on population and social environment conditions of the city roads area	Analysis of the geographical distribution of the city roads among the municipal divisions, wards, and subwards
		Discussion with the LCIII and LCII chairmen, and with the municipal environmental officer and urban planner, for collecting the available background data of relevance
	<u>Field observation and field counting survey</u> Baseline data regarding the roadside and road reserve areas that can only be collected through field observation	Preparation and execution of a field survey for counting the number and categories of settlements and facilities, and of natural assets, lying along the roadside and within the limits of the road reserve of the city roads
		Selection of the hot spots defined as the places where activities or settlements could affect the livelihood of the concerned people
	<u>Field questionnaire survey</u> Baseline data on the roadside and road reserve areas that can be only collected through field observation	Preparation of a simple and short questionnaire sheet targeting at the people having an activity in the hot spots (3 hot spots have been identified)
	<u>Interview of the roadside and road users</u> Baseline data and opinion regarding the project of the road users and roadside users	Interviews with the motorcycle associations of Gulu Interview with the business community associations of Gulu

Source: JICA Study Team

20.8.2 Checklist Table of Identification of the Evaluation Methods for the National Priority Roads Investigation

The checklist table (Table 20.8-2) provides a review of the methods of investigation according to the most relevant impact criteria of the JICA guidelines, selected after scoping.

Table 20.8-2 Identification of the Evaluation Methods for the Physical and Natural Environmental Considerations Study of the National Priority Road Projects

Impact	Measures or objectives to address	Evaluation method
Air pollution, dust	<ul style="list-style-type: none"> ➤ Measures to prevent dust emissions during earth works and transportation of materials 	<ul style="list-style-type: none"> ➤ Establish the most potentially exposed areas, which are human settlements, from <u>field observation</u> ➤ Evaluation of <u>similar cases</u> to find potential issues and appropriate solutions: Field visits and discussions with contractors and district environmental officers regarding the execution of the Amuru pilot project and urgent projects within the scope of the project for rural road network planning in Northern Uganda
Water pollution	<ul style="list-style-type: none"> ➤ Measures to prevent excess suspended matters and accidental leakage of engine oils ➤ Measures to prevent the discharge of residual cleaning water used for the preparation of concrete so that they will not be discharged into the rivers before treatment 	<ul style="list-style-type: none"> ➤ Check <u>legislation and regulations</u> regarding requirements for waste management in Uganda ➤ Evaluation of <u>similar cases</u> ➤ <u>Discussions and field visits</u> with the district environmental officer
Soil contamination	<ul style="list-style-type: none"> ➤ Measures to prevent accidental leakage of engine oils ➤ Identification of old waste disposal sites likely to be a potential source of pollution in case of earthworks 	<ul style="list-style-type: none"> ➤ <u>Field observation</u> ➤ Evaluation of <u>similar cases</u>

Impact	Measures or objectives to address	Evaluation method
Top soil	<ul style="list-style-type: none"> ➤ Measures to store and reuse top soil for the rehabilitation of damaged sites along the road 	<ul style="list-style-type: none"> ➤ Evaluation of <u>similar cases</u> to find potential issues and appropriate solutions
Solid waste	<ul style="list-style-type: none"> ➤ Identification of the appropriate method of disposal or treatment of the green waste, excavated earth waste, and construction waste generated by the project ➤ Measures for the appropriate collection and elimination of used engine oils 	<ul style="list-style-type: none"> ➤ <u>Discussions</u> with the district environmental officer ➤ Evaluation of <u>similar cases</u> ➤ Check <u>legislation and regulations</u> regarding requirements for waste management in Uganda ➤ Evaluation of similar cases in the <u>ESIA reports</u> of UNRA for the Olwiyo – Gulu – Kitgum road and for the Rwenkunya – Apac – Lira – Kitgum – Musingo road (March 2011)
Noise	<ul style="list-style-type: none"> ➤ Identification of the appropriate method for noise reduction and control 	<ul style="list-style-type: none"> ➤ <u>Discussion</u> with the district environmental officer ➤ Evaluation of <u>similar cases</u> ➤ Check <u>legislation and regulations</u> regarding requirements
Water resources, water supply, water use	<ul style="list-style-type: none"> ➤ Identification of sensitive water sources likely to be affected by the project ➤ Measures to protect the water source quality or to supply safe drinking water during the works ➤ Measures to maintain or improve the pedestrian access to the river water after the bridge construction works. 	<ul style="list-style-type: none"> ➤ <u>Discussions and field observations</u> with the district environmental officer ➤ <u>Villages LC1 survey</u> to collect the data regarding sensitive water uses along the priority roads at the level of villages ➤ <u>Discussions with sub-county and parish</u> representatives, and if necessary, LC1 chiefs
Morphology, Soil stability, erosion	<ul style="list-style-type: none"> ➤ Protection and restoration of the river banks during the bridge construction works ➤ Identification of erosion prone areas and sites ➤ Restoration of the river bed morphology to its initial state. ➤ Restoration of the borrow pits to their initial state ➤ Measures for reseeded the roadside embankments and replanting the slopes when appropriate 	<ul style="list-style-type: none"> ➤ <u>Field observations</u> ➤ Evaluation of <u>similar cases</u> ➤ <u>Monitoring tables</u>
Protected natural areas	<ul style="list-style-type: none"> ➤ Avoiding encroachment on forest reserves, and compensate for any damage ➤ Restoring to their initial state the Aswa river banks after construction of the bridges. ➤ Obtaining the permit from the Water Resources Management Department for works in the river beds and for diversion of the watercourse during the works, . 	<ul style="list-style-type: none"> ➤ Identification, delimitation, and characterization of the forest reserves along the project road through <u>discussions and field observations with the forest district officers and NFA officers</u> ➤ <u>Discussions and field observations</u> with the district environmental officer ➤ Check <u>legislation and regulations</u> regarding requirements ➤ Evaluation of <u>similar cases</u> to find potential issues and appropriate solutions
Natural habitats / Forest and wetlands	<ul style="list-style-type: none"> ➤ Measures to minimize the potential loss or degradation of valuable forest natural habitats 	<ul style="list-style-type: none"> ➤ <u>Discussions and field observations</u> with the related district level resource persons ➤ Inventory of the wetlands crossed by the priority roads during <u>field observations</u> with the forest and environmental officers ➤ Analysis of the existing wetlands and forest data and mapping ➤ <u>Field counting survey</u> for the baseline data on valuable natural habitats and use of local resources
Reserved trees and important trees	<ul style="list-style-type: none"> ➤ Measures to avoid, as much as possible, the felling of reserved trees along the road and, in case of unavoidable impact, measures to compensate for the loss (environmental and biological compensation) 	<ul style="list-style-type: none"> ➤ <u>Field observations</u> with the district forest and environmental officers ➤ <u>Field counting survey</u> to establish the presence of reserved trees in the road reserve

Source: JICA Study Team

Table 20.8-3 Identification of the Evaluation Methods for the Social and Human Environmental Considerations Study of the National Priority Roads Project

Impact	Measures or objectives to Address	Evaluation method
Involuntary resettlement of population	<ul style="list-style-type: none"> ➤ Identification of the potential impacts of the project on houses and housing compounds ➤ Resettlement plan 	<ul style="list-style-type: none"> ➤ <u>Field observations</u> with the district environmental officers ➤ <u>Field counting survey</u> to establish the presence of settlements in the road reserve ➤ Analysis of the land acquisition and compensation procedures of UNRA
Involuntary loss or degradation of surface structures other than habitations	<ul style="list-style-type: none"> ➤ Identification of the potential impacts of the project on permanent or temporary structures like shops and workshops ➤ Compensation measures 	<ul style="list-style-type: none"> ➤ <u>Field observations</u> with the district environmental officers ➤ <u>Field counting survey</u> to establish the presence of settlements in the road reserve ➤ Analysis of the land acquisition and compensation procedures of UNRA
Loss of crops land, loss of standing crops, loss of plantations	<ul style="list-style-type: none"> ➤ Identification of the potential impacts of the project on crops and plantations ➤ Compensation measures 	<ul style="list-style-type: none"> ➤ <u>Field observations</u> with the district environmental officers ➤ <u>Field counting survey</u> to establish the presence of tree plantations in the road reserve ➤ Analysis of the land acquisition and compensation procedures of UNRA
Livelihood, poverty, vulnerability	<ul style="list-style-type: none"> ➤ Measures to mitigate the impacts on the livelihood and on the vulnerable groups 	<ul style="list-style-type: none"> ➤ Questionnaire survey in the case of the Gulu city roads project, targeting specific targets identified in the field observations and field counting
Local economy, employment	<ul style="list-style-type: none"> ➤ Application of labour recruitment procedures 	<ul style="list-style-type: none"> ➤ Evaluation of <u>similar cases</u> to find the employment related issues
Land use and use of the local resources	<ul style="list-style-type: none"> ➤ Establish the most sensitive areas for the use of forest products ➤ Mitigate the negative impacts of the project on forest products 	<ul style="list-style-type: none"> ➤ <u>Field observations</u> with the district forest officers ➤ <u>Field counting survey</u> to establish the state of use of forest products (charcoal)
Risk of traffic accidents	<ul style="list-style-type: none"> ➤ Identify the most sensitive areas ➤ Traffic safety campaigns about the risk of traffic accidents during the works and basic rules of safety ➤ Appropriate plans for detours and management of the traffic 	<ul style="list-style-type: none"> ➤ <u>Field observation</u> ➤ Evaluation of <u>similar cases</u> ➤ will be carried out in order to reduce the risks of road accidents.
Distribution of benefits, social equity	<ul style="list-style-type: none"> ➤ 	<ul style="list-style-type: none"> ➤ Evaluation of <u>similar cases</u>
Historical and cultural assets	<ul style="list-style-type: none"> ➤ 	<ul style="list-style-type: none"> ➤ <u>Field observations</u> with the district forest officers ➤ <u>Field counting survey</u> to establish the sites of cultural value for the local communities
Gender equity, children	<ul style="list-style-type: none"> ➤ Ensure that the project has positive effects on gender equity ➤ The full application of the labour recruitment procedures specified in the MoWT environmental guidelines will contribute to providing jobs to the women and to the persons with disabilities, in the roadside communities. ➤ The measures undertaken to safeguard the supply of drinking water to the affected people have a direct beneficial effect on women, who are in charge of taking care of water 	<ul style="list-style-type: none"> ➤ Evaluation of <u>similar cases</u>

Source: JICA Study Team

20.8.3 Field Counting Survey and Method for Analysis of Data

(1) Objectives and conditions of execution of the survey

The objective of the field counting survey was to collect baseline data on the roadside and road reserve conditions as regards the natural and social environment.

The field counting survey has been mainly executed during November 2011, by 2 teams of 2 persons each, based in Gulu and Kitgum. A period of 1 to 2 weeks has been used in October 2011 for testing the counting sheet and training the investigation teams (which applied also for the villages LC1 survey). The priority roads have been divided into appropriate stretches, generally based on landmarks, for counting execution and analysis. The GPS data have been recorded during this investigation for getting the distance data of the road stretches (Table 20.2-1 in Chapter 20.2) and the location of selected elements like the borrow pits. Additional GPS location data have been recorded separately for wetlands and forests during the field observation visits with the district officers, as explained in Chapter 20.2.

(2) Environmental impact indicators of the field counting survey

The field counting survey sheets have been prepared based on the selection of impact indicators related to the JICA guidelines impact criteria. The indicators and their justification are given in Table 20.8-4.

Table 20.8-4 Environmental Impact Indicators Used for the Field Counting Survey

Indicators		Justification
Background natural habitat along the priority road (grassland savannah, woodland savannah, hilly areas) : Field observations with the district officers		Understanding the context and sensitivity to potential indirect impacts of the project.
Presence of protected areas (local and central forest reserves, Aswa river banks) : Field observations and GPS marking with the district officers and eventually NFA		Understanding how the priority roads are likely to affect existing protected areas. Protected areas are observed with the district and NFA officers.
Wetlands crossed by the priority road : Field observations and GPS marking with the district officers and eventually NFA		Sensitive natural habitat with specific regulations in the National Environment (wetlands, river banks and lake shores management) Regulations 2000
Number of reserved trees in the road reserve	Shea Butter	Most common tree species belonging to the list of reserved trees in the Forests Acholi Rules under section 30 of the Forests Act, in the First Schedule
	Mahogany	
	Mvule	
	African blackwood	
	African Palmyra	
Number of important trees in the road reserve	Mango	Tree species preserved by the local communities because of their daily use
	Others	
Number of tree plantations in the road reserve	Alignment tree plantation	The loss of plantation land and products induces a more important loss of income than crops
	Plot tree plantation (Eucalyptus / Pines / others including Banana)	
Number of charcoal selling points along the priority road	Charcoal selling points	These show the trends to use woodland resources for charcoal in case of road improvement
	Charcoal bags at selling points	
Number of roadside settlements	Schools	Gives an idea of the state of the environment along the road in association with housing settlements. Schools and health centres provide the most sensitive points to the risk of traffic accidents during road works.
	Health centres	
	Boreholes	
	Borrow pits	
Type and number of human settlements in the road reserve / Houses	Housing compound but not lone houses	Provides the potential impact on resettlement of people or activities and on the existing structures
	Hut	
	House with unburned brick walls	
	House with burned brick walls	

Indicators		Justification
Type and number of human settlements in the road reserve / Shops	Shops inside a trading centre (permanent and semi-permanent)	
	Shops outside a trading centre (permanent and semi-permanent)	
Type and number of human settlements in the road reserve / Graining mill installation		

Source: JICA Study Team

(3) Method of analysis of the data

The results of the field counting survey have been analyzed with the objective of evaluating and ranking the sensitivity level of the priority roads and road stretches according to the impact criteria of the natural environment. The results of the analysis are presented in Chapter 20.9. The method of analysis provides results on the sensitivity of road stretches according to the impact criteria (1st step), and on the sensitivity of the entire priority road according to the aggregated indicators (2nd step).

The first step analysis uses descriptive and quantitative indicators. The descriptive indicators are the natural and physical conditions and the protected areas. The sensitivity of a road stretch is simply deduced from the presence or absence of key elements, which are the protected areas, the woodland savannah with dense natural vegetation, and the steep slopes in hilly areas. The quantitative indicators are the results of counting. The number of reserved trees per 10km of road in the road reserve is a quantitative indicator used to set the sensitivity level. When the quantitative result for a road stretch is higher than the average established for the whole length of the investigated priority roads, the sensitivity is set as moderate or high, depending on the range of values between the average and the maximum value found for the priority roads.

The second step analysis is complementary and aims at comparing the sensitivity levels of the priority roads. The different results obtained in step 1 are aggregated using a weighting factor from 1 to 2, which is presented in Table 20.8-5. The weighting factor helps to take into account the importance of the natural environment and natural resources.

Table 20.8-5 Sensitivity Criteria Used at Step 2 of the Analysis of the Data and Weighting Factor Used for Each Criteria

List of criteria	Weighting factor	Justification
1. Protected area	2	Natural assets and resources needing ecological preservation or compensation
2. Woodland / dense cover		
4. Wetland		
5. Reserved trees HIGH SENSITIVITY		
8. Charcoal HIGH SENSITIVITY		
3. Hilly / steep slopes	1	Erosion factor
6. Important trees HIGH SENSITIVITY	1	Natural assets not restricted by regulations but important for the communities and likely to be compensated by financial means
7. Plantation HIGH SENSITIVITY		

Source: JICA Study Team

20.8.4 Villages LC1 Survey

(1) Objectives and conditions of execution of the survey

The villages LC1 survey is a field survey based on the collection of data from sub-counties, parishes, and villages LC1. The objective of the villages LC1 survey is to collect the target data of villages LC1 crossed by the priority roads through the support of the sub-counties and

parishes. The time given for investigation was insufficient to undertake a survey with direct interviews of the LC1 representatives.

The main task of the JICA team for the villages LC1 survey was to prepare the questionnaire sheet according to selected indicators, to explain the objectives of the survey and the questionnaire sheet to the sub-counties and parish chiefs, and to collect the requested data. In a few cases, the LC1 representatives have been directly contacted.

The survey needed 6 weeks to be completed, and was mainly executed from the end of October to the beginning of December, by 2 teams of 2 persons each, based in Gulu and Kitgum. The number of sub-counties, parishes, and villages concerned by the villages LC1 survey is summarized in Table 20.8-6. All the villages of the project area have been covered, and most of them have provided the requested data.

Table 20.8-6 Number of Sub-Counties, Parishes, and Villages Concerned by the Villages LC1 Survey

Road number	Total number of sub-counties	Total number of parishes	Total number of villages LC1
IT1	2	3	7
ID1	3	14	40
ID2	6	13	32
ID3	4	13	41
ID4	7	19	58
ID5	3	6	26
ID6	3	6	14
ID7	7	17	68
ID8	4	11	47
Total	39	102	333

Source: JICA Study Team

(2) Environmental impact indicators of the villages LC1 survey

The villages LC1 survey sheets have been prepared based on the selection of impact indicators related to the JICA guidelines impact criteria. The indicators and their justification are given in Table 20.8-7.

Table 20.8-7 Environmental Impact Criteria and Indicators Used for the Villages LC1 Survey

Criteria	Indicators	Justification
Sub-counties, parishes, and villages LC1 crossed by the priority road	Checklist table	Population data at the level of villages indicates the population concerned by the project and the potential level of human pressure on the priority roads environment.
Population data of sub-counties and parishes crossed by the priority road	Number of persons	
	Number of households	
Population data of villages LC1 crossed by the priority road	Number of persons	Drinking water sources located near the project roads are the most sensitive points in case of water pollution during construction. The survey provides a preliminary inventory.
	Number of households	
Functional drinking water resources in the villages and near the road	Checklist table of water sources (protected spring, shallow well, borehole, watercourse)	
	Number of water points in village	
	Number of water points roadside	
Historical or cultural sites of importance for the local communities, located near the priority road	Checklist table of site categories (venerated element or place, monument, grave, and others)	Historical or cultural sites of importance for the local communities must be known before implementation of the project to avoid any detrimental impact.
	Number of sites	
	Specifications (distance from road / place name)	

Criteria	Indicators	Justification
Land ownership along the priority road	Checklist table of categories (customary hold tenure / leasehold tenure)	The survey provides a preliminary understanding of the predominant land tenure system along the priority roads. A list of land owners has been requested as complementary information.
	Number of the landowners roadside	
	List of the landowners roadside (attached document)	
Number of health centres and schools in the village	Number of health centres according to categories (II, III, IV, Hospital,)	Gives an indication of the availability of health and school services in close proximity
	Number of primary schools and secondary schools	

Source: JICA Study Team

20.8.5 Survey of the Gulu City Roads Project

The field survey of the Gulu city roads project consisted in counting of the settlements roadside and in the road reserve, and interviewing the selected target people in the sites found to be the most exposed to the potential impacts of the project (see Table 20.4-7). The source of the potential impact on an existing structure or activity in the road reserve is the widening of the road.

The interview survey was conducted on 30 November and 8 December in 3 places with a total of 10 interviews. The interview was based on a questionnaire sheet with 3 groups of questions as shown in Table 20.8-8.

Table 20.8-8 Questions of the Interview Survey for the Gulu City Roads Project

Field of questions	Questions
Opinion about the project	<ul style="list-style-type: none"> ➤ Do you think the project will create a positive impact in your life? ➤ If yes, what are the benefits expected? ➤ If no, what are the problems ➤ What kind of action are you expecting from the builder in order to improve the conditions of the construction work?
Workshop or shop activity	<ul style="list-style-type: none"> ➤ Where is the workshop located? ➤ How far is the workshop location from the middle of the road? ➤ What do you produce from the workshop? ➤ Number of persons working in the workshop ➤ Who is managing the workshop, man or woman? ➤ How old is the manager? ➤ When did you start your workshop? activity ➤ Is the workshop activity the main source of income for the family? ➤ What is the main source of income for the family? ➤ What is the monthly income from the workshop activity in the family? ➤ What is the total monthly income of the family? ➤ Are you the land owner of your workshop place? ➤ Did the municipal council provide a license for your activity?
Conditions of living at home	<ul style="list-style-type: none"> ➤ Where is your home located? (sub ward and ward) ➤ How far is the workshop from your home of residence? ➤ Do you have a TV set in your home? ➤ Number of persons in the household ➤ Number of persons in the household who have a regular income ➤ Number of persons in the household who are working in the roadside workshop ➤ What is the source of drinking water at home? ➤ What is the source of power at home ➤ Number of children in the home (under 18) ➤ Number of elders in the home (more than 55) ➤ Is there a disabled person living with you in the family? ➤ Are you the land owner of your home/residence?

Source: JICA Study Team

20.8.6 Survey and Analysis of Similar Projects

Similar projects are the road projects studied within the scope of the Project for Rural Road Network Planning in Northern Uganda, and implemented within the scope of the same project for the pilot projects, and within the scope of the Project for Social Infrastructure Development for Promoting Return and Resettlement of IDPs in Northern Uganda, for urgent projects. Each project has been approved by NEMA based on the respective project brief studies.

The advantage of surveying the environmental issues raised during the implementation of these projects are considerable because of their strong similarity with the national priority roads project, and because of the possibility to observe the potential issues during and after construction. These similar projects are then regarded as a very important source of information about the potential impacts, the measures undertaken, and the concrete application of the environmental management plan.

Accordingly, the survey and analysis of the similar projects have included activities like field visits, discussions with the contractor and stakeholders, and analysis of the environmental management plan. The backgrounds of the similar cases considered for the study and the results of survey and analysis are provided in Chapter 8.

20.8.7 Review of the UNRA ESIA Reports for IR1 and IR2 Priority Roads

(1) Impact assessment procedure for the on-going UNRA projects

Table 20.8-9 explains how the EIA procedure for several sections of the priority roads has been taken into consideration to reduce the scope of work of the IEE. The IEE is not performed for the IT2 and IT3 roads, which are already approved by NEMA. The IEE has integrated the results of the ESIA reports for the roads IR1 and IR2, which do not need any new investigation. Only the ID1 road section has been integrated in the IEE study because it is a small section of the road studied by UNRA, as shown in Table 20.8-10.

The results of the ESIA reports for the IR1 and IR2 roads have been analyzed by the JICA study team and comments reported to UNRA. The relationship between the national roads covered by the UNRA ESIA reports and the national priority roads under the scope of the IEE has been analyzed and results are given in Table 20.8-10.

(2) Rate of coverage of the priority roads in the UNRA ESIA reports

The Olwiyo - Gulu –Kitgum road project covers the complete section of the IR2 project and the Acholibur – Kitgum section of the IR1 project. Table 20.8-10 shows that the IR2 project and part of the IR1 project are covering 60% of the total length of the Olwiyo - Gulu –Kitgum road project, while IR2 itself represents 51%. This high ratio means that the ESIA study undertaken by the UNRA has sufficiently focused on the IR2 project, and on the IR1 project between Acholibur and Kitgum. Therefore, a further assessment within the IEE study is not justified.

The coverage ratio of the ID1 and IR1 priority projects within the scope of the Rwenkuny - Apac - Lira - Kitgum - Musingo road project reaches 57% as shown in Table 20.8-11, but 34% and 23% for IR1 and ID1 respectively.

The general conclusion of the review of the UNRA ESIA reports for the delimitation of the geographical scope of work of the IEE of the related priority projects is provided in Table 20.8-12. The ID1 priority project is typically marginal in the ESIA study in terms of coverage ratio (23%) and is consequently retained for the full IEE evaluation. The IR1 and IR2 roads are evaluated from the results of the EISA studies.

Table 20.8-9 Impact Assessment Procedure of the UNRA Projects in Relationship with the Priority Roads Project

Project road according to UNRA	Priority roads of concern	Availability of the ESIA final report	Reference of the ESIA report	Has the ESIA report been submitted to NEMA	Has NEMA approved the project, when ?
Gulu Atiak	IT2 Gulu Atiak	YES	Environment social impact assessment report (ESIA) UNRA - July 2009	YES	YES July 2009
Atiak Nimule	IT3 Atiak Nimule	YES	Environment social impact assessment report (ESIA) UNRA - July 2009	YES	YES July 2009
Olwiyo - Gulu - Kitgum	IR2 Gulu Acholibur	YES	Environment social impact assessment report (ESIA) UNRA - March 2011	NO	-
Rwenkunya - Apac - Lira - Kitgum - Musingo	ID1 Kitgum - Mucwini	YES	Environment social impact assessment report (ESIA) UNRA - October 2011	NO	-
	IR1 Kitgum Lira				

Source: JICA Study Team

Table 20.8-10 Coverage Ratio of Priority Projects within the Scope of the Olwiyo - Gulu - Kitgum Road Project

	Length of Olwiyo - Gulu - Kitgum road project (km)	IR2 project	IR1 project
Olwiyo - Gulu section (km)	66	-	-
Gulu - Acholibur section (km)	85	85	-
Acholibur - Kitgum section (km)	16	-	16
Total length (km)	167	85	120
Coverage ratio of IR2 (%)	-	51	-
Coverage ratio of IR2 with IR1 section (%)	-	60	

Source: JICA Study Team

Table 20.8-11 Coverage Ratio of Priority Projects within the Scope of the Rwenkunya - Apac - Lira - Kitgum - Musingo Road Project

	Length of Olwiyo - Gulu - Kitgum road project (km)	IR1 project	ID1 project
Rwenkunya - Lira section outside Acholi region	147	-	-
Lira - Kitgum section mostly inside Acholi region	123	120	-
Kitgum - Musingo section	80	-	80 (70)
Total length (km)	350	120	80 (70)
Coverage ratio of IR1 (%)	-	34	-
Coverage ratio of ID1 (%)	-	-	23
Coverage ratio of IR1 with ID1 (%)	-	57	

Source: JICA Study Team

Table 20.8-12 Delimitation of the IEE Study according to the Available ESIA Studies

Priority road	Starting point	Ending point	Methodology of evaluation			Justification
			A	B	C	
IT1	Gulu	Kamdini	●			No ESIA or assessment study
IT2	Gulu	Atiak			●	Approved by NEMA
IT3	Atiak	Nimule			●	Approved by NEMA
IR1	Kitgum	Lira		●		Covered by ESIA
IR2	Gulu	Acholibur		●		Covered by ESIA
ID 1	Kitgum	Musingo	●			Covered in ESIA but included in IEE

Priority road	Starting point	Ending point	Methodology of evaluation			Justification
			A	B	C	
ID 2	Kitgum	Atiak	●			No ESIA or assessment study
ID 3	Gulu	Rackoko	●			No ESIA or assessment study
ID 4	Kilak	Adilang	●			No ESIA or assessment study
ID 5	Pajule	Kwon kic	●			No ESIA or assessment study
ID 6	Gulu	Pabbo	●			No ESIA or assessment study
ID 7	Kitgum	Patongo	●			No ESIA or assessment study
ID 8	Kitgum	Ngomoromo	●			No ESIA or assessment study

A. Full IEE method is retained / B. Summary of ESIA results is retained / C. No need of IEE

Source: JICA Study Team

(3) Methods of assessment applied in the ESIA reports

The methods of assessment applied in the 2 ESIA reports of the Olwiyo - Gulu –Kitgum road project and Rwenkunya - Apac - Lira - Kitgum - Musingo road project are similar. They are described in Table 20.8-13. The main observation done is that:

- The approach conforms with the JICA guidelines
- The description of the baseline conditions is not associated with specific stretches of the road alignment, excepted for the natural conditions, provided according to 3 different sections for the Olwiyo - Gulu –Kitgum road as well as for the Rwenkunya - Apac - Lira - Kitgum - Musingo road
- The report does not include the population data and does not provide the details on the results of the social economic survey or on its conditions of execution
- The standpoint in ESIA is that the most sensitive areas are points or places like protected areas, rivers, wetlands, and human settlements.

