

20. TECHNICAL TRANSFER TO MOWT

20.1 Introduction

In addition to the technical transfer regarding utilization of GIS maps for district engineers of Amuru, Nwoya and other districts in Acholi Sub-region (see Chapter 19), the engineers of MoWT Entebbe require training in GPS/CAD/GIS processing techniques for building a road database in order to enable the MoWT's RAMPS system to be used nation wide.

The main target of this technical transfer is

- GIS data processing
- Improvement of RAMPS data

Eleven newly hired civil engineers from the “District and Community Access Roads, Bridge & Drain Structures and Contracts Divisions” of MoWT participated in this program.

20.2 Technical Transfer regarding GIS Data Processing

The objectives of this program were

- To enable the participants to handle processing of GPS centreline data coming from the district engineers,
- To enable the participants to link GPS centreline data to Road attribute data, and
- Produce Thematic Maps and Tabular reports based on the Road Database



Source: JICA Study Team



Photo 20.2.1 GPS Centreline Survey



Source: JICA Study Team

Photo 20.2.2 Preparation of Sample Thematic Maps

Through this training (simulation of road inventory survey and thematic maps for planning), the following findings were observed and recommendations of countermeasures proposed, as shown below:

Findings

- Lack of licensed software for CAD & GIS
- Existing GIS software packages are available but missing license keys
- Lack of skilled personnel to build road inventory database
- GPS units are available but not being used properly

Recommendations

- Activation of existing GIS licenses at MoWT
- Establishment of a CAD/GIS Lab at MoWT
- Procurement of additional CAD & GIS software licenses
- Additional training of personnel at the districts level and MoWT in the proper conduct of road inventory surveys
- Use of satellite imagery in mapping roads

20.3 Technical Transfer for Improvement of RAMPS Data

Although RAMPS is a good tool for road network planning and maintenance planning, its utilization and implementation have the following issues:

- RAMPS is based on the Microsoft Access format database
- Only the one person who is in charge of it can handle it
- On RAMPS software, editing of road inventory data that was collected using GPS is difficult

To improve these situations, the following countermeasures should be considered:

- To use Microsoft Excel format, which all the personnel can use
- To use AutoCAD for editing road inventory data collected using GPS and convert it to RAMPS software format. AutoCAD is a universal software package and is much easier to use in editing road inventory data compared to RAMPS software.

**PART 2: PREPARATION AND IMPLEMENTATION
OF PILOT PROJECT**

PART 2: PREPARATION AND IMPLEMENTATION OF PILOT PROJECT

SECTION 5: PREPARATION OF PILOT PROJECT

21. OBJECTIVE AND SCOPE OF THE PILOT PROJECT

21.1 Objectives of the Pilot Project

At the initial stage of the Study, the pilot project, bridge construction and road improvement/maintenance works, would be implemented in order to examine their impact on the IDPs return process. The feedback of the findings of the project will be used to formulate the Master Plan of the rural road network.

Two bridge sites were selected for the pilot project out of the various bridge requests proffered by the local personnel. These two sites were chosen because they are located on Aswa River which divides the northern original village area and southern IDP camps along the national road (Alero-Anaka-Wii Anaka-Lolim road).

Results of the pilot project will be evaluated considering the effect on acceleration of the IDP return process and the viability of a road and bridge construction project in Northern Uganda. This would also be useful in setting the indexes for conducting monitoring in the 2nd Phase of this study. The indexes and subjects for the evaluation are designed as shown below.

(1) Setting the Index for Post-Project Evaluation

The number of IDPs returned, Traffic volume and road condition will be surveyed after completing the project and will serve as the basis for monitoring in the 2nd Phase.

(2) Evaluation Methodology for the Index of IDP Return

The two bridges, constructed as part of the pilot project, are located on Aswa River, between the northern original village area and the southern IDP camp area along the national and district roads from Gulu. The number of IDP returnees to the northern area from the southern area and other impacts will be counted one month after the bridge completion (October 2011) as well as one year after the completion of the Project (October 2012). Those impacts will be compared to the increases in previous years for evaluation of the bridges.