Table 20.8-13 Summary of the Methods of Evaluation in the ESIA Studies

Methods of evaluation	Criteria
Review of relevant literature	-
Identification of interested and affected people	Through the stakeholders meetings
Socio-economic questionnaire survey	The conditions of execution of the survey and the number of respondents are not explained. It is specified that the questionnaire was administered to 20 households distributed in the different sub-counties. The population data are not provided.
Public consultation and stakeholders meetings	The consultative meeting seems to have concerned 54 persons (LC1 and people, estimated from the attached lists) and 18 administrative stakeholders.
Observation of land occupation and human settlements	The infrastructure and social services, land use and land tenure systems are described in general terms for the whole length of the road
Biological environment field survey	Sampling of 25m ² plots on both sides of the road each 5 to 10km. Forest reserves and main wetlands are inventoried. Wildlife species observed have been inventoried, with a special focus on butterflies and birds.
Interview of key persons in local government and LC1	11 persons interviewed from the Town councils, Sub-counties, and LC1
Resettlement action plan	The resettlement plan is the object of a different document.
Environmental monitoring and management plan	Object of chapters 7 and 8 of the ESIA
UNRA land acquisition and compensation procedure	Land, assets, perennial crops, and materials acquired from the road reserve and from outside the road reserve are concerned.

Source: JICA Study Team

20.8.8 Mapping of the GPS and GIS Data

A set of maps have been produced by the GIS specialist of the JICA study team, within the scope of the IEE study. The objective was:

- To produce the support materials for discussion with the administrative stakeholders
- To understand the geographical distribution of the data collected in the field during the preliminary field survey which was done within the scope of the SEA study in August 2011, for use during the new field survey conducted in October – November 2011
- To present the results of the field surveys conducted for the IEE (final output)

The maps established for the IEE are listed in Table 20.8-14, with a brief description. With the exception of the first map, they are edited separately for Lamwo / Kitgum, Pader / Agago, and Gulu / Amuru areas. The total number of maps reaches 25 sheets. The maps are available in an attachment.

Table 20.8-14 List of Maps Attached in Appendix of the IEE Study

	Map title	Description
1	Priority roads and district boundaries A4 SIZE <i>Source: JICA Study Team 2011</i>	Priority roads (IT / IR / ID types) District boundaries in bold Sub-counties with names
2	Priority roads and parish boundaries <i>Source: JICA Study Team 2011</i>	Priority roads (IT / IR / ID types) Parish boundaries
3	Priority roads and bridges <i>Source: JICA Study Team 2011</i>	Priority roads (IT / IR / ID types) Bridges (good or fair condition / bad or very bad condition / no data) Sub-county boundaries
4	Trading centres along the priority roads and subsistence crop land <i>Source: JICA Study Team 2011 and NFA 2005</i>	Priority roads (IT / IR / ID types) Trading centres Subsistence farm land cover NFA 2005 Sub-county boundaries
5	Forest reserves and woodland along the priority roads <i>Source: JICA Study Team 2011 and NFA 2005</i>	Priority roads (IT / IR / ID types) Central forest / local forest reserves crossed by the road Central forest reserves and woodland cover area according to NFA 2005 Sub-county boundaries
6	Wetlands crossed by the priority roads <i>Source: JICA Study Team 2011 and NFA 2005</i>	Priority roads (IT / IR / ID types) Wetlands crossed by the road Sub-county boundaries
7	Streams crossed by the priority roads <i>Source: JICA Study Team 2011 and NFA 2005</i>	Priority roads (IT / IR / ID types) Main rivers according to NFA 2005 Streams crossed by the road Sub-county boundaries
8	Borrow pit sites along the priority roads <i>Source: JICA Study Team 2011</i>	Priority roads (IT / IR / ID types) Borrow pits roadside Sub-county boundaries
9	Functional health facilities in the priority roads project area <i>Source: JICA Study Team 2011 and UNOCHA</i>	Priority roads (IT / IR / ID types) Sub-county boundaries Health facilities according to UNOCHA 2011 (II, III, IV, Hospital)

Source: JICA Study Team

20.9 Results of the Study and Impacts of the Project on the Environment

20.9.1 Categorization of the Project as a Result of the IEE Study

The results of the investigation study for IEE and the evaluation of the potential impacts show that the project is likely to have negative impacts, but that the expected positive impacts are sufficiently important to justify the implementation of the project. The negative impacts can be mitigated through appropriate measures within the scope of a management and monitoring

plan. A more detailed impact assessment will be necessary for the national priority roads and for the Gulu city roads.

In the case of the national priority roads, the project consists of improving the existing infrastructure. The main negative impacts likely to occur from implementation of the project are the indirect long term effects on the woodland savannah, the loss of reserved or important trees in the road reserve, and the resettlement of houses and shops located in the road reserve. The roads ID2, ID6 and ID7 are the most sensitive to the potential impacts on the natural environment. The roads ID2, ID7 and ID8 are the more concerned with the potential impacts on the local communities, in terms of resettlement, and preservation of the water sources. These results need, however, to be reconsidered according to the design conditions of the project and a more detailed investigation. The national priority roads project belongs to the category B of the JICA system of classification of projects for impact assessment requirements.

In the case of the Gulu city roads project, the project consists of improving the existing infrastructure within the limits of the road reserve. The improvement of the carriageway and drainage will bring important benefits, strongly expected by the roadside and road users and by the citizens. The implementation of the project is likely to induce negative impacts on 3 specific spots on roads 1, 2, and 3. On road 1, a few workshops and market shops partly established in the road reserve will be affected. On road 2, the alignment of trees will be affected if the road width design is not adjusted for their preservation, which is necessary to avoid an irreversible negative impact on the urban landscape potential. A few trees at the starting point could be lost. On road 3, a few trees or built structures could be affected according to the design and alignment conditions. Based on appropriate design of the project and compensation measures, the negative impacts of the project can be mitigated. The consultation of the public and stakeholders within the scope of a more detailed study will be an important process for the appropriate mitigation of the negative impacts at design and construction steps. The Gulu city roads project belongs to the category B of the JICA system of classification of projects for impact assessment requirements.

20.9.2 Sensitivity of the Natural Environment along the National Priority Roads Project

(1) Reference values used for the ranking of sensitivity of the road stretches

The method of evaluation of the sensitivity of the natural environment has been presented in Chapter 20.8. Table 20.9-1 presents the minimum, maximum and average values found from the results of the field counting survey for the whole length of the investigated priority roads. These values are the number per 10km of road. The average and maximum values are used for ranking the sensitivity of a road stretch. The average value is regarded as representative of the Acholi region for the ID roads because the investigated priority roads cover the whole area.

Table 20.9-1 Reference values used for the ranking of sensitivity of the road stretches

	Minimum value	Maximum value (Number/10Km)	Average value (Number/10Km)
Reserved trees	0	298.7	32.6
Important trees	0	145	24.3
Plantations	0	19.7	4
Charcoal points	0	4.7	0.8
Charcoal bags	0	51.8	4.8

Source: JICA Study Team

(2) Ranking of sensitivity of the natural environment at road stretch level (step 1)

First, the road stretches are ranked for the counting indicators. Results are given in Table 20.9-2 for the reserved trees, Table 20.9-3 for the important trees, Table 20.9-4 for the tree

plantation, and Table 20.9-5 for the charcoal products. Then, a set of 5 selected qualitative indicators have been used to establish the sensitivity level of the roads for the general natural and physical conditions as a result of the data presented in Chapter 20.2. Table 20.9-6 is a summary. More than half of the wetlands identified along the roads are located on road ID7.

Table 20.9-2 Sensitivity Level of Road Stretches according to the Reserved Trees Indicator

Road number / stretch number		Reserved trees				Number / Km x10	Moderate sensitivity	High sensitivity
		SB	Tb	Pa	Total			
ID2	2	70	0	0	72	94.6		✓
ID6	1	1	4	44	50	76.5		✓
	2	0	2	135	139	118.1		✓
	3	11	0	446	460	298.7		✓
ID7	2	114	0	0	116	50.4	✓	
	3	151	1	18	173	73.3		✓
	4	161	0	1	166	68.9		✓
	5	321	0	6	332	104		✓

Source: JICA Study Team

Table 20.9-3 Sensitivity Level of Road Stretches according to the Important Trees Indicator

Road number / stretch number		Important trees			Number / Km x10	Moderate sensitivity	High sensitivity
		M	O	Total			
ID1	2	39	13	54	33.8	✓	
ID2	2	24	21	47	60.8		✓
	3	28	33	64	26.3	✓	
ID2	2	60	0	62	48.3	✓	
ID3	2	51	1	52	26.8	✓	
ID6	1	42	3	46	70.3		✓
	2	49	0	51	42.2	✓	
ID7	1	154	132	287	145		✓
	2	23	103	128	55.7	✓	
	3	37	68	108	45.2	✓	
	5	29	79	113	34.4	✓	

Source: JICA Study Team

Table 20.9-4 Sensitivity Level of Road Stretches according to the Tree Plantations Indicator

Road number / stretch number	Number / Km x10	Moderate sensitivity	High sensitivity
IT1	1	22	✓
	2	15	✓
	3	7.2	✓
ID2a	1	6.2	✓
	2	5.4	✓
ID3	1	8.1	✓
ID4	3	6	✓
ID5	3	4.2	✓
ID6	1	17.1	✓
	2	6.9	✓
ID7	1	19.7	✓
	2	4.4	✓
ID8	2	5.9	✓

Source: JICA Study Team

Table 20.9-5 High Sensitivity Road Stretches according to the Charcoal Products Indicator

Road number / stretch number		Charcoal	
		a	b
ID1	2	1.9	8.4
ID2	2	2.7	8.1
	4	2.2	5.4
	5	2.8	19.3
ID3	3	1.9	15.5
	4	0.9	51.8
ID4	1	2.1	12.8
ID5	1	4.7	50
ID6	3	1.3	5.2

Source: JICA Study Team

Table 20.9-6 Summary of Sensitivity of Roads according to Indicators of the Natural and Physical Conditions

Priority road number	Central or local forest reserve	River in the 6 th schedule list (Aswa)	Wetlands	Woodland savannah / dense natural vegetation cover	Hilly area / steep slopes
IT1	✓				
ID1				✓	
ID2	✓	✓		✓	✓
ID3	✓	✓	✓	✓	
ID4			✓		
ID5			✓		
ID6				✓	✓
ID7	✓		✓		✓
ID8	✓			✓	

Source: JICA Study Team

(3) Ranking of sensitivity of the natural environment at road level (step 2)

The ranking of sensitivity of the priority roads can be done by aggregating the different results obtained in step 1, and affecting the weighting factor, as presented in Table 20.8.5 of Chapter 20.8. The weighting factor helps to take into account the importance of the natural environment and natural resources. Table 20.9-7 shows the results, indicating that the roads ID2, ID6 and ID7, in grey, are the most sensitive to the project from the point of view of the natural environmental conditions.

Table 20.9-7 Ranking of Sensitivity of the Natural Environment at Road Level

	IT1	ID1	ID2	ID3	ID4	ID5	ID6	ID7	ID8
Protected area	2		2	2				2	2
Woodland / dense vegetation		2	2				2		2
Hilly / steep slopes			1				1	1	
Wetlands				2	2	2		2	
Reserved trees HIGH			2				2	2	
Important trees HIGH			1				1	1	
Plantation HIGH	1						1	1	
Charcoal HIGH		2	2	2	2	2	2		
Score	3	4	10	6	4	4	9	9	4

Source: JICA Study Team

20.9.3 Main Results of the Field Surveys for the Human and Social Environmental Conditions along the Priority Roads

The population living along the priority roads is summarized according to the results of the villages LC1 survey, in Table 20.9-8. The main issues raised by the results of the field surveys as regards to the human and social environment along the priority road are summarized in Table 20.9-9, according to the criteria of the investigation.

Table 20.9-8 Population in the Project Area of Priority Roads

Road number	Number of villages LC1		Population of villages LC1 having provided data	
	Crossed by the priority road	Having provided population data	Number of persons	Number of households
IT1	0	0	0	0
ID1	0	0	0	0
ID2	0	0	0	0
ID3	0	0	19502	0
ID4	0	0	19502	0
ID5	0	0	39004	0
ID6	0	0	78008	0
ID7	0	0	156016	0
ID8	0	0	312032	0
Total	333	286	183439	-
			182002	38948

Source: JICA Study Team

Table 20.9-9 Main Issues Raised by the Results of the Villages LC1 Survey

Impact criteria	Conditions and issues
Population	The population of villages along the road is estimated to be at least 183,439 persons. The average number of persons per household is 4.67. The priority roads that are the most densely populated based on the number of persons per road km are the roads ID5, ID6, and ID8
Resettlement	The number of houses that are likely to be directly affected by the ROW of the project reaches 153 units, most of them being houses of the hut type (125). The 190 shops found in the road reserve of the priority roads outside a trading centre area are mostly semi-permanent (143). The roads ID2 and ID7 have the highest number of settlements in the road reserve, mainly houses of the hut type and shops outside the trading centre. The road ID8 is also concerned with shops.
Water sources	The total number of water sources reported to be located near the roads amounts to 424 points, 86% of them being boreholes. There are, however, 50 river water sources for drinking use near the road, mostly along the roads ID2, ID3, and ID7.
Sites of cultural value	The total number of sites of cultural importance along the priority roads amounts to 78, most of them being graves and places of social importance. These sites are mostly located along the roads ID3 and ID4. It is, however, suspected that the survey has not provided a complete inventory of these sites.

Source: JICA Study Team

20.9.4 Potential Impacts of the Project on the Environment

The results of the study of the potential impacts of the national priority roads project on the environment are summarized in Table 20.9-10 for the natural environment and in Table 20.9-11 for the social environment.

Table 20.9-10 Potential Impacts on the Physical and Natural Environment

Impact criteria	Ranking		Results
	Constr	Toper.	
Air pollution, dust	B-	A+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ Exhaust gases of trucks and heavy machines during construction are sources of air pollutants. Given the local conditions, they will not affect the ambient air quality. ➤ The increased traffic during construction will generate more dust along the road, which will directly affect the pedestrians and motorcyclists. ➤ In places where people will be strongly exposed to dust during the works, the prevention of dust by sprinkling water on the road will be done.

Impact criteria	Ranking		Results
	Constr	Oper.	
			<p>Operation phase</p> <ul style="list-style-type: none"> ➤ The present road conditions are a factor of dust pollution for the pedestrians. The improvement of the road will strongly contribute to reduce this kind of pollution. The traffic induced by the improvement of the roads is however a possible factor of air pollution in the trading centres sections.
Water pollution	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The residual cleaning water used for the preparation of concrete must be treated through pond sedimentation and filtration before discharge, otherwise it is a factor of surface water pollution. ➤ The residual engine oils and fuels or any other dangerous water contaminants will be managed properly. They will be collected and treated by a company agreed by NEMA. The risk of contaminating surface water and groundwater will be minimized.
Soil contamination and top soil	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ There is no known contaminated soil site that could be excavated during the improvement works. ➤ The proper management of oils and fuels in the camp sites during the works will prevent any risk of contamination due to discharge or accidental leakage. ➤ Land clearance along the improvement section of the project road and around the bridge construction sites will generate the loss of important quantities of top soil. Top soil is an important natural resource that should not be wasted. ➤ Top soil will be stored and reused for the rehabilitation of damaged sites along the road.
Solid Waste	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ Vegetation and land clearance along the improvement sections of the project road and around the bridge construction sites will be a source of green waste and inert waste. ➤ The proper elimination of the inert waste materials generated by the rehabilitation and construction works will be managed in coordination with the district authorities and local communities. ➤ The discharge of any waste in the river beds or along the river banks must be avoided.
Noise	B-	B-	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ Noise will not be a significant issue since the works will be implemented far away from the housing settlements. The traffic of trucks and machines will not significantly affect the residents. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The induced traffic after construction is not likely to generate significant noise or change the ambient noise level
Morphology	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The main factors of morphological change due to the project are the road fill and cut sections, the bridge abutments, and the borrow pits. Only the opening of borrow pits and the bridge works can induce a significant change in the existing morphology. The restoration of the borrow pits and river banks to their initial state will be necessary.
Soil stability, erosion	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The construction works of bridges are likely to disturb the soil stability and induce erosion of the slopes. The full restoration of the river banks to their initial state will be necessary to control the stability of the banks and reduce the risk of erosion. The slopes formed by the morphological restoration works and by the fill and cut slopes along the roads will be replanted. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ There is a risk of gully erosion along the roads in the hilly areas. The design of an appropriate drainage system in these zones will prevent erosion, assuming that proper maintenance will be done.
Water resources, water supply, water use	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ Rivers can be water supply sources for drinking uses of the local communities. The construction of bridges is then likely to induce a major impact on such water sources, depending on the proximity of the water source and on the conditions of water pollution control. ➤ In case of risk of contamination of the water supply source, the regular supply of safe drinking water tanks for the local population and during the period of works is a high priority measure to be planned in the environmental management plan. ➤ The supply of water for works and for the workers will avoid the use of local water sources and preferably depend on outside water sources. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The design of the bridges can seriously affect the existing access paths to the river for daily use of water. The proper design of bridges with access to the rivers will not only prevent negative impacts it can also improve the existing conditions of access for the local people.

Impact criteria	Ranking		Results
	Constr	To per.	
Protected areas	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ There are local and central forest reserves in the project area, which are most generally tree plantations. They should not be affected by the construction works. In case of tree felling, the compensation can be implemented easily with no damage in terms of natural habitat preservation. ➤ River banks should also be considered as protected areas, with a buffer zone of 30m width, excepted for the Aswa river, which requires protection of 100m width. The full restoration of the river banks, including the vegetation cover, is necessary in this context. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The protected areas will not be affected during the operation phase.
Natural Habitats, forest products	B-	B-	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The natural habitats that can be directly affected by the construction works are wetlands (road widening) and woodlands (bridge construction) crossed by the priority roads. This impact is limited and temporary. Measures to avoid water pollution and impacts on fisheries in the wetlands must be planned in the environmental management plan. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The impact of the project on woodlands can be persistent and detrimental to the woodland areas crossed by the priority roads. This impact can be important because the increased accessibility to the remote woodland areas will result in an intensification of the agricultural use of land and marketing of wood products like charcoal. The mitigation measure is difficult to implement because it consists in a long term sensitization and support of local communities to compensate such detrimental trends by forestry actions. ➤ In the context of an effective management of the forests by the local communities and the forestry authorities, the implementation of the project will provide a potential for improved control management of the forest by the forest officers, which is a positive impact.
Reserved trees and important trees	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The reserved trees growing inside the road reserve will be lost with the construction works. The loss is important on the ID6 and ID7 roads, where the reserved trees are mainly <i>Shea Butter Nut</i> trees or palm trees. A financial compensation will be done to the people claiming ownership of the trees, according to the stipulations of the Forests Acholi Rules under section 30 of the Act. The ecological compensation should however be done at the same time, through sensitization and support to encourage the local people to replant equivalent species. ➤ It is possible that the village elders will request specific traditional ceremonies when felling a reserved or important tree. The UNRA and district authorities must facilitate such compensatory actions, after public consultation, good communication, and mutual understanding.
Wildlife	D	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The extent of the wildlife along the rivers (birds, aquatic ecosystem) is not known. It is assumed that the riparian forest could be important as a refuge for wildlife and habitat for birds. The impact of the project on this habitat will be minor and concentrated on the bridge crossing points. The possible function of the rivers as biological corridors for wildlife will not be affected by the project after construction. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The areas crossed by the priority roads are not considered as having a rich wildlife. The project will not affect the existing wildlife.
Runoff, drainage patterns, floods	B-	A+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The main risk of floods or detrimental change in the drainage pattern is related to the inappropriate design of culverts or river diversion during the bridge construction works. This impact remains possible during the works but should not affect the settlements. ➤ The uncontrolled runoff during construction works in the sections crossing the trading centres is a possible cause of damage to the nearby houses and settlements. This impact is however not significant compared with the present conditions of inefficient drainage. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The project will have positive impacts on the drainage along the road, due to improvement of the present conditions

Source: JICA Study Team

Table 20.9-11 Potential Impacts on the Human and Social Environment

Impact criteria	Constr.	Oper.	Results
Land ownership, land use rights	B-	D	Design phase ➤ Land along the priority roads is mainly used according to the customary hold tenure rules. The UNRA procedures for the proper acquisition of land in the road reserve will be applied.
Changes in land use patterns / intensification of land use	B-	D	Operation phase ➤ The main factor of land use change is the improved access to the woodland areas, leading to the extension of agricultural land at the detriment of forest land. From the point of view of environmental conservation, this change is a negative impact.
Crops, plantations	B-	D	Design phase ➤ The loss of standing crops in the road reserve due to the improvement works is the main direct impact of the project, but it is a minor impact easily mitigated by measures like timely harvesting and financial compensation. The UNRA procedures for compensation is the appropriate measure. ➤ There are several private plantations along the priority roads, a part of them lying in the central forest reserves. The construction works can directly affect these plantations, due to the ROW. The UNRA procedures for compensation is the appropriate measure.
Involuntary resettlement of population and activities	B-	D	Design phase ➤ The number of houses that are likely to be directly affected by the ROW of the project reaches 153 units, most of them being houses of the hut type (125). The 190 shops found in the road reserve of the priority roads outside a trading centre area are mostly semi-permanent (143). The ROW of the project is likely to affect directly between 2 and 3 housing and commercial settlements per 10km of road, on average. The roads ID2, ID7, and ID8 are the most concerned with possible involuntary resettlement impact. ➤ The project is likely to affect settlements in the trading centres crossed by the priority roads. The width of the road will however be adapted to each case to avoid this impact. ➤ The UNRA procedures for compensation is the appropriate measure and conforms with the JICA guidelines. The EIA procedure requires the submission of a resettlement management plan.
Livelihood, poverty, vulnerability	D	A+	Operation phase ➤ The IEE investigation did not aim at collecting data on the specific aspects of livelihood and vulnerability. The general impact of the project in this field is however expected to be positive through the increased accessibility of the remote areas and the intensification of marketing activities of the local crops and products. Accordingly, the project should strongly contribute to alleviate poverty and to reduce vulnerability.
Ethnic minorities	C	C	Construction phase ➤ Given the scale of the project area, the IEE investigation could not establish the conditions of ethnic minorities and their relationship with the project. This aspect needs a case by case study approach within the scope of a more detailed assessment. The improvement of the roads is, however, beneficial for all the local communities, and the ethnic minorities factor does not appear as a significant condition of negative impact.
Local economy, employment	B+	A+	Construction phase ➤ One of the expected advantages of the project for the local communities is the opportunity of jobs for the construction works. The similar cases have, however, shown that the local people do not find as many opportunities as expected. The level of payment is often a source of disappointment. The conditions of payment of the local labor (remuneration, periodicity of payment) and the equity of these conditions with the workers of non-local origin with equivalent skill must be applied. These conditions should be clarified early and between the contractor and the consultant within the contract documents. The conditions of work must be explicitly agreed in the contract documents between the workers and the contractor.
Public infrastructure and social services	B-	A+	Construction phase ➤ The project may generate a temporary disturbance of the existing access. Operation phase ➤ The project will have positive impacts on the access to social services, in particular the health services and schools.

Impact criteria	Constr.	Oper.	Results
Risk of traffic accidents	B-	B-	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ During construction, the risk of traffic accidents is high. The places where schools and health centres are lying roadside are particularly sensitive, with a lot of pedestrians. The secure circulation of the pedestrians and bicycles will be an important task during the works. ➤ Appropriate plans for detours and management of the traffic will be carried out in order to reduce the risks of road accidents. ➤ Traffic safety campaigns should be organized in order to sensitize the roadside communities to the risk of traffic accidents and to the basic rules of safety. The workers will be sensitized in order to adopt safe driving in the housing areas. <p>Construction phase</p> <ul style="list-style-type: none"> ➤ The risk of traffic accidents will be a new risk compared with the present situation, particularly in the sections crossing trading centres.
Distribution of benefits, social equity, conflicts	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The main potential source of conflicts seems to be the misunderstanding between the outside workers and the local communities. The factors of conflict are the inequitable conditions of work, and the behaviour of the workers during their stay in the working site. The permanent communication between the village representative, the contractor, and the consultant is an important measure for eradication of the potential sources of conflict. The district environmental officer can have a decisive role to play in this communication action.
Historical and cultural assets, Landscape	B-	D	<p>Design phase</p> <ul style="list-style-type: none"> ➤ The project can induce negative impacts on the local cultural sites. The identified number of sites of cultural importance along the priority roads amounts to 78, most of them being graves and places of social importance. These sites are mostly located along the roads ID3 and ID4. A more detailed investigation is necessary to avoid this impact. The UNRA procedure of compensation is appropriate for mitigating this kind of impact. ➤ The project is likely to have significant impacts on the rural landscape in the crossing of small trading centres or villages, through the felling of big trees, which have a determining landscape function. The roads ID3 and ID7 sometimes cross beautiful villages. A more detailed study is needed to identify such places and evaluate the mitigation measures. This negative impact can be important if not considered properly.
Gender equity, children	D	B+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The full application of the labour recruitment procedure specified in the MoWT environmental guidelines is a condition to improve the possibility of jobs for women. The analysis of similar cases has shown that women are not beneficiaries of the construction works in terms of jobs opportunities. ➤ The implementation of the measures proposed in the field of protection of water sources during the construction works have direct implications on the gender equity, because the women are in charge of supplying their homes with clean water. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The improved accessibility to markets, health care services, and schools are the most positive effects of the project and will contribute to alleviate the tasks or the work load of the women and children. ➤ The maintenance of an access to the river, in the case of bridge construction, is also a factor of gender equity, provided that women need to access the river for water use purposes. This point has been underlined in the water source criteria.
Occupational health	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ Basic hygiene facilities will be provided in the work camps in compliance with the occupational safety and health act requirements (2006). ➤ The workers will not be exposed to any specific environmental risk. The working conditions are those of the rural road works, and the protection of workers will be implemented according to the standard rules included in the contract procurement, to avoid accidents.

Source: JICA Study Team

20.9.5 Results of Study for the Gulu City Roads Project

The main potential impacts of the Gulu city roads project on the environment are summarized in Table 20.9-12. A summary of the areas the most likely to be affected is provided in Table 20.9-13. The study has shown that there are several conditions that can contribute to improve

the quality of the project, in coordination with the beneficiaries and stakeholders of the project. These conditions are:

- The transparency of the process of selection of the contractor and the supervision of the works by the project consultant like JICA. The study has shown that the concerned roadside users and road users are extremely sensitive to the quality and transparency of the works.
- The widening and improvement of the carriageway together with the most appropriate drainage are the most beneficial expected improvements
- The integration of street lights, road signs, and speed governors (humps) into the improvement works will add value to the project and be highly appreciated by the roadside users and road users
- The involvement of the roadside users and road users associations in the process of road rehabilitation, like the business community and the motorcycle associations, met during the study, is strongly expected and is a condition of success of the project
- The potential impact of the project on the extensions built on the road reserve is a factor of conflict, needing a strong coordination process with the roadside users and road users for mutual understanding and agreement.
- The potential impact of the project on specific sites with detrimental effects on the activities of low income households will need appropriate compensation measures in coordination with the municipality. The principle of compensation in such cases was agreed to in principle by the Gulu mayor at a meeting with the JICA Study Team held on the 2nd December 2011.







Table 20.9-12 Potential Impacts on the Environment and Conditions of Improvement

Impact criteria	Ranking		Results
	Constr.	Oper.	
Air pollution, dust	B-	B+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ Road works and demolition of roadside extension structures will be a major source of dust, affecting the ambient air quality during construction. Prevention of dust by sprinkling water on the road will be done <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The quality of ambient air will improve in terms of dust contents.
Solid Waste	B-	D	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ Demolition waste will be generated in large quantities needing an appropriate elimination method.
Noise	B-	B+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ Noise will be a significant issue for the residents, and appropriate measures of noise reduction will be needed. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The improvement of the roads should facilitate the smooth movement of traffic and reduce the noise level.
Runoff, drainage patterns, floods	B-	A+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The uncontrolled runoff during construction works is a possible cause of damage to the nearby settlements, but this impact is not significant compared with the present conditions of lack of drainage. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The project will have a strong positive impact on the urban drainage conditions.
Reserved trees and important trees, urban landscape	B-	D	<p>Design phase</p> <ul style="list-style-type: none"> ➤ The roads 2 and 3 have beautiful trees within the alignments that strongly contribute to the present and future urban landscape of Gulu. Most of the trees are reserved tree species like the Mvule. The preservation of these trees is a priority. The city roads project should be designed with the necessary adjustments. ➤ On road 2, the planned width of 14m will need to be more restricted in order to keep the existing trees. The project is, however, likely to directly affect them at the starting junction point of the road, due to alignment constraints. The preservation of the alignment on road 2 is compatible with the designed width of the road excepted at the beginning point where the extension of the road will be detrimental to a few trees and existing buildings.

Impact criteria	Ranking		Results
	Constr.	Oper.	
Land ownership, land use rights	B-	D	<p>Design phase</p> <ul style="list-style-type: none"> ➤ There is no land ownership issue since improvement works will be done within the width of the existing municipal road reserve. It is, however, possible that a conflict will be generated about the road reserve limit in case of impact on the roadside activities.
Involuntary resettlement of population and activities	B-	D	<p>Design phase</p> <ul style="list-style-type: none"> ➤ A great number of settlements have been illegally extended into the road reserve. These settlement extensions are mostly terraces or ground borders of shops, used for the exhibition of goods or for facilitating the access. With improvement of the roads and design of walkways, the loss of these built extensions will not affect the access to the shops for the pedestrians. It is, however, possible that the loss of the built extensions will affect the attractiveness and activity of the restaurants or shops in a few cases. In the latter case, compensation could be needed in order to avoid a detrimental impact. ➤ There are a few cases where the project will directly affect the activity of the shops or workshops. There are at least three sites where this impact is likely to occur. A questionnaire survey has been undertaken in these sites, showing that there is a potential impact on the household income, needing compensation measures. Details are provided in Table 20.9-13. ➤ There is a possibility that a few buildings will be affected along the road 3 in case of adjusting the road alignment to accommodate the trees. This aspect is more detailed in Table 20.9-13.
Livelihood, poverty, vulnerability	B-	B+	<p>Design phase</p> <ul style="list-style-type: none"> ➤ The 3 sites identified as potentially affected by the project in terms of loss of income are the most concerned with poverty and vulnerability. A more detailed assessment is, however, necessary for understanding the possible impacts in this field. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The project will contribute to improve the quality of the living environment and livelihood.
Local economy, employment	B+	A+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The project is expected to provide jobs to the roadside communities, particularly along the approach roads. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The project is expected to considerably improve the business conditions and conditions of work of the roadside shop keepers and workshops, and of the road users like the Boda-boda. The impact will be positive.
Public infrastructure and social services	B-	A+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ The project will have temporary negative impacts on the conditions of transportation and access for the pedestrians, motorcycles, and vehicles. Electricity poles in the road reserve will be removed and relocated. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The improvement of the carriageway with walkways and drainage systems is required by the citizens, in combination with improvements like street lights. The project will have great positive impacts on the urban living environment, and on the conditions of transportation and access for the pedestrians, motorcycles, and vehicles.
Risk of traffic accidents	B-	B+	<p>Construction phase</p> <ul style="list-style-type: none"> ➤ During construction, the risk of traffic accidents is high. The secure circulation of the pedestrians and vehicles will be an important task during the works. ➤ Appropriate plans for detours and management of the traffic will be carried out in order to reduce the risks of road accidents. ➤ Traffic safety campaigns should be organized in order to sensitize the roadside communities to the risk of traffic accidents and to the basic rules of safety. <p>Operation phase</p> <ul style="list-style-type: none"> ➤ The risk of traffic accidents should be strongly reduced after improvement of the road conditions for equivalent traffic volume.

Source: JICA Study Team

Table 20.9-13 Areas Most Affected by the City Roads Project

City road number	Potential impacts of the Gulu city roads project	Views
1	Cerelendu market at a point where a few shops are encroaching on the road reserve (questionnaire interview numbers 5 and 6).	
	Industrial area workshop (questionnaire interview number 2). The outside activity of the workshop is partly located in the road reserve.	
2	Road 2 at its beginning junction point. The 3 Mvule trees and the temporary shop (temporary hotel / questionnaire interview number 10) are likely to be affected by the ROW according to the designed width and alignment. That could, however, be adjusted. The project will likely affect 3 Mvule, 1 Palm trees, and 1 or 2 temporary structures, in this section.	
	Road 2 after the corner up to the junction with the city road 3. In this section, the 14m wide design is not compatible with the preservation of the 38 Mvule trees. A design adjustment must be done.	
3	Road 3 with the 46 Mvule trees on the southern side of the street. The trees will be preserved by shifting of the road to the northern side (municipal land available for extension).	
	The same road at the beginning point from the junction with city road 7. The road alignment and its design will induce a widening detrimental to the reserved trees on the south (left) or to the building on the northern side (right). The building structures include 12 permanent shops, 3 temporary shops, 1 abandoned building, 1 restaurant, and 1 guest house.	

Source: JICA Study Team

20.10 Survey and Analysis of Similar Project Cases

(1) Context

As explained in Chapter 20.8, the similar projects are the road projects studied within the scope of the Project for Rural Road Network Planning in Northern Uganda. The projects have been implemented within the scope of the same project for the pilot projects, and within the scope of the Project for Social Infrastructure Development for Promoting Return and Resettlement of IDPs in Northern Uganda, for the urgent projects.

Table 20.10-1 is a list of the similar projects taken into consideration, with the date of the visits in the field.

(2) Results according to the impact criteria

Table 20.10-2 provides the main results of the similar project survey, with a statement of the main issues and the lessons learned in terms of priority actions that should be undertaken to avoid similar potential problems during implementation of the national priority roads project.

Table 20.10-3 is a complete summary of the issues found on each site visited. Issues are reviewed according to the most relevant impact criteria of the JICA guidelines.

(3) Results for environmental management and monitoring

Finally, the analysis of the similar projects has shown the importance of the lessons learned in terms of environmental management and monitoring. The review of the environmental management plan submitted by the contractor and its comparison with the facts in the field has provided useful information on the weaknesses and needs of strengthening the process of environmental management and monitoring. The results are given in Table 20.10-4.

The environmental management plan prepared by the contractor for the Urgent Projects 1, 3, 5, and 6 is structured according to the following chapters:

- Summary of environmental and social management plan
- Dangerous and hazardous goods management plan
- Waste management plan
- Environmental awareness seminar
- Noise, air, water, and land pollution control plan
- Reclamation management plan
- Soil erosion and sediment control plan
- Spill contingency response plan
- Gender and HIV / AIDS management plan
- Environmental quality assurance program

Table 20.10-1 Specifications of the Similar Projects and Field Visits

Similar project	Starting construction	Ending construction	Date of field visit and observations
PILOT PROJECT Bridge 1 Aswa Bridge	March 2010	Sept. 2011	<u>During construction</u> Visit done on 3 rd August 2010 within the scope of the project brief <u>After construction</u> Visit done on 24 th Oct. 2011 1 month after the inauguration ceremony of the new road and bridge
URGENT PROJECT 1 Atiabar bridge	May 2011	Aug. 2012	<u>During construction</u> Visit done on 24 th Oct. 2011, after 4 to 5 months work. (bridge work site almost entirely flooded at the time) Second visit done on 22 nd Nov. 2011, with the environmental and forest officers of Gulu and Amuru
URGENT PROJECT 2 Aringa bridge	Nov. 2011	July 2012	<u>During construction</u> Field visit on 8 th Nov. 2011 with the environmental officers of Lamwo and Kitgum. 3 days after starting works on river diversion
URGENT PROJECT 3 Ayago bridge	June 2011	March 2012	<u>During construction</u> Visit done on 24 th Oct. 2011, 5 months after starting works
URGENT PROJECT 4 Otaka bridge	Sept. 2011	Aug. 2012	<u>During construction</u> Visit done on 15 th Nov. 2011, with the environmental officer and forest officer of Pader 2 months after starting works, following excavation.
URGENT PROJECT 5 Dawa & Chome bridges	Aug. 2011 (Chome) Sept. 2011 (Dawa)	Aug. 2012 (with road)	<u>During construction</u> Visit done on 24 th Nov. 2011, with the forest / environmental officer of Gulu, 1 month after starting works for Dawa, and 3 months for Chome
URGENT PROJECT 6 Olwiyo Anaka road	Aug. 2011	Aug. 2012	<u>During construction</u> Field visit on 21 st Oct. 2011, 3 months after starting works.

Source: JICA Study Team

Table 20.10-2 Main Results of Analysis of Similar Projects

Major impact criteria	Main problems	Priority actions for the environmental management of the priority projects
Solid waste	The standpoint of the contractor is that the construction project basically generates no waste, due to small quantities and reuse. Accordingly, there is no activity for waste management, no records on waste categories or methods of elimination, and no approved arrangement for disposal.	➤ PROVIDE A DETAILED WASTE MANAGEMENT PLAN AND EXECUTE IT BASED ON A MONITORING AND REPORTING SCHEDULE
Dangerous substances and waste water	The storage facilities for substances that are dangerous for water in the environment are large containers. Their efficiency in case of accidental spillage is not known. The location of these containers and of the concrete mixing sites has been found to sometimes be not compliant with the environmental management plan, which is a factor of increased risk. In sites with river water use downstream, it might be critical.	THE ENVIRONMENTAL MANAGEMENT PLAN MUST BE MORE EXPLICIT ABOUT THE MEASURES FOR PREVENTION OF ENVIRONMENTAL POLLUTION. THE MEASURES FOR POLLUTION PREVENTION INCLUDING THE SAFETY DISTANCE BETWEEN THE FACILITIES AND THE RIVER MUST BE STRICTLY APPLIED, REPORTED, AND CONTROLLED.

Major impact criteria	Main problems	Priority actions for the environmental management of the priority projects
Water uses and water sources	The bridge works have a potential risk of pollution of downstream water sources used for drinking purposes. There was no measure undertaken by the contractor in order to supply clean water to the people at risk, which was specified in the project brief approved by NEMA.	<ul style="list-style-type: none"> ➤ WITHIN THE SCOPE OF THE ENVIRONMENTAL MANAGEMENT PLAN AND ON THE BASIS OF THE NEMA APPROVED REPORT, PLAN BEFORE WORKS AND ON A CASE BY CASE BASIS THE ADEQUATE SUPPLY OF DRINKING WATER TO PEOPLE WHOSE DRINKING WATER SOURCE IS POTENTIALLY AFFECTED BY THE CONSTRUCTION WORKS ➤ INTEGRATE IN THE BRIDGE CONSTRUCTION THE STRUCTURE FOR FACILITATING ACCESS TO THE RIVER FOR WATER USE BY THE LOCAL PEOPLE AFTER THE WORKS AND FOR THE LONG TERM
Restoration of the river banks after the works are completed	<p>The management plan provided that all the disturbed areas will be seeded and planted. Revegetation measures are important for prevention of erosion and for landscape restoration. The restoration of the river banks must be a priority action of the environmental management plan because they are protected areas. The pilot project 1 has, however, shown that that revegetation was not implemented.</p> <p>In the case of the urgent projects, under construction, there are indications that revegetation is not considered as an important task because nature itself will provide it.</p>	<ul style="list-style-type: none"> ➤ PUT THE RESTORATION TASK OF RIVER BANKS AT THE HIGHEST LEVEL IN THE ENVIRONMENTAL MANAGEMENT PLAN ➤ MONITOR THE MORPHOLOGICAL RESTORATION OF THE RIVER BANKS, THE USE OF THE PROPER MATERIALS AND TOP SOIL, WITH NO MIX OF CONSTRUCTION OR DEMOLITION WASTE ➤ PLAN BEFORE WORKS IN COORDINATION WITH THE DISTRICT FOREST OFFICER THE DETAILED ACTIVITIES OF REVEGETATION OF THE RIVER BANKS ➤ EXECUTE THE PLAN BASED ON A MONITORING AND REPORTING SCHEDULE
Restoration of borrow pits	<p>The restoration of borrow pits is a strong requirement of NEMA and district environmental officers, and is clearly required by the environmental guidelines of the Ministry of Works.</p> <p>The pilot project has, however, shown that the contractor may not fulfil this requirement at the time of the construction works.</p>	<ul style="list-style-type: none"> ➤ PUT THE RESTORATION OF BORROW PITS AT THE HIGHEST LEVEL IN THE ENVIRONMENTAL MANAGEMENT PLAN ➤ PLAN THE MORPHOLOGICAL RESTORATION OF THE BORROW PITS IN COORDINATION WITH THE DISTRICT ENVIRONMENTAL OFFICER, WITH A CLEAR SCHEDULE DEADLINE ➤ PLAN THE DETAILED ACTIVITIES OF REVEGETATION OF THE BORROW PITS IN COORDINATION WITH THE DISTRICT FOREST OFFICER, BEFORE STARTING WORKS ➤ EXECUTE THE PLAN BASED ON A MONITORING AND REPORTING SCHEDULE
Employment conditions	Employment conditions are often an issue of dissatisfaction for the local people, because of the low level of remuneration, inequity of conditions compared with equivalent skilled workers coming from Kampala, and uncertainty about the time of payment.	EMPLOYMENT CONDITIONS AND INVOLVEMENT OF THE WOMEN IN THE WORKS MUST BE IMPROVED ACCORDING TO PROPOSITIONS IN THE ENVIRONMENTAL MANAGEMENT PLAN AND IN ACCORDANCE WITH THE GUIDELINES OF THE MINISTRY OF WORKS
Gender equity	Women receive almost no benefit from the construction works	

Source: JICA Study Team

Table 20.10-3 Detailed Review of Main Issues Raised by the Similar Projects

Impact criteria	Statement of the observed conditions	Project case and implementation step	Data source		
			1	2	3
Air pollution, dust	➤ There were no complaints from the residents about air pollution or dust in relationship with the works.	Pilot project Bridge 1 ASWA Bridge <i>During construction</i>	•		
		Urgent project 1 ATIABAR Bridge	•	•	•
		Urgent project 4 OTAKA Bridge	•	•	•
Water pollution, Soil contamination	➤ Dangerous substances for water and soil like oil waste were collected for treatment in Kampala by Gatsby Trust Uganda Ltd, a company authorized by NEMA.	Pilot project Bridge 1 ASWA Bridge <i>During construction</i>			•
	➤ Oil and fuel liquids were kept in drums or jerry cans inside a closed container. There was, however, no specific facility to contain an eventual spillage, and 6 diesel fuel jerry cans were found without their caps.	Pilot project Bridge 1 ASWA Bridge <i>During construction</i>			•
	➤ According to the contractor, the works and preparation of concrete do not generate liquid waste.	Urgent project 1 ATIABAR Bridge			•
	➤ Oil and fuel liquids were kept in drums or jerry cans inside a closed container. The distance of 30m from the container to the river, specified in the environmental management plan, is not respected, which is particularly critical given the use of river water downstream. ➤ The concrete preparation site is located very close to the river, which does not conform to the minimum distance of 30m mentioned in the environmental management plan. There was no specific treatment or filtration measure undertaken for waste water generated by washing the concrete mixture.	Urgent project 5 CHOME Bridge			•
Solid waste	➤ The refilling materials used for the restoration of the river banks are a mixture of solid inert waste and soil, showing that waste separation has not been completely done. ➤ It was observed that big concrete slabs and inert waste materials have been left inside the earth fill materials used for restoration of the river bank.	Pilot project Bridge 1 ASWA Bridge <i>After construction</i>			•
	➤ The excavated top soil will be reused. ➤ More than 1000 cement paper bag waste have been eliminated by open burning. ➤ The litter waste is buried with the excess earth materials in the old borrow pits. ➤ The concrete platform constructed for the preparation of concrete will be crushed and mixed with soil at the end of the works for restoration of the river banks.	Urgent project 3 AYAGO Bridge			•
	➤ There was no solid waste and there was no solid waste management measure. Waste cement paper bags were burnt.	Urgent project 5 CHOME Bridge			•
	➤ There was no solid waste, or it was reused. There were no specific measures for the collection and treatment of solid waste. ➤ Earth deposits have been observed at the entrance of Lamiyo in an open space which is regarded as important because it was formerly used for a church. The interviewed residents complained that this was unauthorized dumping and that restoration of the site should be completed.	Urgent project 4 OTAKA Bridge	•		•

Impact criteria	Statement of the observed conditions	Project case and implementation step	Data source		
			1	2	3
Noise	➤ There were no complaints from the residents about noise in relationship with works.	Pilot project Bridge 1 ASWA Bridge <i>During construction</i>	•	•	
		Urgent project 1 ATIABAR Bridge	•	•	
Water resources, water supply, water use	➤ The recommendation of the project brief for the design of an access path and stairs to the river from the bridge for the preservation or facilitation of the multi-uses of river water at the bridge crossing point has not been complied with.	Urgent project 4 OTAKA Bridge			•
		Urgent project 2 ARINGA Bridge			
	➤ The contractor was not aware of the use of river water by the local community of Potika, downstream. The issue of use of river water is also related to the issue of gender, because river water withdrawal is a task done by women. Any modification on the river water source is likely to directly increase the burden of the women.	Urgent project 2 ARINGA Bridge		•	•
	➤ There were no measures for ensuring the supply of clean drinking water to the downstream people who depend on the Chome river water for drinking, although it was strongly recommended in the project brief.	Urgent project 5 CHOME Bridge			•
Morphology, soil stability, erosion	<ul style="list-style-type: none"> ➤ A borrow pit roadside remains unrestored at the end of the works. The contractor claims that it will be done later. ➤ A borrow pit close to the bridge has been partially restored, leaving excavated points which retain stagnant water. ➤ Revegetation works have not been performed. 	Pilot project Bridge 1 ASWA Bridge <i>After construction</i>			•
	➤ The main preoccupation of the roadside resident interviewed during the field visit was the proper restoration of the borrow pit opened on his land, after the works.	Urgent project 1 ATIABAR Bridge	•		
River banks	<ul style="list-style-type: none"> ➤ Restoration of the river banks was not completed. There are excavated points without levelling and the concrete platform for the preparation of concrete has not been completely removed. ➤ Revegetation works have not been performed. 	Pilot project Bridge 1 ASWA Bridge <i>After construction</i>			•
	<ul style="list-style-type: none"> ➤ Restoration of the river banks will be done using a mix of earth and inert waste materials for filling. ➤ Revegetation works are not planned (discussion with contractor). Revegetation is, however, a task included in the environmental management plan of the contractor. 	Urgent project 3 AYAGO Bridge			•
Protected natural areas	➤ The river bank of the Aswa River belongs to the 6 th Schedule of the Water Act, which means a protected buffer zone of 100m. However, revegetation of this protected zone has not been done.	Pilot project Bridge 1 ASWA Bridge <i>After construction</i>			•
Soil stability and risk of erosion	➤ The frequent collapse of the excavated river banks and the related risk of accidents for workers or local people have been reported	Urgent project 1 ATIABAR Bridge			•
		Urgent project 3 AYAGO Bridge			•
Loss of crops land, loss of standing crops, loss of plantations	➤ The encroachment of road works on a plantation roadside has been a source of conflict with the landowner, but was finally resolved through continuous discussions with the contractor, the JICA team, and the LCIII / LCI .	Urgent project 6 OLWIYO ANAKA ROAD			•

Impact criteria	Statement of the observed conditions	Project case and implementation step	Data source		
			1	2	3
Livelihood, poverty, vulnerability	➤	➤			
Local economy, employment	➤ Job opportunities were a source of disappointment for the local residents in Lulyango, because the unskilled workers were paid half the expected rate, and they said that they prefer to dig gardens, which is more profitable	Pilot project Bridge 1 ASWA Bridge <i>During construction</i>	•		
	➤ Among the 66 persons employed for the bridge and 3 culverts, 31 have been recruited from the local villages. ➤ Local people are employed based on an agreement form, but there is no formal working contract.	Urgent project 1 ATIABAR Bridge and culverts			•
	➤ 35 to 40 persons have been working on the construction site. About half this number is represented by the non skilled labor employed from local villages. ➤ Local people are employed based on an agreement form, but there is no formal working contract.	Urgent project 3 AYAGO Bridge			•
	➤ 85% of the 60 persons employed on the site are locals. ➤ Local people are employed based on an agreement form, but there is no formal working contract.	Urgent project 4 OTAKA Bridge			•
	➤ Among the 46 persons employed, about 20 are local people.	Urgent project 5 CHOME Bridge			•
Distribution of benefits, social equity	➤ The local unskilled people employed in the construction works are complaining about the low level of their payments compared with equivalent skills coming from outside. The lack of payment deadlines or regularity is also a source of complaint.	Urgent project 4 OTAKA Bridge	•		
Local conflicts of interest	➤ The dissatisfaction about payment conditions of locals for work is likely to generate a conflict between the local community and the contractor. The JICA team consultant has started communication with the locals and the contractor to resolve this problem.	Urgent project 4 OTAKA Bridge	•		
Gender equity, children	➤ There were no women employed. ➤ A group of women is getting income from the supply of cooked food.	Urgent project 1 ATIABAR Bridge and culverts			•
	➤ 1 skilled woman belongs to the work team. ➤ A group of women is getting income from the supply of cooked food.	Urgent project 3 AYAGO Bridge			•
	➤ Employed women are 1 as an office clerk and 2 as cooks	Urgent project 4 OTAKA Bridge			
	➤ There is 1 woman as office clerk and 2 women for cooking ➤ The interviewed female resident complained that the contractor was not interested in involving women in the works	Urgent project 4 OTAKA Bridge	•		•
	➤ There are 2 women getting income from cooking activity	Urgent project 5 CHOME Bridge			•
HIV/ diseases, health and hygiene	➤ The interviewed residents have complained about the sexual behaviour of a few persons employed on the work site. There was, however, no any official complaint.	Urgent project 4 OTAKA Bridge	•		

1. Discussions with roadside residents

2. Discussions with the district environmental officer

3. Direct observations and discussions with the work site contractor team

Source: JICA Study Team

Table 20.10-4 Environmental Management and Monitoring in Similar Project Cases

Environmental management plan	<ul style="list-style-type: none"> ➤ There is a business as usual environmental management plan prepared by the contractor for urgent projects 1, 3, 5, and 6. ➤ There was however nobody on site having the task of implementing the plan and controlling its application. ➤ It was observed that there was a serious gap between what was written in the plan and what was executed in the field, for each impact criteria. The most important gaps concerned the application of the waste management plan, the full and clean restoration of disturbed sites, in particular the river banks and the borrow pits, including the revegetating actions. ➤ The waste management plan provided that solid waste will be segregated before approved disposal. Neither the segregation nor the approved dumping sites were observed on any site of the similar cases. ➤ The environmental management plan does not provide solutions about the preservation of the water sources downstream, although this issue was part of the approved project brief reports. ➤ On site, there is clearly no transparency about the environmental activities, if performed.
Environmental monitoring activity	<ul style="list-style-type: none"> ➤ Monitoring activities are integrated in the first chapter of the environmental management plan, namely, the summary of the environmental and social management plan. ➤ The monitoring activities affecting the responsibility of the environmental officer are safety surveying, waste water generated by concrete washing or other sources, noise, food waste, sanitation including solid waste (domestic waste category), and incineration of medical waste, which all together represent 6 monitoring tasks among a total of 22. ➤ The environmental management plan does not provide the monitoring measures for the most important issues like solid waste management, river bank restoration, borrow pit restoration, water use and water sources, gender and employment conditions. ➤ Environmental activities were not reported even on a quarterly basis as provided in the environmental management plan. What was reported focused on working conditions and accidents, which is not adequate for reporting the application conditions of the environmental management plan ➤ The monthly reports presented by the contractor to the JICA consultant do not include environmental management issues ➤ There is clearly no environmental monitoring activity undertaken by the contractor, and no reporting to the JICA consultant or to the district environmental officer. ➤ There was no facilitation to involve the district environmental officer in site inspection

Source: JICA Study Team

20.11 Environmental Monitoring

20.11.1 Environmental Monitoring of Impacts on the Physical and Natural Environment

Table 20.11-1 is a summary of the monitoring criteria and proposed monitoring activities, according to the relevant impact criteria of the JICA guidelines, for the physical and natural environment. The environmental monitoring activity is evaluated according to the potential impacts likely to occur from the project and to the issues raised by the analysis of similar cases. The responsibility of execution is on the contractor based on a detailed monitoring plan in the environmental management plan.

The most important monitoring issues for the physical and natural environment are:

- Solid waste management
- Restoration of borrow pits
- Restoration of river banks or wetlands
- Revegetation of slopes and restored sites
- Ecological compensation for lost reserved trees
- Employment conditions

- Financial compensation for land and improvements
- Communication with the local communities and reporting activities
- Control of application of the NEMA approval conditions, of the recommendations of the assessment documents submitted to NEMA, and of the environmental management plan presented by the contractor

Most of these issues have been addressed in the District administrative and operational guidelines manuals of Volume 5 (Ministry of Works, Housing, and Communications – Oct. 2003). The financial compensation for land and improvements is fully addressed by the Land Acquisition and Compensation procedures of UNRA. The analysis of the similar cases has, however, shown that the environmental issues need to be better addressed with more transparency and more effective results.

Table 20.11-1 Environmental Monitoring of Impacts on the Physical and Natural Environment

Impact criteria	Monitoring criteria	Monitoring site	Monitoring frequency	Observations
1 Air pollution, dust	<ul style="list-style-type: none"> ➤ Visual observation of the conditions of haulage of materials in the most exposed sites along the road (condition of containment or coverage of materials using a tarpaulin sheet, and littering conditions on road) ➤ Interviews with roadside inhabitants and LC1 for understanding the eventual complaints on dust related nuisances. 	<ul style="list-style-type: none"> ➤ The most exposed inhabited sites like the trading centres, along the road 	<ul style="list-style-type: none"> ➤ 1 / month for visual observation ➤ 1 / month for interviews with roadside inhabitants and LC1 	<ul style="list-style-type: none"> ➤ Interviews must include, at the same time, the other potential sources of local nuisances generated by the project works, like noise and traffic or walking conditions. Water quality is also concerned. ➤ The data will be recorded on environmental data sheets for reporting by the environmental consultant to the district environment officer.
2 Water Pollution, Soil contamination	<ul style="list-style-type: none"> ➤ Measurement of suspended matter and BOD in stream water for ambient water quality ➤ Measurement of stream water, to determine if it meets regulatory drinking water criteria, if river water is used for drinking purposes (this is not needed if alternate drinking water is provided to the people) ➤ Visual observation of the conditions of management of motor oil, fuels and lubricants on the work site (storage, reuse and collection of waste oils, accidental spillage) ➤ Interview with LC1 for understanding the eventual complaints on drinking water quality, in case of use of the river water for drinking in close proximity to the work site 	<ul style="list-style-type: none"> ➤ Streams and wetlands affected by bridge or box culvert construction works ➤ For water quality sampling sites, one upstream site and one downstream site ➤ For the management of oil substances, the work site 	<ul style="list-style-type: none"> ➤ 1 / month excepted the visual observation of oil product storage, to be done daily 	<ul style="list-style-type: none"> ➤ Interviews performed including other monitoring issues like air pollution, etc. ➤ Analysis of the water quality change, and comparison with regulatory norms ➤ The data will be recorded on environmental data sheets for reporting by the environmental consultant to the district environmental officer.

Impact criteria		Monitoring criteria	Monitoring site	Monitoring frequency	Observations
3	Top soil	<ul style="list-style-type: none"> ➤ Calculating the volumes of excavated top soil and field observation of the storage and reuse conditions during the works ➤ At the end of works, check the balance between the volume of excavated top soil and the volume of top soil reused for the restoration of its initial function and initial sites. 	<ul style="list-style-type: none"> ➤ Camp work site ➤ Bridge and box culvert construction site ➤ Road work sites 	<ul style="list-style-type: none"> ➤ Daily records 	<ul style="list-style-type: none"> ➤ Monthly reports and report of final statement at the end of the works ➤ Counting data sheets for reporting by the environmental consultant to the district environment officer.
4	Solid waste	<ul style="list-style-type: none"> ➤ Establish a system to monitor the volumes of solid waste generated by the project, and a follow up of waste segregation, collection, and treatment method for each category, including reuse, in accordance with the solid waste management plan (excavation waste, construction waste, domestic waste, plastic waste, others) ➤ Field observation of the storage and reuse of top soil during the works ➤ Field observation of litter on roads and work sites 	<ul style="list-style-type: none"> ➤ Camp work site ➤ Bridge and box culvert construction site ➤ Road work sites 	<ul style="list-style-type: none"> ➤ Daily records 	<ul style="list-style-type: none"> ➤ Monthly reports and report of final statement at the end of the works ➤ Counting data sheets for reporting by the environmental consultant to the district environment officer.
5	Noise	<ul style="list-style-type: none"> ➤ On site observation of the conditions of noise in the exposed sites along the road (day and night conditions, engine noise, noise induced by the trucks) ➤ Interviews with roadside residents and LC1 for understanding the eventual complaints on noise related nuisances. ➤ In case of a complaint, measurement of ambient noise levels and noise sources for compliance with regulations 	<ul style="list-style-type: none"> ➤ The most exposed inhabited sites like the trading centres, along the road or residences near the camp work site or construction site 	<ul style="list-style-type: none"> ➤ 1 / week for on site observation ➤ 1 / month for interviews with roadside inhabitants and LC1 	<ul style="list-style-type: none"> ➤ Interviews performed including other monitoring issues like air pollution, etc.
6	Water resources, water supply, water use	<ul style="list-style-type: none"> ➤ Measurement of the water supply activities and of the satisfaction of residents in case of alternate drinking water supply for the population exposed to a risk of river water shortage or drinking contaminated river water ➤ Checklist of the persons restricted by the construction works for their usual use of the river water and importance of the impact, for men and women 	<ul style="list-style-type: none"> ➤ Streams and wetlands concerned by bridge or box culvert construction works ➤ River water use sites 	<ul style="list-style-type: none"> ➤ Daily records ➤ 1 / month for interviews of concerned people and LC1 	<ul style="list-style-type: none"> ➤ Specific interviews targeting the people potentially affected in their daily water uses, and LC1 ➤ Measurement of the water supply activities: volumes, frequency ➤ Checklist: list of persons, gender, number, water use, category of impact ➤ Data sheets for reporting by the environmental consultant to the district environment officer

Impact criteria	Monitoring criteria	Monitoring site	Monitoring frequency	Observations
7 Morphology, Soil stability, erosion	<ul style="list-style-type: none"> ➤ Field observation and records of the morphological changes of the old and new borrow pits used for improvement works ➤ Check the application of the measures of the environmental management plan for the morphological restoration of the newly created borrow pits. ➤ Check the application of the measures of the environmental management plan for the reseeded and planting for the vegetal fixation of slopes 	<ul style="list-style-type: none"> ➤ Borrow pits ➤ River banks at bridge construction sites ➤ Roadside slopes 	<ul style="list-style-type: none"> ➤ Records 1 / week ➤ Reports 1 / month ➤ Final report at end of the works 	<ul style="list-style-type: none"> ➤ Recording of the conditions using pictures taken from selected fixed points and classified by date. ➤ Checklist of restoration activities and schedule
8 Natural habitats, Protected natural areas	<ul style="list-style-type: none"> ➤ Field observation and records of the vegetal cover of the river bank ➤ Check the execution of the measures of the environmental management plan for the biological restoration of the affected river banks : reuse of the stored top soil, supply of the seeds, planting 	<ul style="list-style-type: none"> ➤ River banks at bridge or box culvert construction sites ➤ Wetlands at bridge or box culvert construction sites 	<ul style="list-style-type: none"> ➤ Records 1 / week ➤ Reports 1 / month ➤ Final report at end of the works 	<ul style="list-style-type: none"> ➤ Recording of the conditions using pictures taken from selected fixed points and classified by date. ➤ Checklist of the biological restoration activities and schedule
9 Biological diversity and protected species (plants)	<ul style="list-style-type: none"> ➤ Counting of the mature reserved trees felled during land clearance, according to species ➤ Check the execution of the measures of the environmental management plan for the ecological compensation of the trees: supply of the seeds, planting 	<ul style="list-style-type: none"> ➤ Road reserve 	<ul style="list-style-type: none"> ➤ Daily records during the clearance works ➤ Weekly records during the planting works ➤ Final report at end of the works 	<ul style="list-style-type: none"> ➤ Recording of the species and location per village or stretch ➤ Checklist of the ecological compensation plan

Source: JICA Study Team

20.11.2 Environmental Monitoring of Impacts on the Human and Social Environment

The financial compensation for land and improvements and resettlement are fully addressed by the Land Acquisition and Compensation procedures of UNRA. Therefore, the monitoring activities for the human and social environment that are the responsibility of the contractor are related to the employment conditions, the gender equity, and the security at the work site and occupational health. These aspects are considered in the MoWT Guidelines (Environmental impact assessment guidelines for road projects, and District administrative and operational guidelines, 2003 - District Road Works Manuals series).

In addition, there are specific issues learned from the analysis of similar project cases, which must be checked by the consultant in charge of supervision of the works, regarding the environmental activities of the contractor. They are:

- Control of application of the NEMA approval conditions
- Control of application of the environmental management plan presented by the contractor

- Communication with the local communities (villages LC1)
- Reporting to the environmental officers of the district and UNRA

20.12 Stakeholders

(1) Stakeholders for the national priority roads

The involvement of the administrative stakeholders in the IEE study has been facilitated during the execution of the field surveys and at the end of the study through the presentation of the results of the investigations. The main administrative stakeholders are the district officers (environment, forest), and the NFA officers. The following activities were executed in coordination with the stakeholders:

- Individual meetings with the district and NFA officers at the beginning of the study
- Field observation with the district and NFA officers as shown in Table 20.12-1
- Meeting for presentation of the method and results of the IEE study to a large panel of stakeholders, at the end of the study

The objectives of the individual meetings were to present the project and the objectives of the IEE study, to collect data on specific environmental indicators like the protected areas and the wetlands, and to get the point of view of the officers about the approach of the study.

The objectives of the field observation visits were to directly involve the officers in the field and to make them aware of the present conditions and possible impacts for each priority road.

The group meeting organized for the presentation of the method and results of the IEE study was held on 6th December 2011 in Kitgum (Jaflo Gardens hotel). The persons invited to the meeting were the district officers in charge of environment, forest, population, physical planning and fishery, the district engineers, the UNRA officers, and the NFA officers. After confirmation by phone calls, the expected number of attendants to the meeting on the stakeholders side was estimated at around 25 persons. The actual number was 8 persons, as detailed in Table 20.12-2.

After presentation of the field counting survey, villages LC1 survey, and survey and analysis of similar cases, the meeting attendees made comments on the issues of the borrow pit restoration and revegetating actions. It was underlined that the contractor should not be paid before complete restoration of the borrow pits, attested to by the presentation of an environmental restoration certificate, and that the contractor must be controlled through the group visits of district officers on site and under strict rules of implementation by the supervising project manager. The revegetating actions must be undertaken in coordination with the district forest officer, in order to guaranty a permanent monitoring of the measures.

Table 20.12-1 Field Observation with the District Officers and NFA in November 2011

Districts	Priority roads	District officers		NFA	Date of field visit
		Environ.	Forestry		
GULU	IT1				
	ID2	•			22.11.11
	ID3	•			24.11.11
	ID6	•			22.11.11
AMURU	ID2	•			22.11.11
	ID6	•			22.11.11
LAMWO	ID1	•	•		8.11.11
	ID2	•	•	•	10.11.11
	ID8	•	•	•	10.11.11

Districts	Priority roads	District officers		NFA	Date of field visit
		Environ.	Forestry		
KITGUM	ID1	•	•		8.11.11
	ID2	•	•		17.11.11
	ID8	•	•		17.11.11
	ID7	•	•		17.11.11
PADER	ID3	•	•		15.11.11
	ID4	•	•		15.11.11
	ID5	•	•		15.11.11
AGAGO	ID4				-
	ID7	•			11.11.11

Source: JICA Study Team

Table 20.12-2 List of Participants to the Meeting Organized on 6th December 2011 in Kitgum

District	Position	Name	Phone number
Lamwo	Environment officer	Komakech Richard	0772480668
Kitgum	Engineer	Bongomin Patrick	0772362467
Pader	Forestry officer	Magara Justine	0772550128
Agago	Engineer	Bongomin Samuel Otto	0772825858
Kitgum	Environment officer	Wany Oyok David	0772978783
Kitgum	UNRA / RI sector manager	Vule Martin	0752540611
Amuru	Engineer	Okello Louis D. P.Abur	0772560679
Agago/Kitgum/ Pader	NFA Sector manager	Atim Harriet	0772378290

Source: JICA Study Team

(2) Stakeholders for the Gulu city roads

In the case of the Gulu city roads, the main administrative stakeholders are the municipal environmental officer and the chiefs of the divisions and wards. Table 20.12-3 provides a list of the stakeholders met by the JICA study team for the investigations. The roadside beneficiaries of the city roads and the city road users are also important stakeholders taken into account for the IEE study.

Table 20.12-4 is a list of the representatives of relevant associations met by the JICA study team for the study.

Table 20.12-3 List of the Main Administrative Stakeholders Met by the JICA Study Team for the Gulu City Roads Project

Position	Date of meeting	Objective of meeting	Contact
Municipal environmental officer	14.11.2011	General & data	Mr Ocaka James 0774-151502
Officer in charge of traffic	10.11.2011	Accidents data	Mr Okoya Patrick Kagwa 0782-347198
Physical planner	16.11.2011	Municipal plan	Ms Mukonyozi Evelyn 0774157328
Parish chief-Tegwana	14.11.2011	Population data	Mr Okot Richard 0782-274081
Parish chief Labour line	14.11.2011	Population data	Mr Oyat Samuel 0782-501767
Layibi CDO	15.11.2011	Population data	0782-956887
Laroo-Ass Town clerk	14.11.2011	Population data	Mr Onyee John Paul 0772-630827
Bardege, CDO	16.11.2011	Population data	Mr Otto Santo 0782-697917
Bardege Town agent	17.11.2011	Population data	Mr Ocitti Livingstone 0772-372753

Source: JICA Study Team

Table 20.12-4 List of the Main Associations Met by the JICA Study Team for the Gulu City Roads Project

Organization	Date of meeting	Contact
Chairman / Gulu united motorcycle rider association	30.11.11	Anywar Panaleo 0782695269
Chairman / Independent youth motorcycle rider association	30.11.11	Oryema Joe 0779889709
Chairman / Bardege motorcycle rider association	30.11.11	Okello Walter 0782468236
Vice Chairman / Layibi motorcycle rider association	30.11.11	Olwoch Nelson 0774681228
Chairman / Golden Youth motorcycle rider association	30.11.11	Ocaka David 0718279717
Chairman / Gulu business community association	1.12.11	Ocan Deboke 0772497250

Source: JICA Study Team

21. PROJECT EVALUATION

21.1 Introduction

This chapter will reveal the benefits generated from the high priority projects proposed in the previous chapter to determine if those road improvement projects are economically and socially feasible. In general, a road improvement project generates a wide range of direct benefits; including travel cost/time savings, decrease in traffic accidents, saving in energy consumption, and so forth. Indirect benefits from road projects include income generation, and stimulation of the regional economy.

In the following section, high priority projects are tested in a numerical manner by conventional economic analysis. In a latter section, the road improvement projects in the study area are also examined, identifying indirect benefits; the extent to which these projects will contribute to accessibility of social infrastructure.

21.2 Economic Analysis

21.2.1 General

The primary objective of the economic analysis is to examine the effects of the project investment. The following discussion will reveal economic validity of necessary projects and high priority projects proposed in Chapter 16, by the conventional economic analysis – Net Present Value and Economic Internal Rate of Return.

21.2.2 Basic Assumptions

21.2.2.1 "With project" and "Without Project"

"With Project" implies the situation where the proposed projects are implemented, and "Without Project" implies where no investment takes place. The quantified economic benefits generated from the implementation of the projects are defined as savings in Vehicle Operating Costs (VOC: vehicle operating cost and vehicle time cost) and Travel Time Cost (TTC) derived from the difference between "With Project" and "Without Project".

21.2.2.2 Implementation Schedule

The implementation schedule incorporates the following assumptions: projects will commence in 2013 and be completed by 2016 for IR1 and IR2 and in 2017 for IT1 and MR1. The roads and bridges are gradually open to traffic from 2016.

21.2.2.3 Project Lifecycle

The period of the economic evaluation for road projects is set at 30 years after the completion of the projects.

21.2.2.4 Prices

A base year price is prepared based on the exchange rates in 2011 which are announced by Bank of Uganda, and exchange rates applied to this analysis are set as follows:

1.0 USD = 2,522.7 Ushs.

21.2.2.5 Vehicle Operating Cost

Vehicle operating costs estimated in the previous JICA study (the Feasibility Study on the Construction of a New Bridge across River Nile at Jinja, and the Project for Rural Road Network Planning in Northern Uganda) are applied in this analysis. These vehicle operating costs are summarized in Table 21.2-1.

Table 21.2-1 Vehicle Operating Cost by Vehicle Type (at Economic Prices, as of 2009)

Items	Motorcycle	Sedan	Mini Bus	Large Bus	Truck	Trailer	
Time Related VOC (USD/year)	Crew cost	-	-	1,647.0	8,943.0	19,357.0	19,357.0
	Maintenance Cost	13.3	107.9	161.8	313.8	313.8	313.8
	Insurance Cost	328.0	496.0	613.0	580.0	357.0	357.0
	Depreciation Cost	128.0	722.0	1,299.0	2,438.0	2,244.0	3,456.0
	Sub-Total	469.0	2,809.0	3,721.0	12,275.0	22,272.0	23,483.0
	Overhead Cost	-	-	372.0	1,228.0	2,227.0	2,348.0
	Total	469.0	2,809.0	4,093.0	13,503.0	24,499.0	25,831.0
USD / Hour	0.063	0.375	0.547	1.803	3.272	3.450	
Distance Related VOC (USD/year)	Fuel Cost	269.7	4,247.2	4,853.9	12,973.1	11,892.0	12,973.1
	Lubricant Cost	19.0	42.8	76.0	582.7	662.3	722.5
	Tyre Cost	25.7	207.3	173.3	582.8	884.1	2,818.1
	Maintenance Cost	21.8	136.2	263.0	774.1	591.4	910.5
	Depreciation Cost	237.0	1,341.0	2,413.0	4,529.0	4,168.0	6,417.0
	Sub-Total	573.1	5,974.8	7,778.9	19,441.3	18,197.9	23,841.7
	Overhead Cost	-	-	777.9	1,944.1	1,819.8	2,384.2
Total	573.1	5,974.8	8,556.7	21,385.4	20,017.7	26,225.9	
USD / 000km,	34.386	159.328	213.918	356.423	363.958	437.098	

Source: The Feasibility Study on the Construction of a New Bridge across River Nile at Jinja, JICA (2009); The Project for Rural Road Network Planning in Northern Uganda, JICA (2010)

In 2009, the annual average exchange rate of the Uganda shilling to US dollar was 2,030.5, and it has been depreciating to 2,177.6 in 2010, and 2,522.7 in 2011. On the other hand, the annual percentage change of the Core Consumer Price Index (CPI) recorded 4.8% in 2010 and 17.2% in 2011. Table 21.2-2 indicates the changing rates of the Core CPI and the exchange rates from 2009 to 2011.

Table 21.2-2 Changing rates of Core CPI and Exchange rates from 2009 to 2011

		Unit: percent	
Items	2009 to 2010	2010 2011	
(1) Core CPI (inflation)	4.8	17.2	
(2) Exchange rate (Depreciation of Uganda shilling to US dollar)	7.2	15.9	
(3) Changing rate (1) – (2)	-2.4	1.3	
(4) GDP per Capita	1.9	2.7	
(5) Changing rate (1) – (2) + (4)	-0.5	4.0	

Source: Core CPI “Consumer Price Index December 2011”, UNBOS; Exchange rate Bank of Uganda Web page (http://www.bou.or.ug/bou/rates_statistics/download_archive.html?path=/bou/bou-downloads/research/ExchangeRatesStatistics/&title=Monthly%20Exchange%20Rates&subtitle=null&restype=binary&secname=&year=2011&month=All)

Considering the changing rate calculated in Table 21.2-2, vehicle operating cost by vehicle type as of 2012 is calculated as shown in Table 21.2-3.

Table 21.2-3 Vehicle Operating Cost by Vehicle Type (at Economic Prices, as of 2011)

Items	Motorcycle	Sedan	Mini Bus	Large Bus	Truck	Trailer
USD / Hour	0.062	0.371	0.540	1.783	3.235	3.411
USD / 000km,	33.999	157.536	211.511	352.414	359.864	432.182

Source: JICA Study Team

21.2.2.6 Travel Time Cost

Passenger's travel time costs were also estimated in the previous JICA study (the Feasibility Study on the Construction of a New Bridge across River Nile at Jinja) and applied in this economic analysis. Table 21.2-4 shows the summary of Travel Time Costs of passengers at 2009 prices.

Table 21.2-4 Passenger Travel Time Cost by Vehicle Type (as of 2009)

Items	Motorcycle	Sedan	Mini Bus	Large Bus
No of Average PAX/ Vehicle*1	1.46	2.51	13.03	46.36
Time Value (USD)/PAX /Month*2	119.40	119.40	119.40	119.40
Aggregated Time Value (USD)/Month/Vehicle	174.32	299.69	1,555.78	5,535.38
Aggregated Time Value (USD) /Hour/Vehicle	0.96	1.64	8.55	30.41

Note: *1 Based on Traffic Survey in Jinja; *2 Estimates from Uganda National Household Survey 2005/2006 and Consumer Price Index (CPI) source: Bank of Uganda

Source: JICA (2009) The Feasibility Study on the Construction of a New Bridge across River Nile at Jinja; The Project for Rural Road Network Planning in Northern Uganda, JICA (2010)

As shown in (4) of Table 21.2-2, GDP per Capita had grown at 1.9% in 2010 and 2.7% in 2011. Considering the growth of GDP per Capita, and the changes of exchange rate and inflation rate, as well as Vehicle Operation Cost, Travel Time Saving is calculated as shown in Table 21.2-5.

Table 21.2-5 Passenger Travel Time Cost by Vehicle Type (as of 2011)

Items	Motorcycle	Sedan	Mini Bus	Large Bus
Aggregated Time Value (USD) /Hour/Vehicle	0.95	1.62	8.45	30.07

Source: JICA Study Team

The Travel Time Cost increases year by year in accordance with the economic development of Uganda. In this analysis, it is supposed that the increase rate is the same as the growth rate of real GDP per capita. As indicated in Table 21.2-6, average growth rate of GDP per Capita from 2001 to 2010 was 3.7%. Therefore, it is supposed that the Travel Time Cost would increase at the same rate during the project period.

Table 21.2-6 Annual Growth Rate of GDP per Capita in Uganda from 2001 to 2010

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average 2001-2010
Growth rate of GDP per Capita	5.3	3.3	2.1	2.6	6.5	3.6	4.4	6.6	0.3	1.9	3.7

Source: Statistical Abstract 2011, UBOS

21.2.3 Economic Cost

The project costs in terms of financial prices were estimated in Chapter 20. For the economic analysis, financial costs are converted to economic costs by deducting the tax portion, applying a standard conversion factor to the portion of non-trade goods.

All the costs of the projects, excluding tax, are classified as non-trade goods as all the construction materials are available in Uganda. In this Study, the following conversion factors are applied;

- For tax, conversion factor of zero is applied and
- For local currency portion of construction and administration costs (e.g., land acquisition and compensation), a standard conversion factor is applied.

The standard conversion factor (SCF) is an index, which converts domestic prices to border prices by adjusting for the distortion of prices in the domestic market. This analysis uses 0.90 which was estimated in “the Project for Rural Road Network Planning in Northern Uganda.”

21.2.3.1 Investment cost

Table 21.2-7 shows investment cost of the 3 trunk road improvement projects. The cost is converted to the economic cost by using the conversion method mentioned above. Total investment costs measured by the economic cost are 23.7 million USD for IT1, 69.7 million USD for IR1 and 67.5 million USD for IR2.

Table 21.2-7 Investment Cost for Trunk Road Improvement Projects (IT1, IR1 and IR2, economic cost)

Unit: USD

Cost items		IT1: Kamdini-Gulu Road Improvement	IR1: Kitgum-Lira Road Improvement	IR2: Gulu-Acholibur Road Improvement
Construction cost	Foreign currency	2,282,500	7,636,830	7,396,130
	Local currency	18,457,623	61,858,323	59,908,653
Sub-total of construction cost		20,740,123	69,495,153	67,304,783
Consulting service cost		2,739,000	3,818,000	3,701,800
Land acquisition		2,968,110	221,580	207,630
Total cost		23,708,233	69,716,733	67,512,413

Source: JICA Study Team

21.2.3.2 Maintenance cost

Table 21.2-8 indicates the maintenance cost for 3 trunk road improvement projects. The cost is converted to the economic cost by using the conversion method mentioned above.

Table 21.2-8 Maintenance Cost for Trunk Road Improvement Projects (IT1, IR1 and IR2, economic cost)

Unit: USD

Project Name	IT1: Kamdini – Gulu Road Improvement	IR1: Kitgum Lira Road Improvement	IR2: Gulu Acholibur Road Improvement
Annual maintenance	103,701	347,476	336,524
Periodic maintenance (every 5 years)	311,102	1,042,427	1,009,572
Periodic maintenance (every 20 years)	2,074,012	6,949,515	6,730,478

Source: JICA Study Team

21.2.4 Economic Benefit

Tables 21.2-9, 21.2-10 and 21.2-11 are estimated VOC and travel time costs in 2018 and 2030. These costs are calculated from the demand forecast (vehicle-kilometres and vehicle hours) by types of vehicle, unit vehicle operating cost (Table 21.2-3) and unit travel time cost (Table 21.2-5). VOC and travel time cost in other years are interpolated from these figures.

Table 21.2-9 Estimated VOC and Travel Time Cost (IT1)

Unit: USD

	Passenger car	Small bus	Large bus	Light truck	Heavy truck	Motor-cycle
VOC Saving						
2018 w/o project	115,185	21,352	30,029	100,656	586,157	7,770
2018 with project	109,012	20,166	28,420	95,136	554,442	7,231
Saving in 2018	6,173	1,186	1,609	5,520	31,715	538
2030 w/o project	135,706	34,554	48,741	163,592	951,154	12,470
2030 with project	77,087	19,637	27,717	92,823	540,144	6,891
Saving in 2030	58,619	14,917	21,025	70,769	411,010	5,579
Travel Time Cost						
2018 w/o project	677,840	449,583	681,660	54,460	300,789	160,303
2018 with project	641,513	424,609	645,140	51,474	284,515	149,198
Saving in 2018	36,327	24,974	36,519	2,987	16,275	11,105
2030 w/o project	1,229,323	1,119,959	1,703,168	136,251	751,335	396,030
2030 with project	698,314	636,460	968,504	77,309	426,670	218,859
Saving in 2030	531,010	483,499	734,664	58,941	324,665	177,171

Source: JICA Study Team

Table 21.2-10 Estimated VOC and Travel Time Cost (IR1)

Unit: USD

	Passenger car	Small bus	Large bus	Light truck	Heavy truck	Motor-cycle
VOC Saving						
2018 w/o project	107,034	9,516	8,560	152,484	360,078	48,748
2018 with project	60,411	5,074	5,251	95,177	206,837	26,280
Saving in 2018	46,624	4,442	3,309	57,307	153,241	22,468
2030 w/o project	226,184	20,171	5,028	269,867	493,264	131,844
2030 with project	120,102	10,173	2,426	162,843	285,743	67,765
Saving in 2030	106,081	9,999	2,602	107,024	207,522	64,079
Travel Time Cost						
2018 w/o project	629,878	200,363	194,315	82,502	184,776	1,005,767
2018 with project	355,506	106,836	119,191	51,496	106,140	542,200
Saving in 2018	274,372	93,527	75,124	31,006	78,636	463,567
2030 w/o project	2,048,937	653,787	175,680	224,763	389,639	4,187,303
2030 with project	1,087,973	329,709	84,755	135,626	225,713	2,152,185
Saving in 2030	960,963	324,077	90,925	89,137	163,925	2,035,118

Source: JICA Study Team

Table 21.2-11 Estimated VOC and Travel Time Cost (IR2)

Unit: USD

	Passenger car	Small bus	Large bus	Light truck	Heavy truck	Motor-cycle
VOC Saving						
2018 w/o project	201,889	13,418	28,925	86,530	584,170	90,617
2018 with project	87,573	6,029	12,515	37,468	253,718	40,011
Saving in 2018	114,316	7,388	16,409	49,063	330,452	50,605
2030 w/o project	366,110	25,575	7,323	118,640	849,426	215,302
2030 with project	189,381	13,182	3,910	62,184	441,923	111,316
Saving in 2030	176,728	12,392	3,413	56,455	407,503	103,986
Travel Time Cost						
2018 w/o project	1,188,080	282,513	656,589	46,818	299,770	2,561,086
2018 with project	515,352	126,947	284,095	20,272	130,197	825,506
Saving in 2018	672,728	155,566	372,494	26,545	169,573	1,735,580
2030 w/o project	3,316,492	828,913	255,899	98,811	670,978	6,837,886
2030 with project	1,715,556	427,262	136,622	51,791	349,083	3,535,330
Saving in 2030	1,600,936	401,651	119,277	47,020	321,894	3,302,556

Source: JICA Study Team

21.2.5 Annual Cash Flow

Tables 21.2-12, 21.2-13 and 21.2-14 show annual cash flow of each project. The third column (construction cost) and fourth column (maintenance cost) are cash outflow items, and the fifth column (VOC saving and travel time saving) is a cash flow item. The sixth column is net cash flow calculated from cash inflow minus cash outflow.

Table 21.2-12 Annual Cash Flow of IT1

Unit: USD

	Year	Cash Outflow		Cash inflow	Net cash flow	Weight for discount (12%)	Discounted net cash flow
		Construction cost	Maintenance cost	VOC saving and travel time saving			
1	2013	1,917,300			-1,917,300	0.89	-1,711,875
2	2014	8,176,644			-8,176,644	0.80	-6,518,371
3	2015	8,176,644			-8,176,644	0.71	-5,819,974
4	2016	8,176,644			-8,176,644	0.64	-5,196,405
5	2017		103,701	129,070	25,370	0.57	14,395
6	2018		103,701	174,928	71,227	0.51	36,086
7	2019		103,701	220,785	117,084	0.45	52,963
8	2020		103,701	278,715	175,014	0.40	70,685
9	2021		311,102	351,908	40,806	0.36	14,715
10	2022		103,701	444,401	340,700	0.32	109,696
11	2023		103,701	561,302	457,602	0.29	131,550
12	2024		103,701	709,078	605,377	0.26	155,385
13	2025		103,701	895,910	792,209	0.23	181,554
14	2026		311,102	1,132,159	821,057	0.20	168,005
15	2027		103,701	1,430,940	1,327,239	0.18	242,482
16	2028		103,701	1,808,862	1,705,162	0.16	278,149
17	2029		103,701	2,286,959	2,183,258	0.15	317,979
18	2030		103,701	2,891,869	2,788,168	0.13	362,572
19	2031		311,102	3,657,339	3,346,237	0.12	388,521
20	2032		103,701	4,626,120	4,522,419	0.10	468,825
21	2033		103,701	5,852,378	5,748,677	0.09	532,095
22	2034		103,701	7,404,752	7,301,051	0.08	603,377
23	2035		103,701	9,370,227	9,266,526	0.07	683,758
24	2036		2,074,012	11,859,051	9,785,038	0.07	644,659
25	2037		103,701	15,010,971	14,907,270	0.06	876,895
26	2038		103,701	19,003,145	18,899,445	0.05	992,614
27	2039		103,701	24,060,181	23,956,480	0.05	1,123,405
28	2040		103,701	30,466,866	30,363,166	0.04	1,271,284
29	2041		311,102	38,584,337	38,273,235	0.04	1,430,779
30	2042		103,701	48,870,582	48,766,881	0.03	1,627,737
31	2043		103,701	61,906,471	61,802,770	0.03	1,841,829
32	2044		103,701	78,428,794	78,325,093	0.03	2,084,127
33	2045		103,701	99,372,192	99,268,491	0.02	2,358,396
34	2046		311,102	125,922,386	125,611,284	0.02	2,664,501
				EIRR	12.6%	NPV	2,482,392

Source: JICA Study Team

Table 21.2-13 Annual Cash Flow of IR1

Unit: USD

	Year	Cash Outflow		Cash inflow	Net cash flow	Weight for discount (12%)	Discounted net cash flow
		Construction cost	Maintenance cost	VOC saving and travel time saving			
1	2013	2,672,600			-2,672,600	0.89	-2,386,250
2	2014	35,431,067			-35,431,067	0.80	-28,245,429
3	2015	35,431,067			-35,431,067	0.71	-25,219,133
4	2016		347,476	1,027,047	679,571	0.64	431,880
5	2017		347,476	1,157,100	809,625	0.57	459,403
6	2018		347,476	1,303,623	956,147	0.51	484,414
7	2019		347,476	1,450,146	1,102,670	0.45	498,792
8	2020		1,042,427	1,613,138	570,711	0.40	230,501
9	2021		347,476	1,794,451	1,446,975	0.36	521,794
10	2022		347,476	1,996,144	1,648,668	0.32	530,827
11	2023		347,476	2,220,508	1,873,032	0.29	538,452
12	2024		347,476	2,470,091	2,122,615	0.26	544,823
13	2025		1,042,427	2,747,729	1,705,301	0.23	390,811
14	2026		347,476	3,056,574	2,709,098	0.20	554,335
15	2027		347,476	3,400,134	3,052,659	0.18	557,709
16	2028		347,476	3,782,313	3,434,838	0.16	560,296
17	2029		347,476	4,207,451	3,859,976	0.15	562,184
18	2030		1,042,427	4,680,378	3,637,951	0.13	473,078
19	2031		347,476	5,206,465	4,858,989	0.12	564,162
20	2032		347,476	5,791,688	5,444,212	0.10	564,384
21	2033		347,476	6,442,694	6,095,219	0.09	564,171
22	2034		347,476	7,166,880	6,819,404	0.08	563,573
23	2035		6,949,515	7,972,470	1,022,955	0.07	75,482
24	2036		347,476	8,868,616	8,521,141	0.07	561,391
25	2037		347,476	9,865,499	9,518,023	0.06	559,882
26	2038		347,476	10,974,441	10,626,965	0.05	558,137
27	2039		347,476	12,208,040	11,860,565	0.05	556,184
28	2040		1,042,427	13,580,311	12,537,884	0.04	524,952
29	2041		347,476	15,106,841	14,759,365	0.04	551,753
30	2042		347,476	16,804,972	16,457,496	0.03	549,317
31	2043		347,476	18,693,995	18,346,519	0.03	546,758
32	2044		347,476	20,795,369	20,447,893	0.03	544,091
33	2045		1,042,427	23,132,967	22,090,540	0.02	524,821
				EIRR	4.5%	NPV	-40,702,458

Source: JICA Study Team

Table 21.2-14 Annual Cash Flow of IR2

Unit: USD

	Year	Cash Outflow		Cash inflow	Net cash flow	Weight for discount (12%)	Discounted net cash flow
		Construction cost	Maintenance cost	VOC saving and travel time saving			
1	2013	2,591,260			-2,591,260	0.89	-2,313,625
2	2014	34,311,477			-34,311,477	0.80	-27,352,899
3	2015	34,311,477			-34,311,477	0.71	-24,422,231
4	2016		336,524	3,352,400	3,015,877	0.64	1,916,644
5	2017		336,524	3,522,059	3,185,535	0.57	1,807,558
6	2018		336,524	3,700,719	3,364,195	0.51	1,704,406
7	2019		336,524	3,879,380	3,542,856	0.45	1,602,608
8	2020		1,009,572	4,067,042	3,057,471	0.40	1,234,861
9	2021		336,524	4,264,171	3,927,647	0.36	1,416,349
10	2022		336,524	4,471,253	4,134,729	0.32	1,331,272
11	2023		336,524	4,688,802	4,352,278	0.29	1,251,176
12	2024		336,524	4,917,358	4,580,834	0.26	1,175,786
13	2025		1,009,572	5,157,489	4,147,917	0.23	950,595
14	2026		336,524	5,409,792	5,073,268	0.20	1,038,091

	Year	Cash Outflow		Cash inflow	Net cash flow	Weight for discount (12%)	Discounted net cash flow
		Construction cost	Maintenance cost	VOC saving and travel time saving			
15	2027		336,524	5,674,897	5,338,373	0.18	975,301
16	2028		336,524	5,953,465	5,616,941	0.16	916,245
17	2029		336,524	6,246,193	5,909,669	0.15	860,710
18	2030		1,009,572	6,553,812	5,544,240	0.13	720,971
19	2031		336,524	6,877,094	6,540,570	0.12	759,404
20	2032		336,524	7,216,849	6,880,325	0.10	713,261
21	2033		336,524	7,573,931	7,237,407	0.09	669,892
22	2034		336,524	7,949,237	7,612,713	0.08	629,134
23	2035		6,730,478	8,343,713	1,613,234	0.07	119,037
24	2036		336,524	8,758,351	8,421,827	0.07	554,848
25	2037		336,524	9,194,198	8,857,675	0.06	521,038
26	2038		336,524	9,652,355	9,315,832	0.05	489,275
27	2039		336,524	10,133,980	9,797,456	0.05	459,438
28	2040		1,009,572	10,640,291	9,630,719	0.04	403,231
29	2041		336,524	11,172,570	10,836,046	0.04	405,087
30	2042		336,524	11,732,167	11,395,643	0.03	380,363
31	2043		336,524	12,320,501	11,983,977	0.03	357,143
32	2044		336,524	12,939,067	12,602,543	0.03	335,337
33	2045		1,009,572	13,589,437	12,579,865	0.02	298,869
				EIRR	6.0%	NPV	-28,090,826

Source: JICA Study Team

21.2.6 Calculation of NPV and EIRR

The discount rate to calculate Net Present Value (NPV) is set at 12%, which is the opportunity cost of capital and a criterion for whether a project is feasible or not, from the viewpoint of national economic development.

Weight for the 12% discount is tabulated in the seventh column of Tables 21.2-12, 21.2-13 and 21.2-14. Figures in the eighth column are discounted net cash flow.

Table 21.2-15 NPV and EIRR of Trunk Road Improvement Projects

Name of Project	NPV (million USD)	EIRR (%)
IT1: Kamdini – Gulu Road Improvement	2.5	12.6
IR1: Kitgum – Lira Road Improvement	-40.7	4.5
IR2: Gulu – Acholibur Road Improvement	-28.1	6.0

Source: JICA Study Team

Table 21.2-15 shows NPV and EIRR of each project. NPV is positive and EIRR exceeds 12% in regard to IT1: Kamdini – Gulu Road Improvement project, however, NPV is negative and EIRR is lower than 12% regarding the other two projects.

21.2.7 Sensitivity Analysis

Table 21.2-16 shows the result of the sensitivity analysis. EIRR drops by 0.4 to 0.5 percent when construction cost increases by 10%, and economic benefit (VOC saving and travel time saving) decreases by 10%.

Table 21.2-16 Results of Sensitivity Analysis

Name of Project	Base case	10% increase in construction cost	10% increase in maintenance cost	Unit: percent
				10% decrease in economic benefit
IT1: Kamdini – Gulu Road Improvement	12.6	12.1	12.5	12.1
IR1: Kitgum – Lira Road Improvement	4.5	4.1	4.5	4.0
IR2: Gulu – Acholibur Road Improvement	6.0	5.4	6.0	5.3

Source: JICA Study Team

On the other hand, the increase of maintenance cost does not affect EIRR. The reason comes from the small level of maintenance cost in comparison with construction cost.

EIRR of IT1: Kamdini – Gulu Road Improvement project recorded more than 12%. The project would have robust performance in terms of economic feasibility.

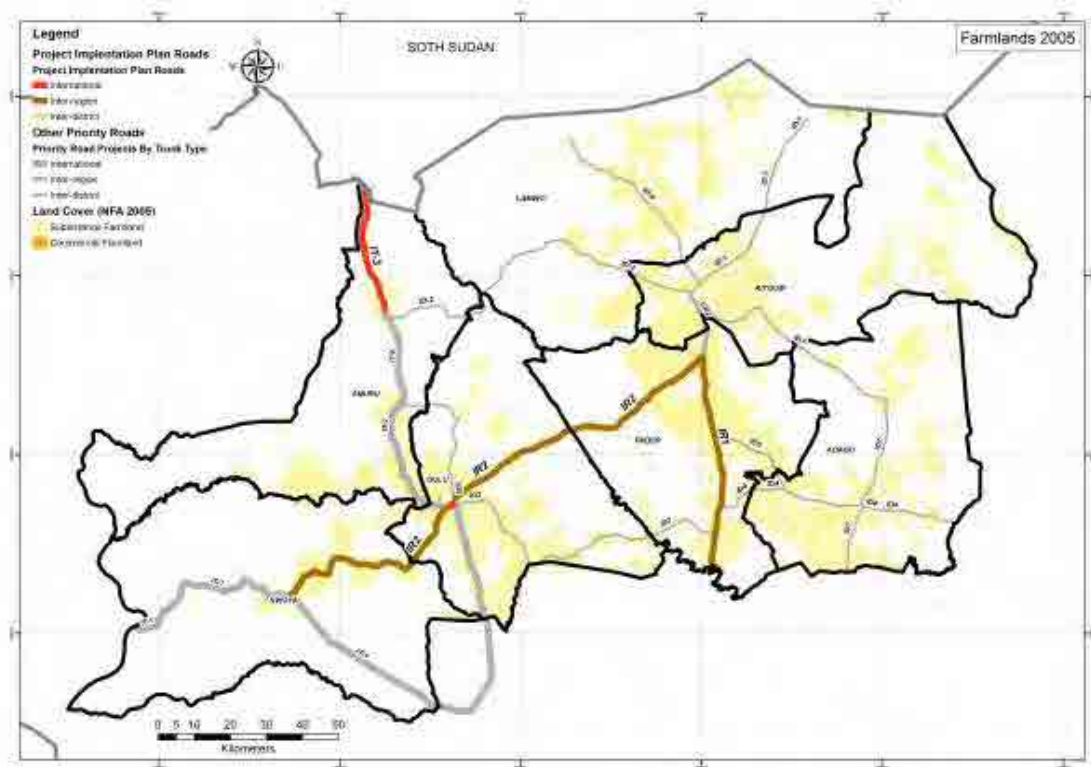
21.3 Other Benefits from the Priority Projects

21.3.1 Benefits from Trunk Road Improvement Projects

Improvement of the trunk roads is expected to bring about the following benefits in terms of regional economic development and social development.

21.3.1.1 Effects on regional economic development

IT1 (Kamdini – Gulu Road) and IR1 (Kitgum – Lira Road) run along farm lands. IR2 (Gulu – Acholibur Road) also runs through farm land near the suburbs of Gulu and Acholibur.



Source: JICA Study Team

Figure 21.3-1 Farm Land and Road Network

In Acholi Sub-region, the following agricultural products are produced.

- For regional consumption (regional trading) purposes: sorghum, millet, cassava, beans, maize, peanuts, and
- For commercial (international export) purposes: cotton and sunflower.

Improvement of these trunk roads enables efficient transport of material (fertilizer and seeds) and agricultural products. In particular, improvement of transport in the rainy season and transporting agricultural products without damage (which is mostly caused by bad road condition) are the expected impacts from the project implementation.

Smooth transportation of agricultural products to Gulu and Kitgum also expands agricultural business. Since these towns work as centres for trans-shipment and distributive processing, farmers along the roads have a chance to start or expand commercial businesses not only for commercial products such as cotton but also regionally consumed products such as sorghum, millet, cassava, etc.

When the Study Team visited the pilot project sites in Oden Sub-county and Matisi Sub-county for impact assessment, it found that open burning was being conducted not only on existing farm land but also on uncultivated land. This means that farmers have decided to expand their farm lands because of improvement in the community access road. The same kind of activities are expected after improvement of the trunk road improvement projects.

The other expected impacts on the regional economic development are caused by accessibility. A typical example is increased employment opportunities for people in the suburban areas of Gullu, Kitgum and Lira because of expansion of the commuting area. Such improvement of accessibility also brings about increased consumption in the towns, commercial activities (selling food and vegetables, for example), etc.

21.3.1.2 Effects on Social Aspects

Improvement of community access roads is emphasized by the GOU and donors, and the projects are included in on-going programs such as NUDEIL, NUSAF and RALNUC. Actually, improvement of access roads has a significant impact on rural people; however, improvement of trunk roads also has an effect in the following aspects as aid programs are continued.

Hospitals and primary health care centres: In the initial stage of a recovery and reconstruction program, construction of primary health care facilities in the rural area is a priority. A typical target is to increase the number of the primary health care centres per village or 1000 population, etc. As time goes on, the target changes to development of a referral system at the regional level. Currently, two top-level hospitals are located in Gulu in Acholi Sub-region. Improvement of the trunk road will contribute to transport of patients to the top-level hospital, and contribute to improvement of medical service. Improvement of the trunk road also supports strengthen the network of the primary healthcare facilities. In general, the human resources of these healthcare centres are lacking. Improvement of the trunk road enables the healthcare centres to dispatch human resources to support each other.

Education: As well as hospitals/ primary healthcare centres, construction of school facilities is the first priority of the initial stage of recovery and reconstruction. After that one of the issues of this area is recruitment of teachers. Teachers have received their training in urban areas, and they want to stay in the urban areas. In the case of Acholi Sub-region, it is supposed that teachers want to stay in towns such as Gulu, Kitgum and Lira, and commute to their schools. Improvement of the trunk road enables such situation. The same issue would be available in the health sector (doctors working in the primary health centres).

Water supply: Boreholes are constructed in the recovery and reconstruction programs. Carrying water from the borehole to their houses is work for women and children in Acholi Sub-region. After improvement of the road network, carrying water would be easier, in particular, in the rainy season. It would be possible to introduce water trucks if the road condition were improved.

21.3.2 Benefits from Municipal Road Improvement Project

The traffic count survey inside of Gulu Municipality was conducted by the Engineering Department of Gulu Municipal Council in June 2011. Table 21.3-1 shows the number of vehicles by types. Although the number of vehicles was calculated for each road, the locations of the traffic count points are not clear.

Table 21.3-1 Results of Traffic Count Survey in Gulu (as of June 2011)

Road Name	Number of Vehicles by Types			
	Motorcycle	Passenger Car	Minibus & light trucks	Trucks
Acholi Road	3,882	867	445	441
Jumo Kenyatta Road	3001	790	285	340
Andrea Olal Road	4,601	1,763	1,332	513
Lagony Road	1,399	601	4,503	558
Gulu Avenue	5,367	1,273	5,112	1,144

Source: Engineer Department, Gulu Municipal Council

Since no demand forecast for the Municipal Road Improvement Project has been conducted, the quantitative benefits of the project are not clear. However, the following benefits could be realized when the project is completed.

The direct benefits could be divided into two types. The first one is improving inter-city transport until bypass roads are constructed in the future (year 2030). Improvement of Sections 1, 2 and 3 brings about such benefit. The second one is improving transport in the business district of Gulu city. Improving of other sections also brings about such benefit.

In addition to that, the following indirect benefits could be pointed out. The first one is a basis of urban infrastructure improvement. Improving roads which form the city blocks is a basis for improving drainage, water supply and sewerage in the future. Formation of city blocks is also a basis for urban development of Gulu which will have a role as an economic center of Acholi Sub-Region. The other benefit is decrease of dust. Towns in Acholi Sub-Region are very dusty, in particular, in the dry season. One of the reasons comes from the unpaved roads. This damages the products that are being sold in these towns. If the project were conducted, the problem would be reduced.

21.4 Conclusions

Out of the three trunk road projects, IT1: Kamdini – Gulu Road Improvement project, is feasible from the viewpoint of national economic development. The project shows robust performance in the sensitivity analysis, too.

The other trunk road projects (IR1: Kitgum – Lira Road Improvement Project and IR2: Gulu – Acholibur Road Improvement Project) are not feasible due to limited traffic; however, it is necessary to consider not only direct effects but also indirect effects on the regional economic development and social aspects. Currently, the main target of the road improvement in the Acholi Sub-region is community access roads; however, improvement of the trunk road network would also be important considering regional economic development in the mid and long term perspectives.

Quantitative benefits of the Municipal Road Improvement Project (MR1) were not analyzed in this report. However, the project produces benefits for both inter-city traffic and traffic in the downtown area of Gulu Municipality. The project is also a basis of urban infrastructure improvement such as drainage, water supply and sewerage, and urban development.

22. NECESSARY ACTIONS FOR PROJECT IMPLEMENTATION

22.1 Introduction

This chapter discusses what actions are necessary to realize the Master Plan. Since the high priority road programs are proposed as the result of various analyses, the next steps are to initiate actions so as to implement them.

22.1.1 High Priority Road Programs

The Study selects three national road improvement programs and one municipal road program as explained earlier. The early implementation of these programs is very essential so as to achieve the regional development goals.

Although the importance of early implementation of high priority programs has been recognized, the scopes of the programs are rather extensive with total lengths of 60-120km and the cost of the programs might require about a million US dollars/km, which may not be covered by the state road development budget except for the Gulu Municipal Road Improvement Program.

The Road Fund in Uganda has been in effect from July 2010, however the fund is under the control of the Ministry of Finance that means that there is no flexibility to use the fund by road administrative agencies such as MoWT and UNRA and it sometimes is used for other objectives than road development and maintenance. In other words the Road Fund system does not work as expected.

The budget allocation to the road sector decreases year by year. For example, the budget of the sector in 2010/11 was 14% of the total state budget while the budget in 2008/09 was 17%. This trend is expected to continue up to 2015 and the budgets will stay at only 12-13% for those years.

Moreover, it is said that the backlog for proposed national road network improvements and rehabilitation in UNRA is about 2 billion USD in construction costs and they all await the arrangement of funding.

Under these circumstances, the important action is to arrange for the high priority programs to be ranked high in the national road development policy/strategy, which would result in earlier implementation of these programs.

Among the programs, IT1: Kamidini – Gulu Road Improvement Program has the advantage that the implementation of its neighboring sections, which are the Kafu-Karuma-Kamidini

section and the Gulu-Atiak- Nimule section, have been committed to with financial assistance from IDA (International Development Association) and WB/JICA, respectively. This means that the Kamidini- Gulu section is the only one still outstanding along the northern corridor connecting to South Sudan and it should be implemented in near future otherwise the corridor will not function as expected.

Besides, this Study confirms the project feasibility and its economic viability and that automatically makes the program a high priority.

On the other hand, the other two programs (i.e. IR1: Gulu-Acholibur Road Section and IR2: Kitgum-Lira Road Section) are expected to have rather less traffic volume even in 2018 and 2030 and the Study, thus, does not confirm their project feasibility.

Most of the development partners have criteria for making decisions for funding which are:

- i) The existence of a rational plan;
- ii) Prioritization within the plan based on economic and social criteria, and
- iii) Placing the proposals within the overall assistance strategies of the country and various development partners

As the two programs meet the criteria of i) and ii) above, the two programs still need authorization in regard to iii) before the development partners will consider the funding.

The GOU is undertaking preparation of RSDP3: Road Sector Development Plan 3 which is a consequence of the RSDP2 and if the RSDP3 assigns them high priorities it would give them an advantage in terms of donor funding.

It is said that the EU intends to introduce the idea for new loan with a larger budget with expectations of repayment from Ugandan oil money and the EU focuses on nation wide support in the transport sector.

The Study Team has had discussions with MoWT in terms of donor funding, new EU funding in particular, for high priority road programs and advised them to include these programs in the RSDP3.

In addition to the national roads improvement programs, the Study Team has given advice and support in preparation of the application of the MR1: Gulu Municipal Road Improvement for Japan's Grant Aid.

The general criteria of the Japan's Grant Aid is to contribute to i) Poverty Reduction/Improvement of Living Standard and ii) Facilitation of International Freight Distribution by the program.

The MR1 is expected to contribute to both by increase of industrial capacities in Gulu that would result in creation of job opportunities for IDPs and facilitate the movement of international freight along the Central Corridor to South Sudan.

The advice and supports given to MoWT and Gulu Municipality are how to determine the scope of the program and to prepare an IEE so as to satisfy the criteria.

As a result, the MoWT prepared the application for the MR1:Gulu Municipal Road Improvements and it is about to submit it to the Japanese Embassy in Uganda as of February 2012.

22.2 Road improvement Projects in On-going Programs

22.2.1 Other Road Maintenance Programs

At present, the following programs are being carried out in the Study Area.

Table 22.2-1 On-going Programs and Selection Criteria of Road Projects

Name of Program	NUDEAL Northern Uganda Development of Enhanced Local Government Infrastructure and Livelihood Program	CAIIP2 Community Agricultural Infrastructure Improvement Programme	NUSAF2 Second Northern Uganda Social Action Fund	RALNUC2 Restoration of Agricultural Livelihoods in Northern Uganda, Phase II
Financer/Donor	USAID	ADB	World Bank	DANIDA
Budget	30 million USD	82.5 million USD	100 million USD	20 million USD (Sum of RALNUC2 and DAR2)
Target District	Gulu, Kitgum, Lamwo, Amuru, Oyam, Nwoya districts	Amuru, Nwoya Gulu Kitgum Pader Lamwo Agago districts from Acholi Sub-region; Total 40 districts	Amuru, Gulu Kitgum Pader districts from Acholi Sub-region; Total 40 districts	Amuru and Nwoya districts
Program period	3 years from 2009 in the initial stage; expanding one year due to delay of road projects	From 2009 to 2014	From 2009 to 2014	From 2009 to 2013
Target road	Community access roads	District road and community access roads	Community access roads	Community access roads
Criteria for selection of projects	12 criteria such as no land dispute, and not new construction but improvement, etc.	Decided by district engineer based on district plan	Decided from district plan and local needs; limited budget allocation for road projects	Decided from district plan and local needs; Distribution of Ushs2.4 million per kilometer for road project

Source: JICA Study Team

These programs aim to improve maintenance conditions in the District Road Network and its lower class roads.

23. CONCLUSIONS AND RECOMMENDATIONS

23.1 Conclusions

(1) Rural Road Network for contributing to Regional Development

The development plan for the rural road network was established to be conducive to comprehensive regional development in Acholi sub-region. The development direction of Acholi sub-region was identified based upon reviews of a series of development plans in Uganda such as the “Five-year National Development Plan for Uganda (NDP)” and the “Peace, Recovery Development Plan for Northern Uganda (PRDP)” and the “Five-year District Development Plans (DDPs)”. The future vision of the study area for regional development was defined mainly in consideration of the DDPs in relevant districts.

Additionally, the mutual relationship between Acholi sub-region and other neighbouring regions and countries was also taken into account in the plan. Notably, South Sudan became independent in July 2011 and was considered as one of the most important countries for Acholi sub-region. Field surveys in South Sudan and a literature review were conducted in order to grasp the social, economic and environmental condition. Furthermore future development plans and road conditions in the southern part of South Sudan beyond of the border of Acholi sub-region were investigated through the survey.

In order to promote comprehensive regional development in the study area, the double corridor structure is proposed as the most favourable spatial structure. It consists of two main routes: one connects between Kampala and Juba via Gulu, the other is between Lira and Torit via Kitgum. Based upon this structure, the road network and development scenario were established for contributing to enhance the regional economy and improve the living environment.

(2) Benefit to IDPs

The study proposes the improvement of access to social infrastructure as a development goal in the short and mid terms and improvement of CAR's by LBT as a practical approach to the goal.

The Study carried out the Pilot Projects to prove the LBT approach for the maintenance of CARs. As a result, the Study confirmed the applicability of the approach and some of benefits provided to IDPs by the Pilot Project.

As for the physical aspect of the maintenance work, the study applied sand bags (Donou) for earthwork as well as protection of the drainage structures. As a result sand bags were confirmed as applicable for the works.

(3) Study Roads

Studied district roads and CARs are all marrum roads except a few sections which have low traffic volumes and would also be able to carry the future traffic loads in both the mid and long terms that are projected as the result of the traffic demand forecast.

Those roads are expected to have lower economic feasibility if they are to be tarmac standard roads. Therefore, the roads are not selected as high priority project roads.

Since the progress of damage to the unpaved road is governed by natural conditions that are not predictable, the Study proposed a maintenance work methodology and institutional set up rather than proposing that the District and CARs networks be given high priority in the planning.

The study raised an issue of how to maintain the road networks so that they would be passable throughout the year. In this regard, the study pointed out issues to overcome by the Districts, Sub counties, governmental institutions and local contractors and proposed a way forward.

(4) Conformity/ Harmonization with Existing Road Network Development Plans

The selected high priority roads are generally related to ongoing projects such as the Gulu – Atiak- Nimule road. The early implementation of the high priority road projects is expected to bring synergy effects to regional economy with ongoing projects.

It is, therefore, important that conformity and harmonization of the existing road projects and policies are greatly considered in the planning.

As for the community road level planning, since there are many development programs by the donors such as the CAIP of the AfDB and NUDEIL of USAID, the study held close and frequent discussions with such implementing agencies.

(5) Realization of the Study Results

To realize the study results, economic justification (i.e. feasibility) is required for the execution of a project. In this regard, the study estimated EIRR, which is one of the criteria for project appraisal by major donors, on each high priority project. As a result, IT1 Kamdini-Gulu road section improvement showed an EIRR of 12.5%.

In addition, the study team supported preparation of the application for Japan's Grant Aid on MR1 Gulu Municipal Road Improvement since the project contents meet the implementation policy of the Japan's Grant which include the satisfaction of basic human needs and the improvement of the international freight corridor.

(6) Utilization of Existing Study Outputs

This study developed lessons learned from the existing JICA Amuru/Nwoya study. The study approach was the same as the JICA Amuru/Nwoya Study and its results were effectively used in planning in this study.

(7) Technical Transfer

In forming the regional development policy, the study team worked together with the C/Ps. In addition, the study team collected opinions of the C/Ps regarding the road development scenarios as part of the work for the IEE. Those approaches were also transferred to the C/Ps for the DDP preparations.

GIS training also has been given to the C/Ps. In particular, the road inventory survey training was included as part of the training. The effective utilization of GPS was transferred which can be applied to C/Ps regular maintenance activities.

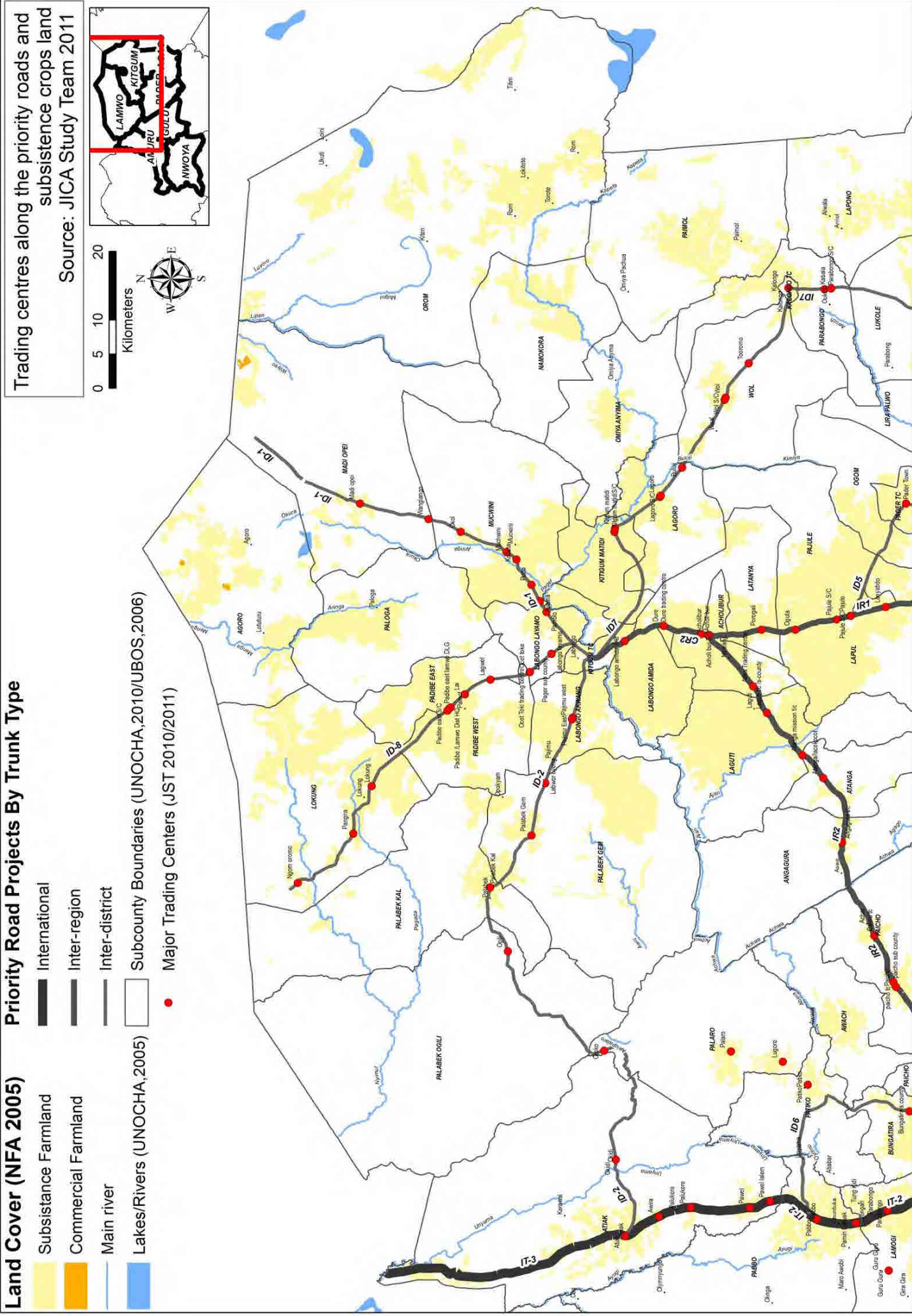
23.2 Recommendations

- 1) In order to expand economic activities in Acholi Sub-region, It is recommended to start the High Priority Projects as soon as possible, expecting the synergic effects with the loan projects currently in progress between Gulu and Nimule. Because Acholi Sub-region has fertile lands there is a positive potential for high agricultural productivity, therefore, it is expected that development of priority feeder roads and CARs in addition to trunk roads will also contribute to expansion of economic activities in this area.
- 2) In the rural area of Acholi Sub-region where almost all IDP had already resettled, it is expected to activate the regional economy through exploiting the close market of South Sudan and providing technical assistance which will lead the current dominant subsistence agriculture into commercial agriculture.
- 3) In order to carry out strategic industrial development in Acholi Sub-region, it is recommended to consider the borderless framework including South Sudan. In the near future, Acholi Sub-region may lead Northern Uganda and the Southern part of South Sudan through the prosperity of the two major service centres, Gulu city and Kitgum city. This will be realized by promoting small and medium scale industries, such as food and processing, to those cities through providing software measures such as a “border treaty with low hurdles”, “deregulation of taxation” and “simplification of the land tenure system” as well as hardware measures such as developing infrastructure and future land use plans.
- 4) It is viewed that “capacity development” for each district will be required considering the new government policy of using a “force account” to maintain district roads. Regarding maintenance of CARs, improvement of management ability of contractors and awareness-rising for residents regarding LBT will also be required. To respond to these requirements, it is recommended to request “technical assistance programs” provided by donor countries including Japan.
- 5) Determining the best method to improve the district roads and CARs is a quite important challenge for each district. However, in the current DDP that has been prepared by each district, there are only simple lists of projects for road improvement and there is no reason given as to why those road projects are economically and socially important. From this point of view, in this study, it is recommended to utilize GIS maps to prove the priority level of specific projects among the road sector development plan, with cooperation of MoWT in the field of graphic processing.

APPENDIX

INITIAL ENVIRONMENTAL EXAMINATION (IEE)

REFERENCED LOCATION MAPS



Trading centres along the priority roads and subsistence crops land
Source: JICA Study Team 2011

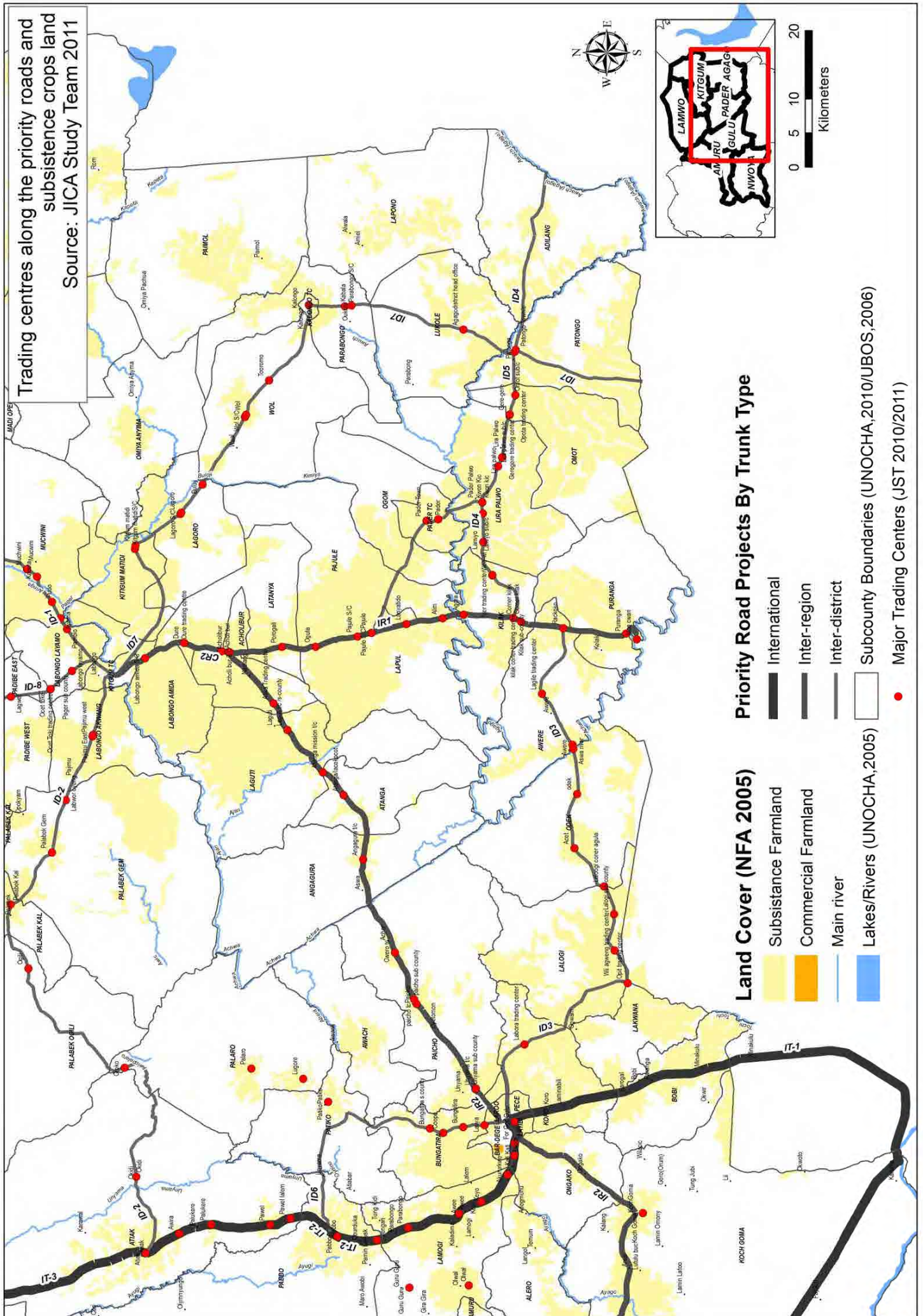
Priority Road Projects By Trunk Type

Land Cover (NFA 2005)

- Subsistence Farmland
- Commercial Farmland
- Main river
- Lakes/Rivers (UNOCHA,2005)
- International
- Inter-region
- Inter-district

- Subcounty Boundaries (UNOCHA,2010/UBOS,2006)
- Major Trading Centers (JST 2010/2011)


Trading centres along the priority roads and subsistence crops land
Source: JICA Study Team 2011



- Priority Road Projects By Trunk Type**
- International
 - Inter-region
 - Inter-district
- Land Cover (NFA 2005)**
- Subsistence Farmland
 - Commercial Farmland
 - Main river
 - Lakes/Rivers (UNOCHA,2005)
- Subcounty Boundaries (UNOCHA,2010/JUBOS,2006)**
- Major Trading Centers (JST 2010/2011)

Land Cover (NFA 2005)

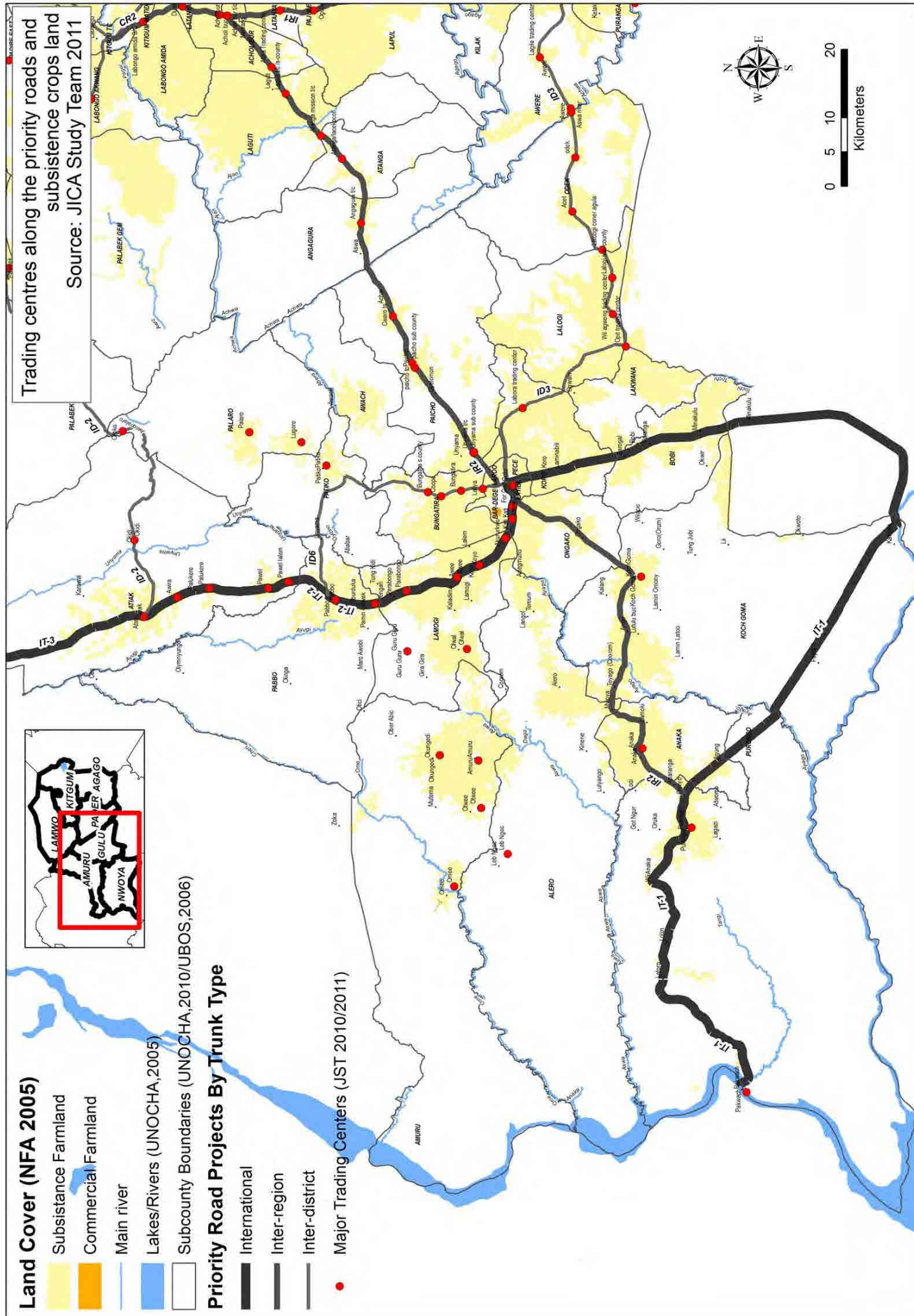
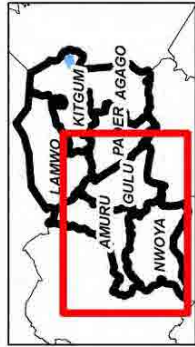
-  Subsistence Farmland
-  Commercial Farmland
-  Main river
-  Lakes/Rivers (UNOCHA,2005)

 Subcounty Boundaries (UNOCHA,2010/UBOS,2006)

Priority Road Projects By Trunk Type

-  International
-  Inter-region
-  Inter-district
-  Major Trading Centers (JST 2010/2011)

Trading centres along the priority roads and subsistence crops land
Source: JICA Study Team 2011



Forest Reserves Along Priority Roads

- ▲ Central Forest
- Local Forest

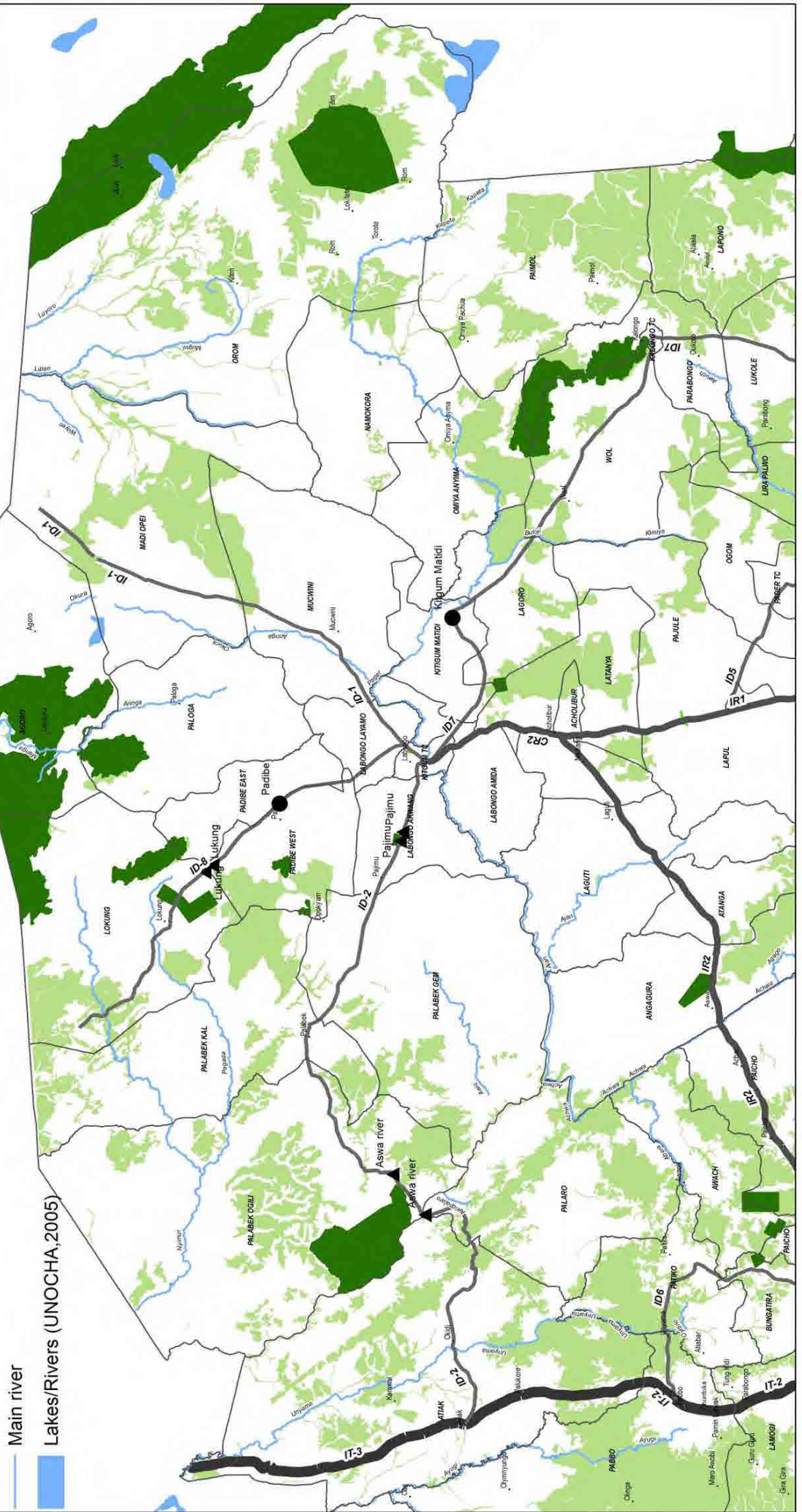
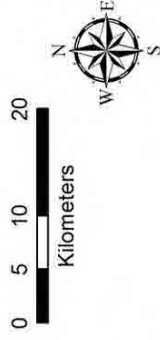
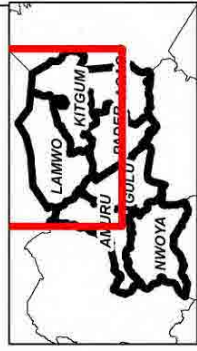
Protection Area Type (NFA, 2005 / WCS/2011)

- Central Forest Reserve
- Local Forest Reserve
- Woodland
- Main river
- Lakes/Rivers (UNOCHA, 2005)

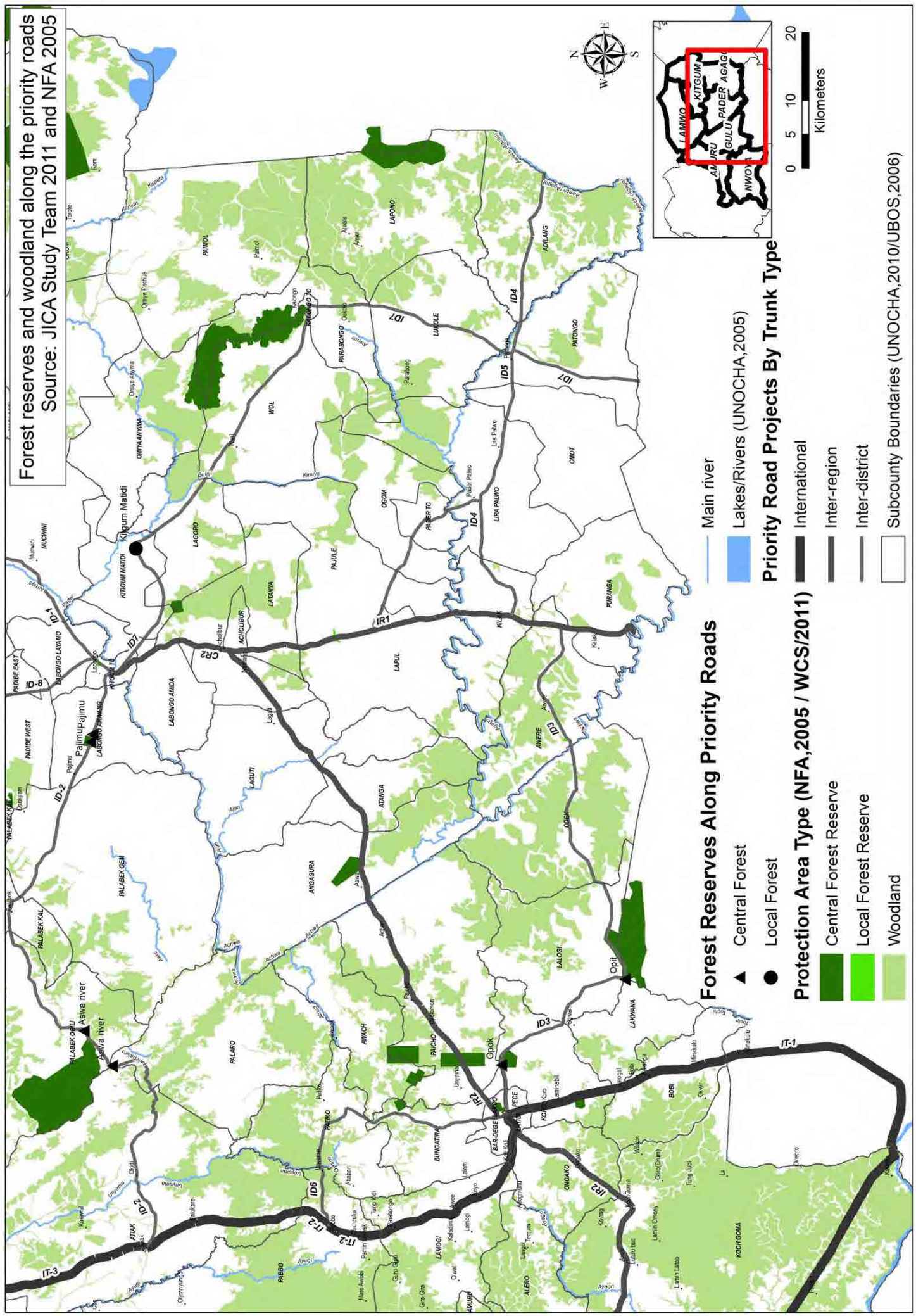
Priority Road Projects By Trunk Type

- International
- Inter-region
- Inter-district
- Subcounty Boundaries (UNOCHA, 2010/JUBOS, 2006)

Forest reserves and woodland along the priority roads
 Source: JICA Study Team 2011 and NFA 2005



Forest reserves and woodland along the priority roads
 Source: JICA Study Team 2011 and NFA 2005



Forest Reserves Along Priority Roads

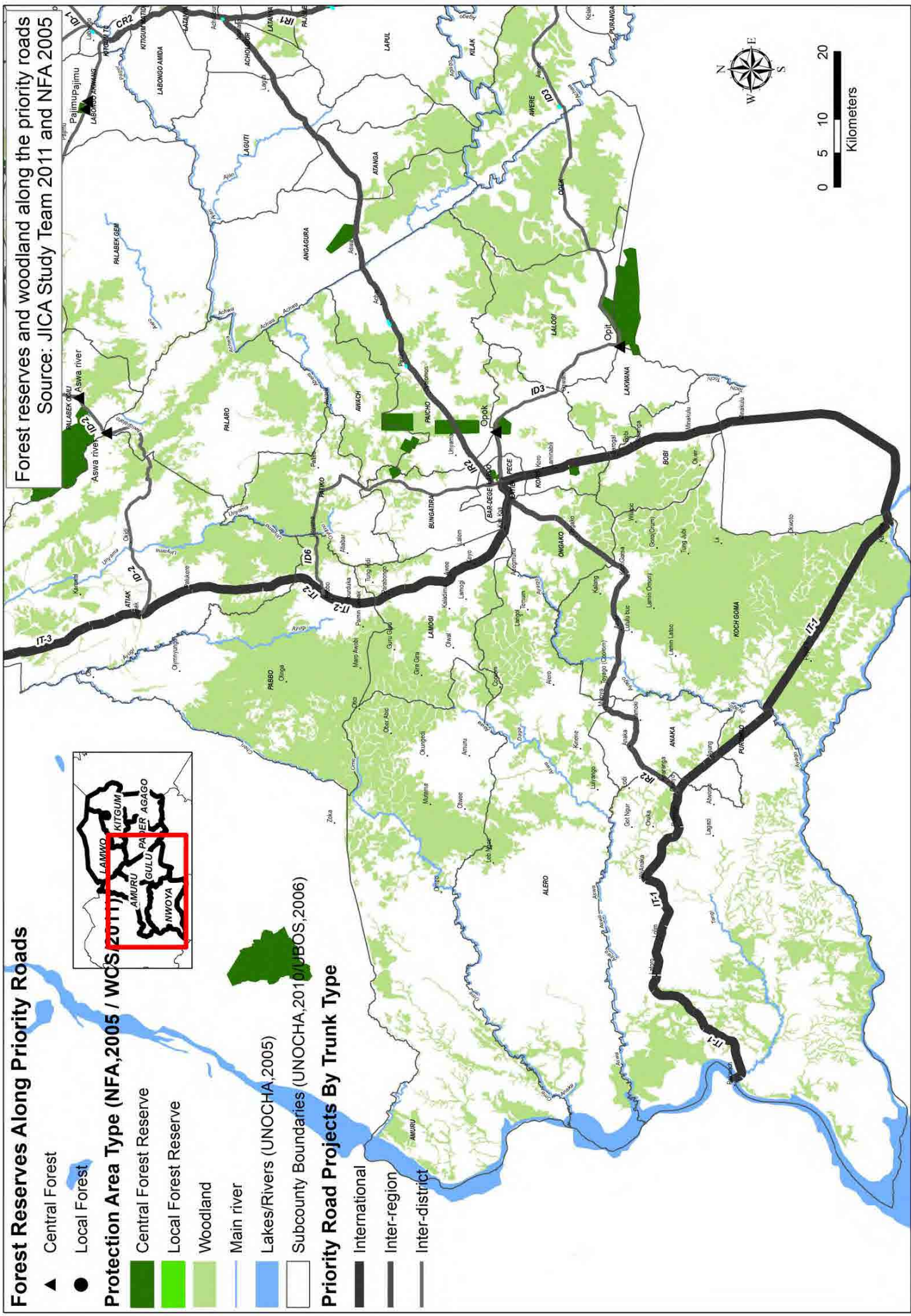
- ▲ Central Forest
- Local Forest

Protection Area Type (NFA,2005 / WCS/2011)

- Central Forest Reserve
- Local Forest Reserve
- Woodland

Priority Road Projects By Trunk Type

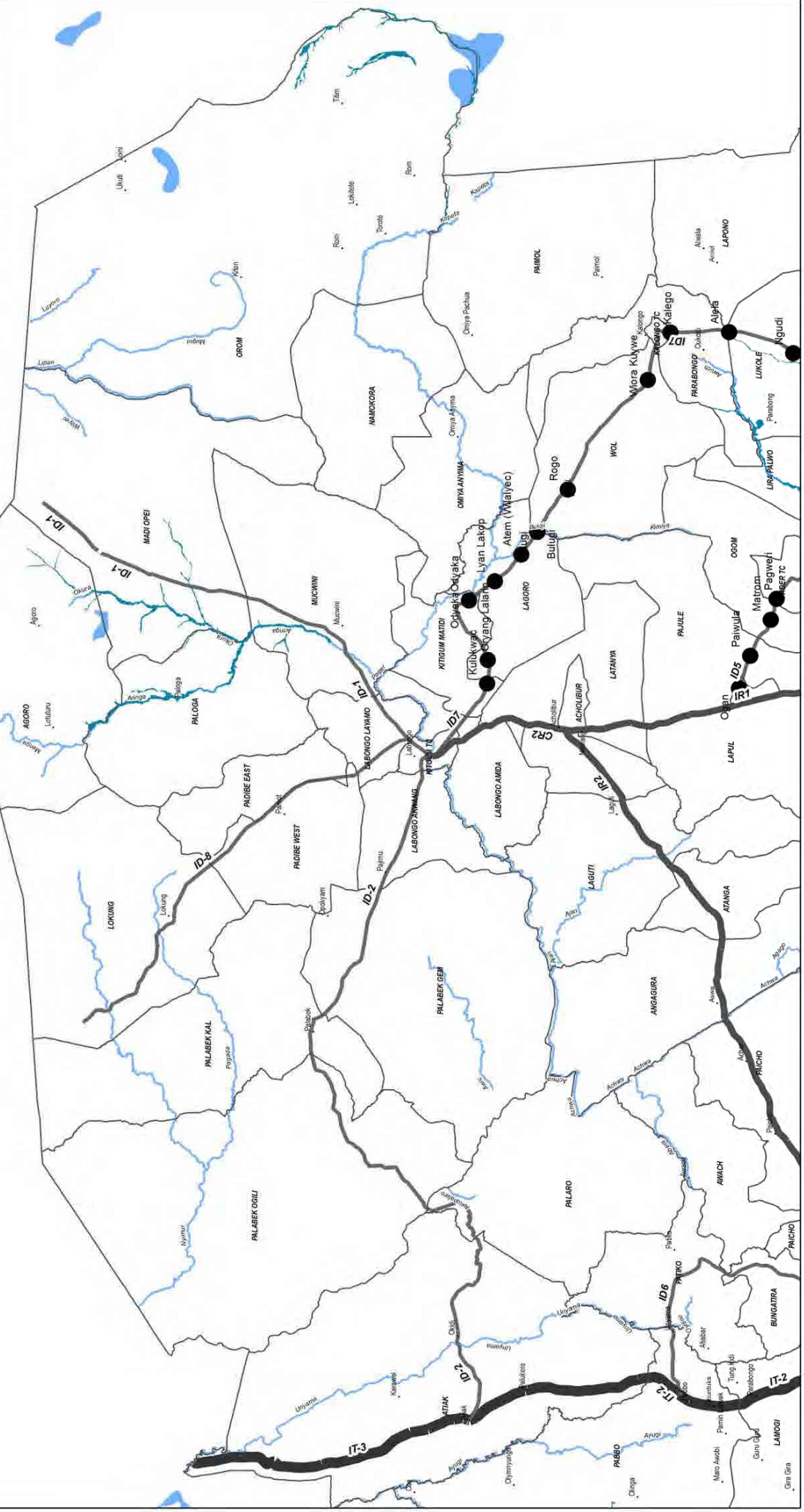
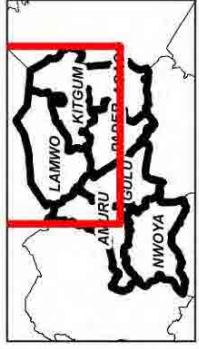
- Main river
- Lakes/Rivers (UNOCHA,2005)
- International
- Inter-region
- Inter-district
- Subcounty Boundaries (UNOCHA,2010/UBOS,2006)



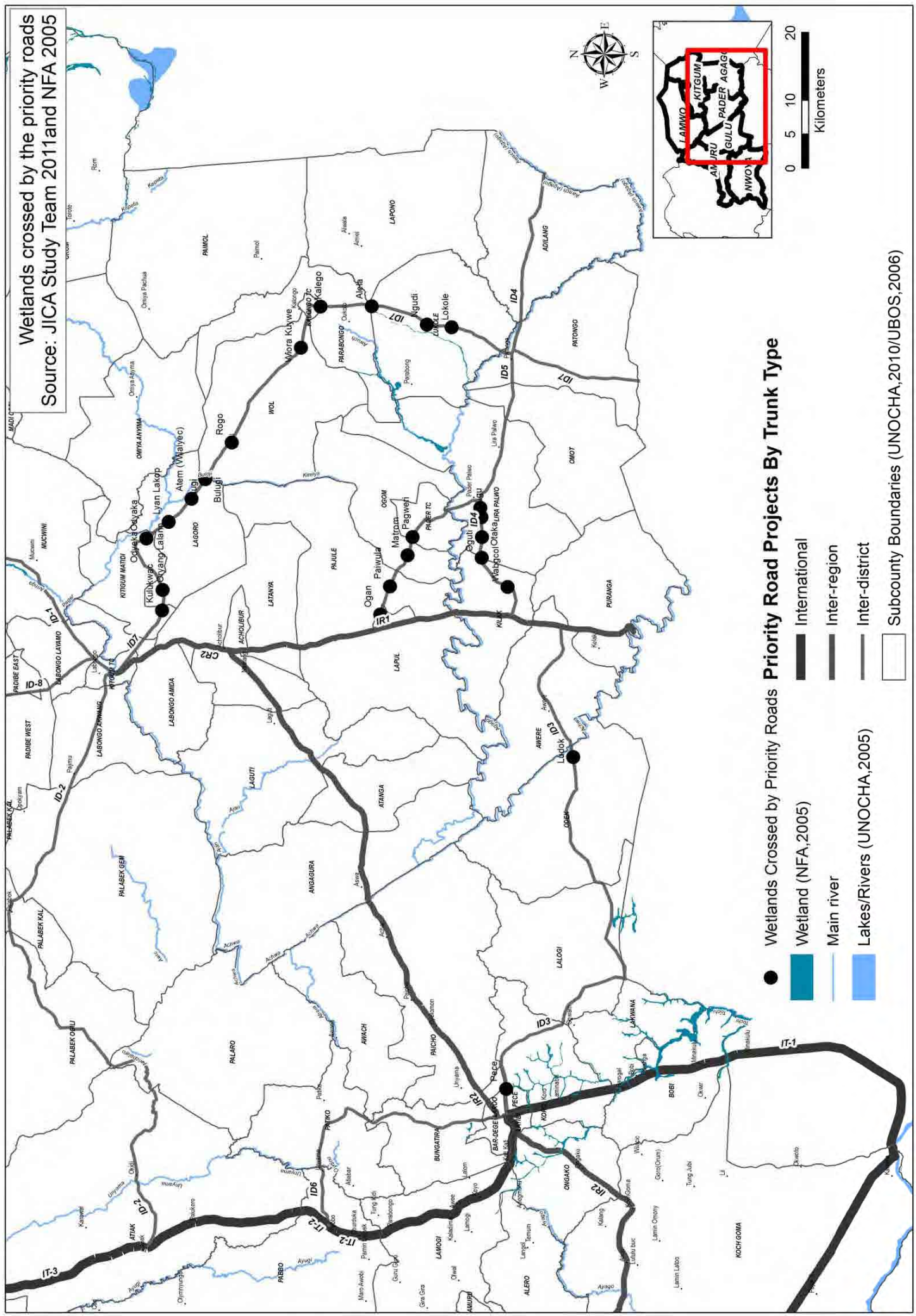
Wetlands Crossed by Priority Roads **Priority Road Projects By Trunk Type**

Wetlands crossed by the priority roads
Source: JICA Study Team 2011 and NFA 2005

- Wetlands Crossed by Priority Roads
- Wetland (NFA,2005)
- Main river
- Lakes/Rivers (UNOCHA,2005)
- International
- Inter-region
- Inter-district
- Subcounty Boundaries (UNOCHA,2010/UBOS,2006)



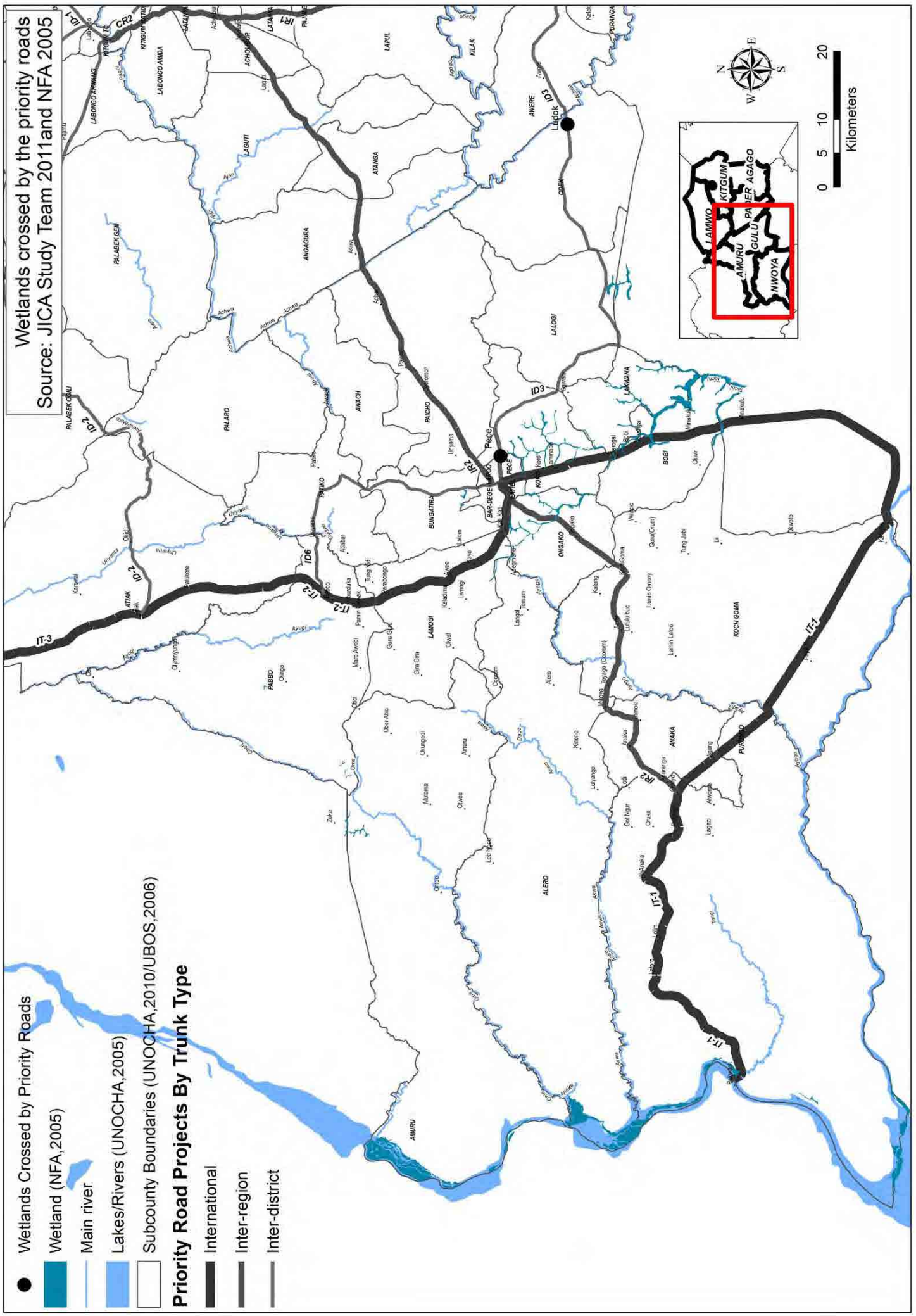
Wetlands crossed by the priority roads
Source: JICA Study Team 2011 and NFA 2005



Priority Road Projects By Trunk Type

- Wetlands Crossed by Priority Roads
- Wetland (NFA, 2005)
- Main river
- Lakes/Rivers (UNOCHA, 2005)
- International
- Inter-region
- Inter-district
- Subcounty Boundaries (UNOCHA, 2010/UBOS, 2006)

Wetlands crossed by the priority roads
 Source: JICA Study Team 2011 and NFA 2005










● Wetlands Crossed by Priority Roads
 Wetland (NFA,2005)
 Main river

Lakes/Rivers (UNOCHA,2005)
 Subcounty Boundaries (UNOCHA,2010/UBOS,2006)

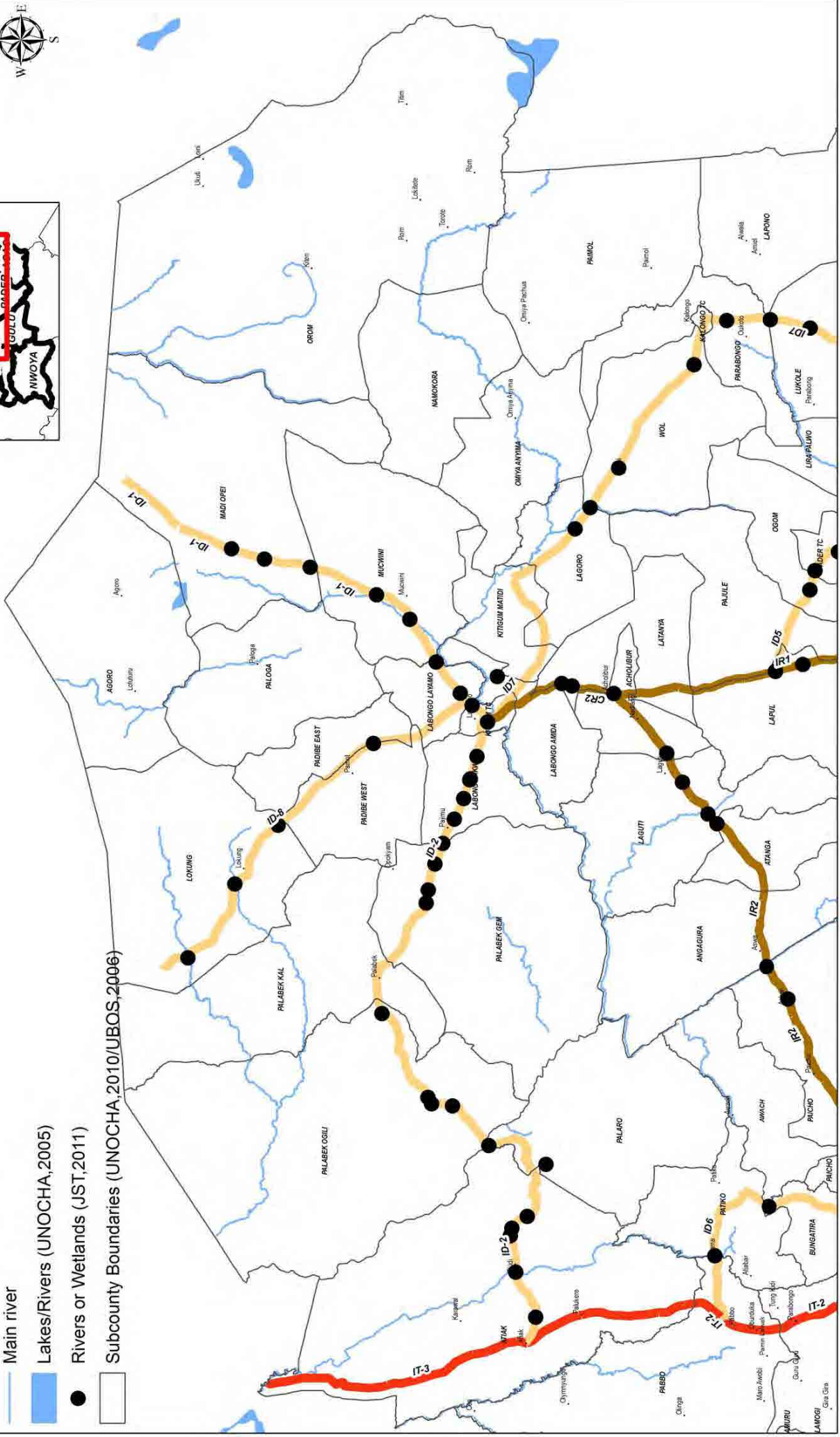
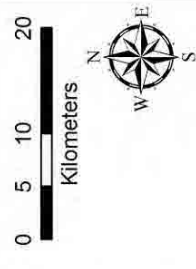
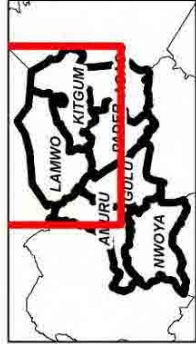
Priority Road Projects By Trunk Type

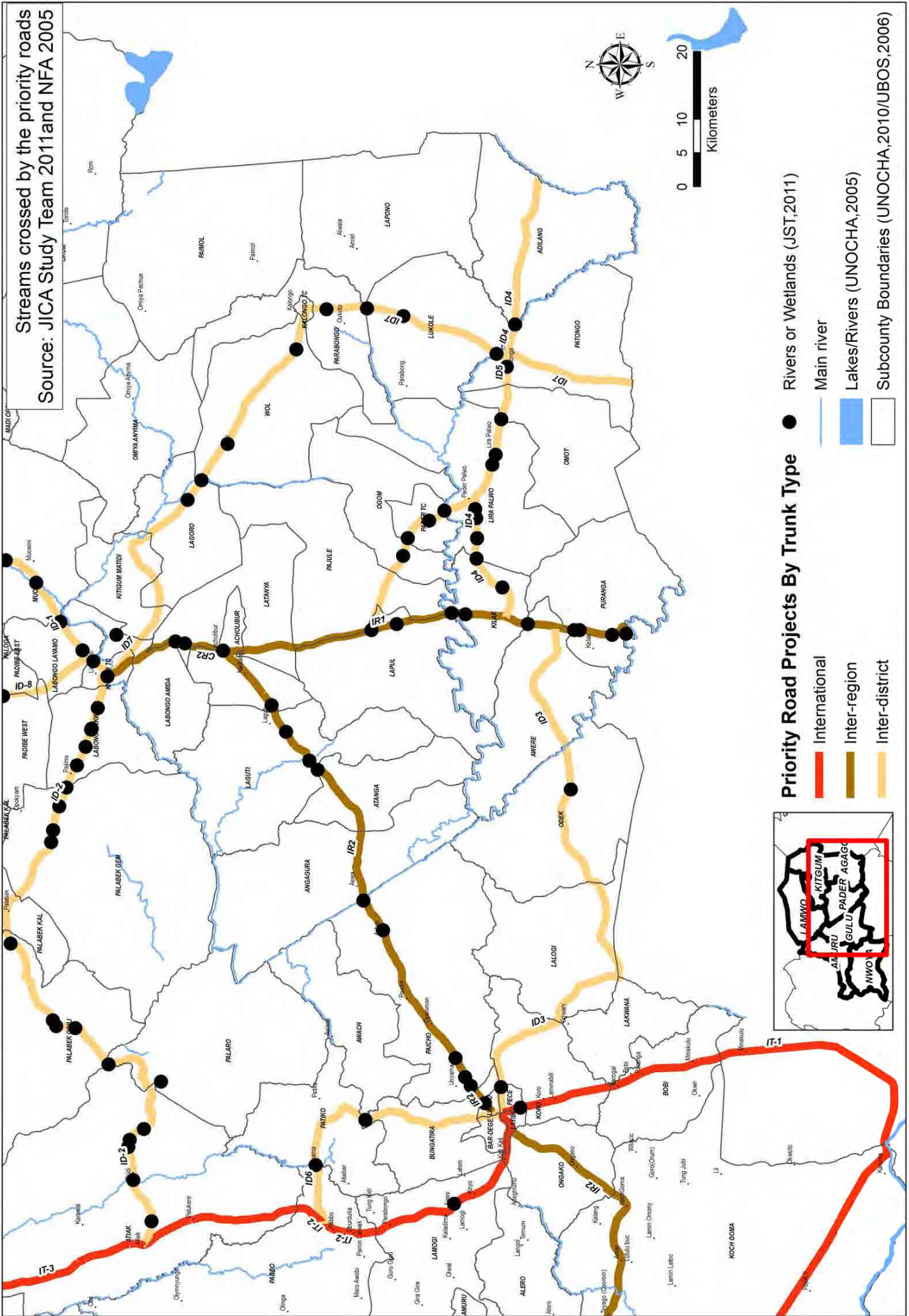
International
 Inter-region
 Inter-district

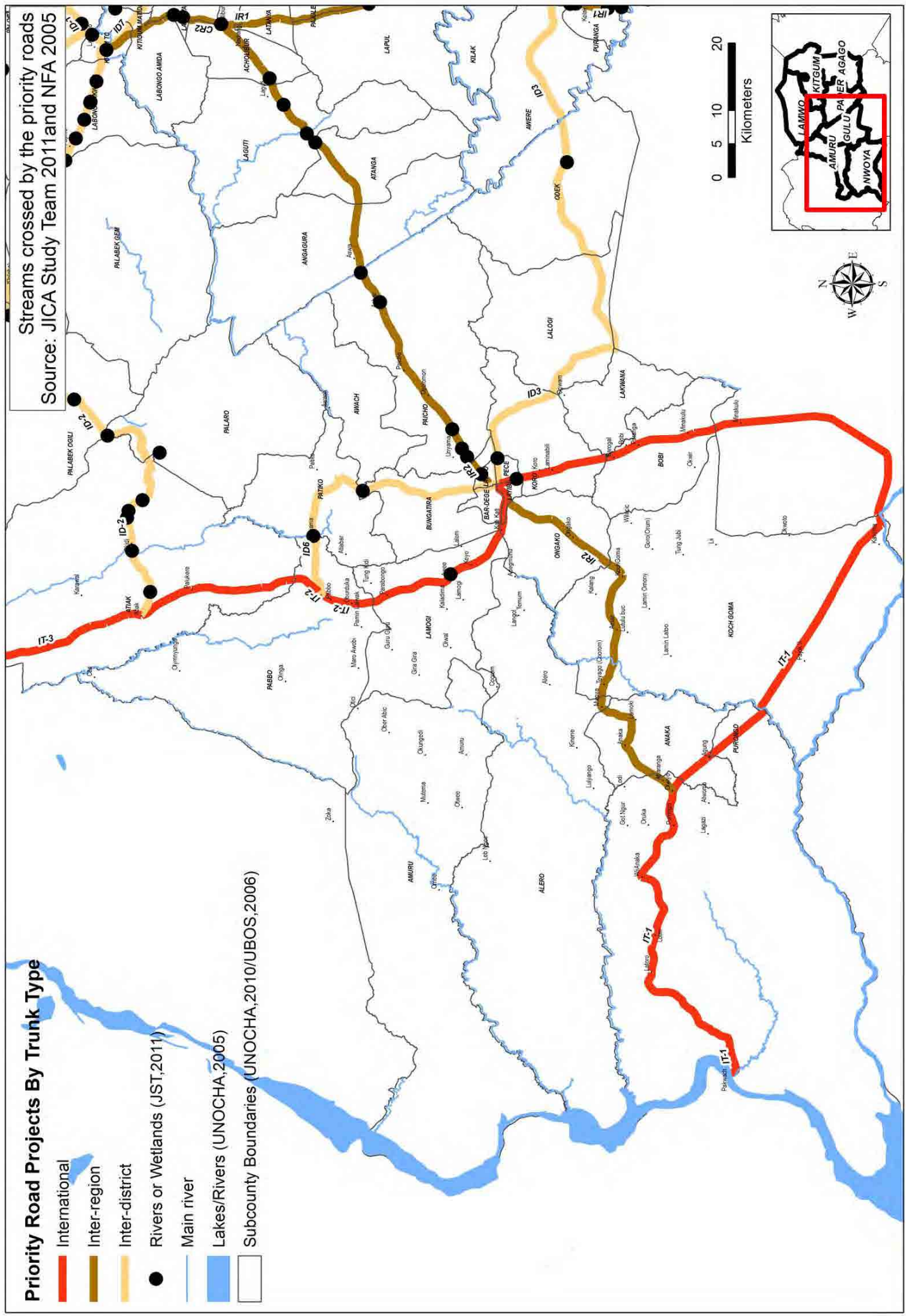
Priority Road Projects By Trunk Type

-  International
-  Inter-region
-  Inter-district
-  Main river
-  Lakes/Rivers (UNOCHA,2005)
-  Rivers or Wetlands (JST,2011)
-  Subcounty Boundaries (UNOCHA,2010/UBOS,2006)

Streams crossed by the priority roads
 Source: JICA Study Team 2011and NFA 2005



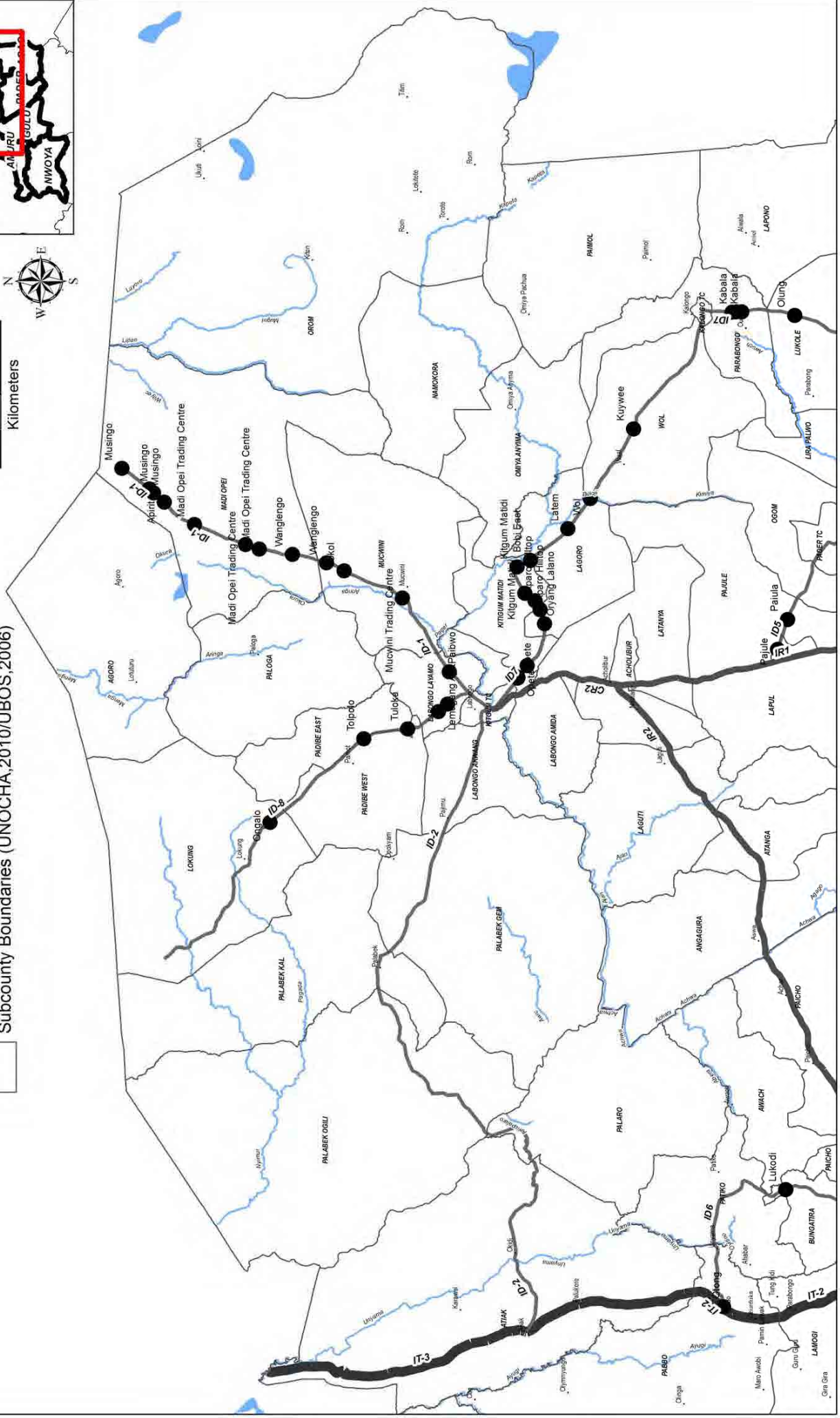
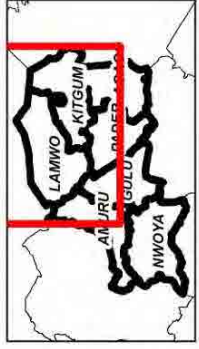
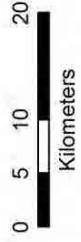




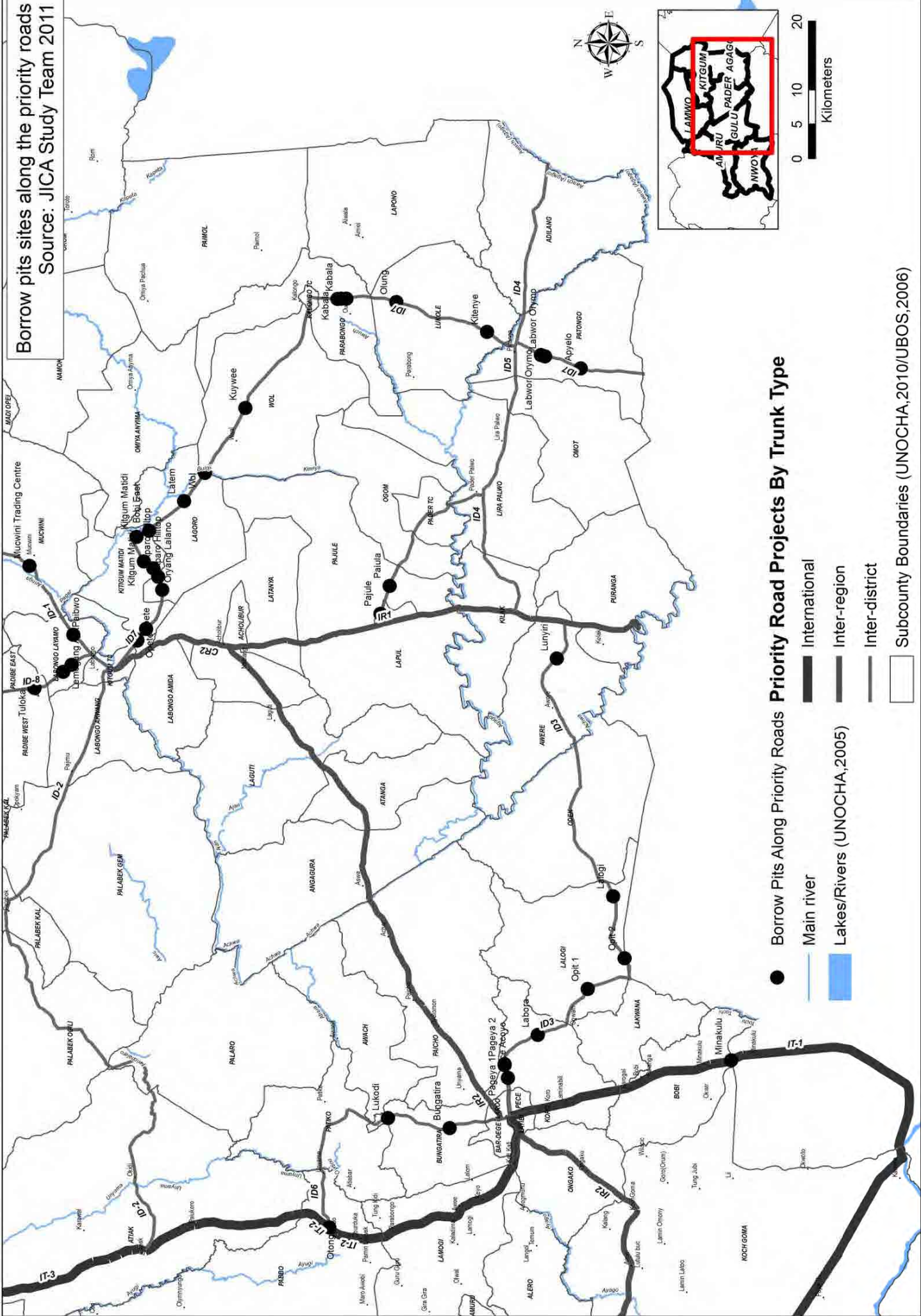
Borrow Pits Along Priority Roads Priority Road Projects By Trunk Type

Borrow pits sites along the priority roads
Source: JICA Study Team 2011

- Borrow Pits Along Priority Roads
- Main river
- Lakes/Rivers (UNOCHA,2005)
- International
- Inter-region
- Inter-district
- Subcounty Boundaries (UNOCHA,2010/UBOS,2006)

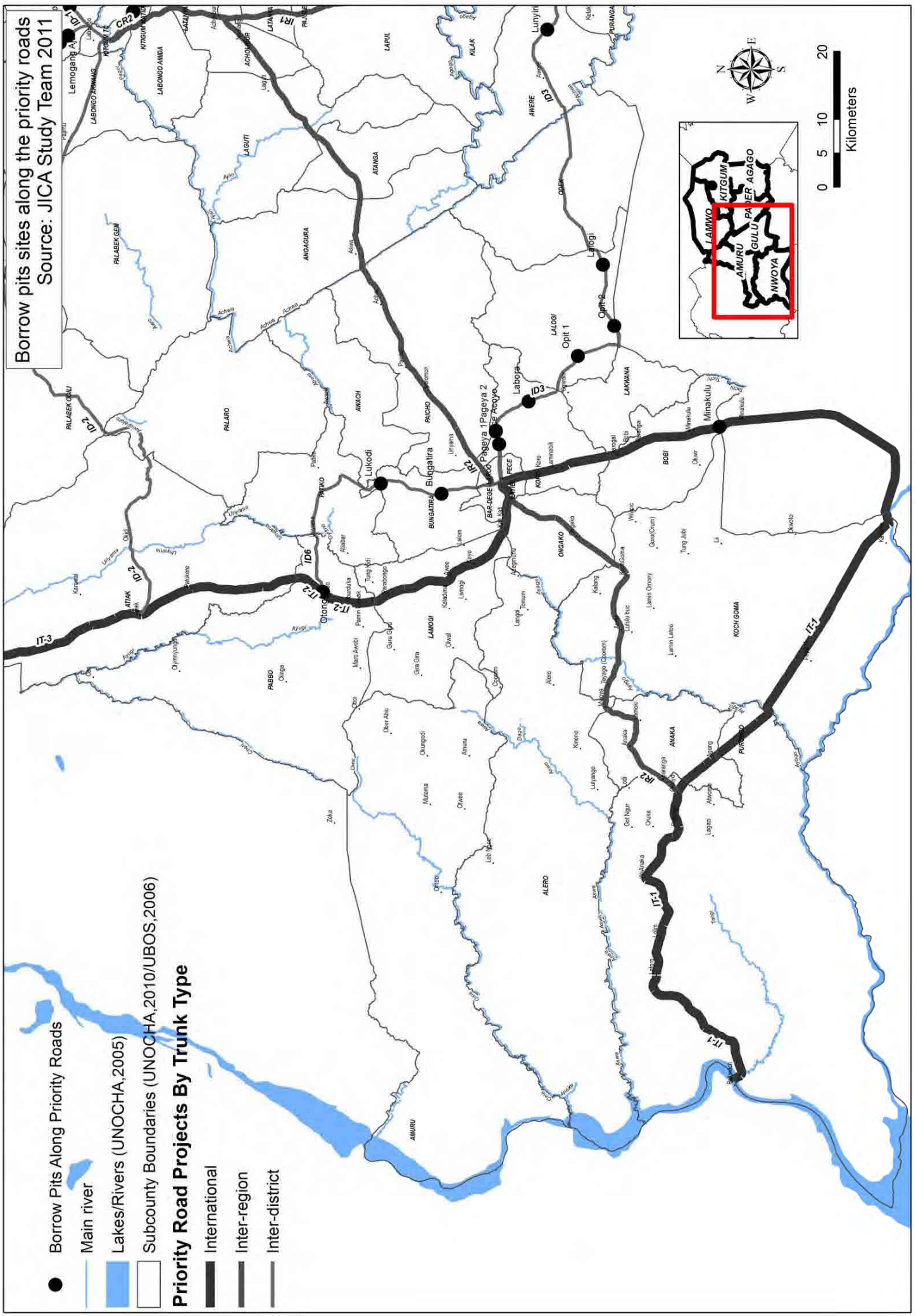


Borrow pits sites along the priority roads
Source: JICA Study Team 2011

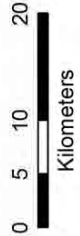
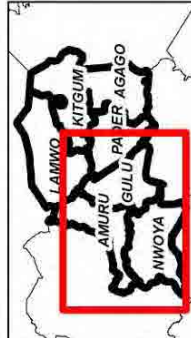


- Borrow Pits Along Priority Roads
- International
- Inter-region
- Inter-district
- Subcounty Boundaries (UNOCHA,2010/JUBOS,2006)
- Main river
- Lakes/Rivers (UNOCHA,2005)

Borrow pits sites along the priority roads
Source: JICA Study Team 2011



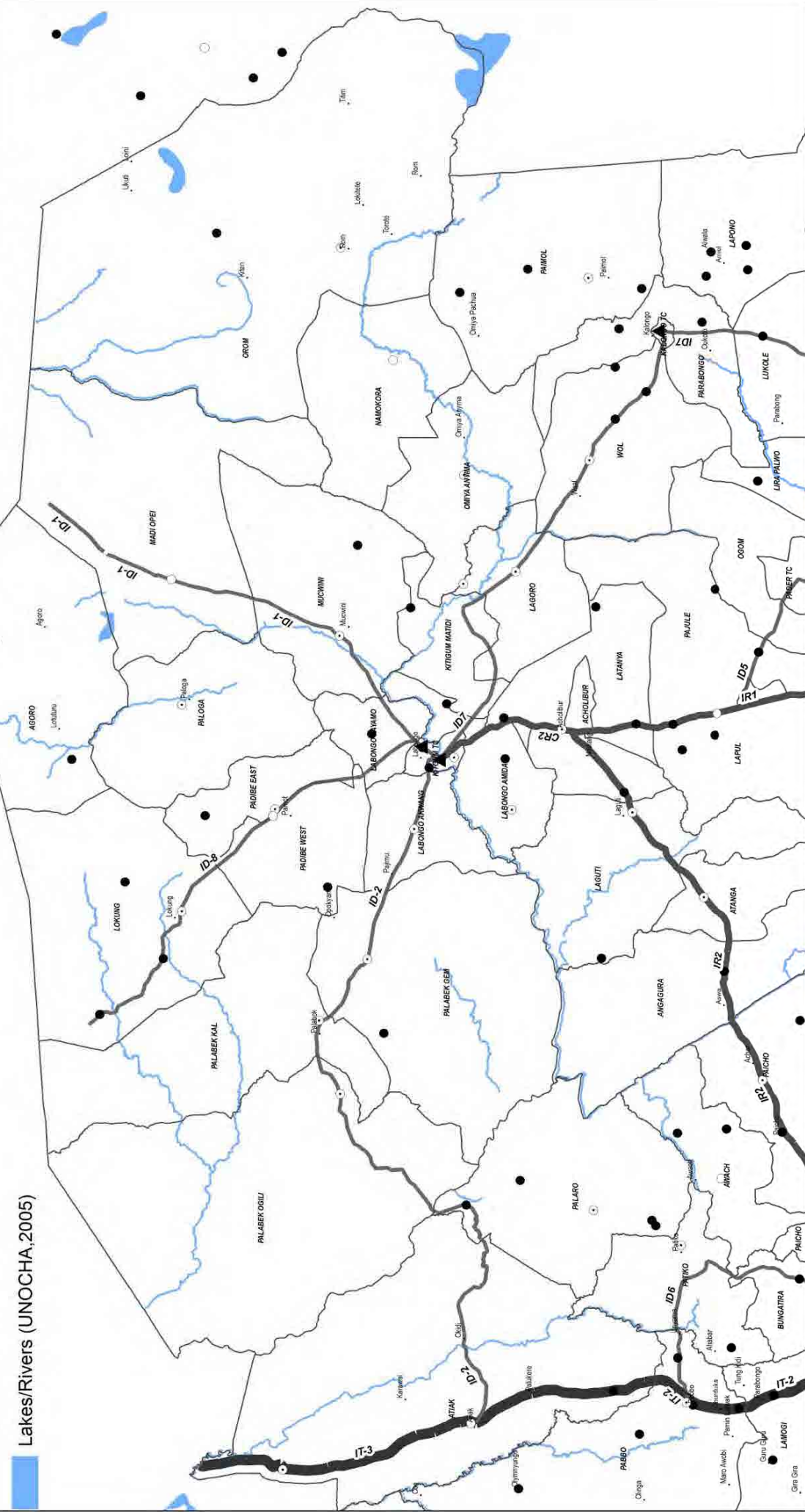
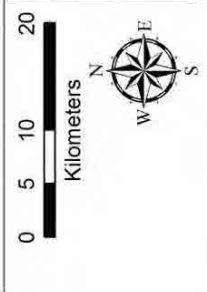
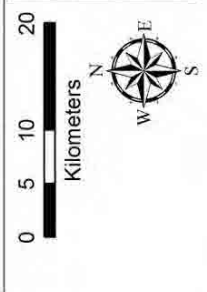
- Borrow Pits Along Priority Roads
 - Main river
 - Lakes/Rivers (UNOCHA,2005)
 - Subcounty Boundaries (UNOCHA,2010/UBOS,2006)
- Priority Road Projects By Trunk Type**
- International
 - Inter-region
 - Inter-district



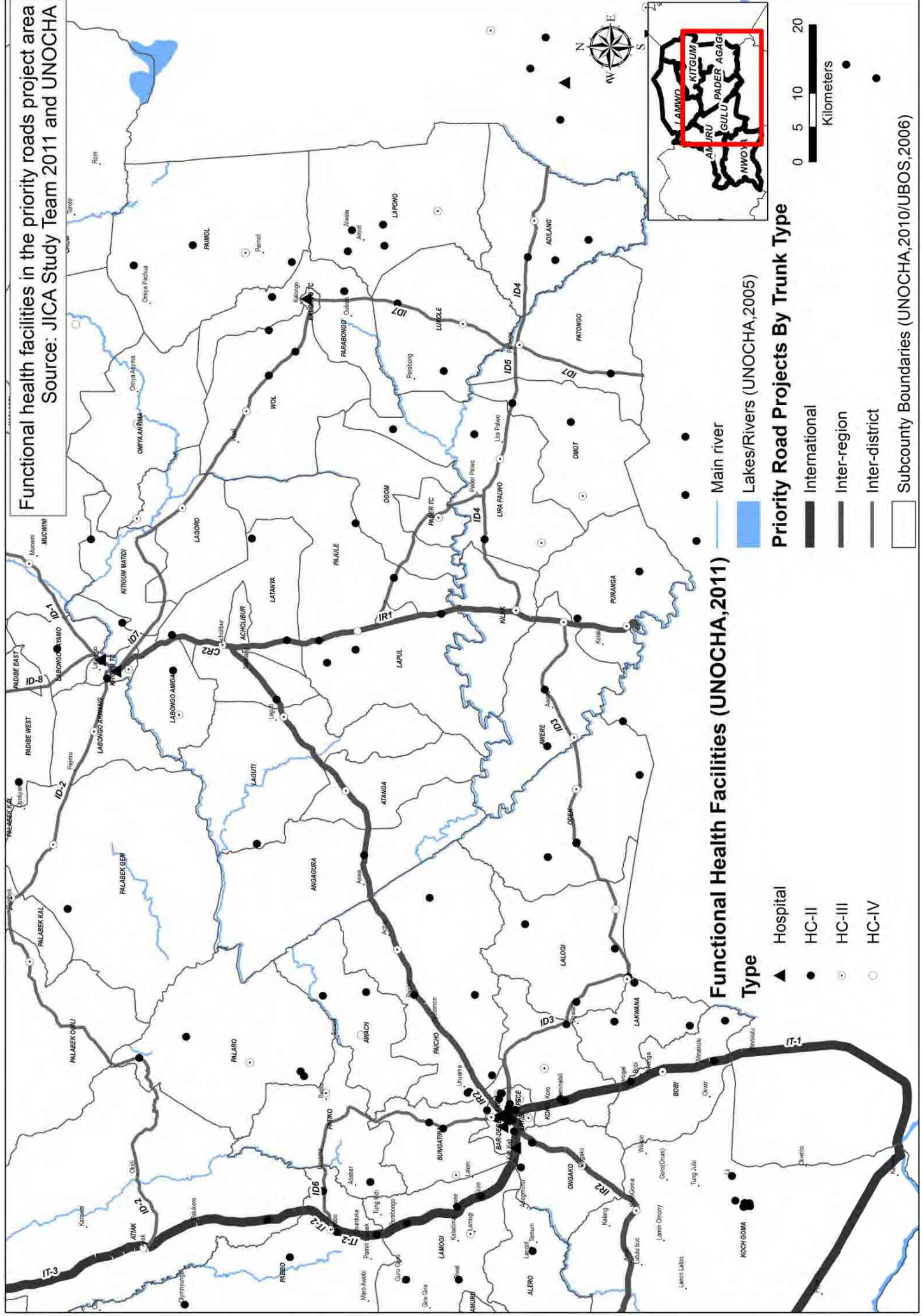
Functional Health Facilities (UNOCHA,2011) Priority Road Projects By Trunk Type

Functional health facilities in the priority roads project area
 Source: JICA Study Team 2011 and UNOCHA

- Type**
- ▲ Hospital
 - HC-II
 - HC-III
 - HC-IV
 - Main river
 - Lakes/Rivers (UNOCHA,2005)
- International
 - Inter-region
 - Inter-district
 - Subcounty Boundaries (UNOCHA,2010/UBOS,2006)



Functional health facilities in the priority roads project area
 Source: JICA Study Team 2011 and UNOCHA



Functional Health Facilities (UNOCHA,2011)

Type

- ▲ Hospital
- HC-II
- HC-III
- HC-IV

Main river

Lakes/Rivers (UNOCHA,2005)

Subcounty Boundaries (UNOCHA,2010/UBOS,2006)

Priority Road Projects By Trunk Type

- ▬ International
- ▬ Inter-region
- ▬ Inter-district

Functional health facilities in the priority roads project area
Source: JICA Study Team 2011 and UNOCHA