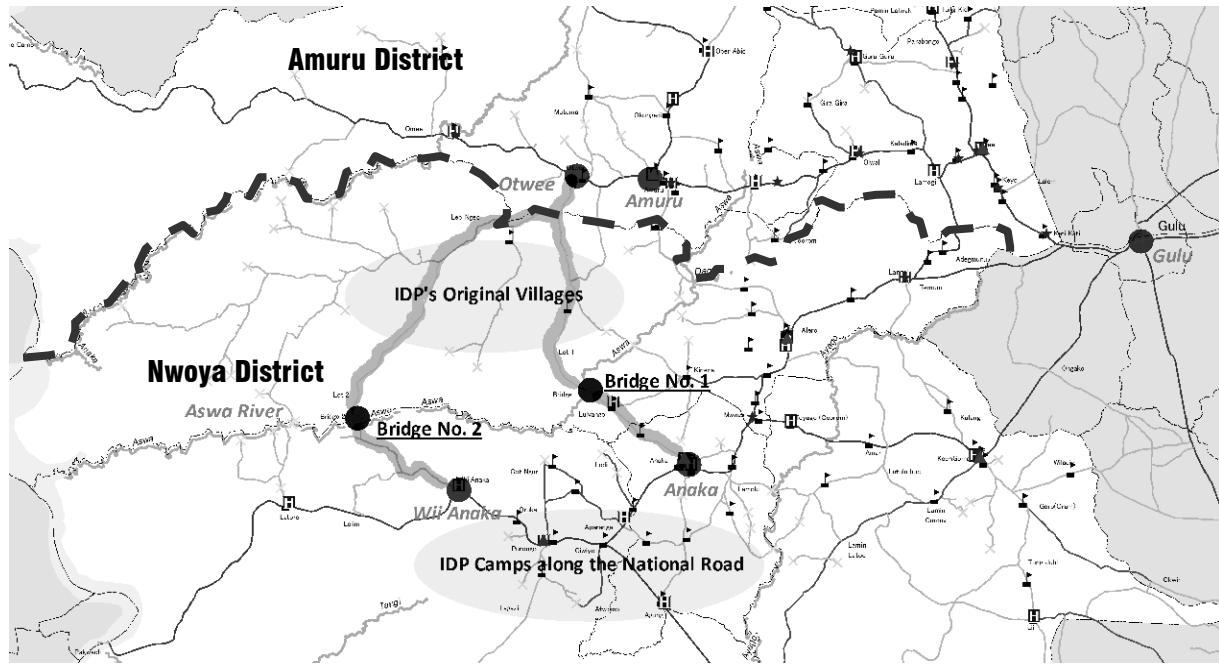
(3) Viability of Road and Bridge Construction Projects in Northern Uganda

The availability of construction material and its cost and the level of local contractors' performance in road and bridge construction works will be investigated and evaluated during this project.

21.2 Location of the Pilot Project

Location of the pilot project is shown in Figure 21.2.1. Both bridges are located on district feeder roads which were recently upgraded from community access roads in June 2009.

Bridge No.1 is along the Otwee-Anaka road and Bridge No.2 is along the Otwee-Wii Anaka road.



Source: JICA Study Team

Figure 21.2.1 Location of the Pilot Project

21.3 Scope of the Pilot Project

The pilot project is divided into two lots for procurement of contractors. The general scopes of these lots are as follows:

- **Lot 1 (Otwee – Anaka Road):** Road improvement for a gravel road of 6.20km (including construction of a reinforced concrete bridge of 35m length, 3 box culverts and 1 pipe culvert) and maintenance of gravel road of 21.31km.
- **Lot 2 (Otwee – Wii Anaka Road):** Road improvement for a gravel road of 0.66km (including construction of a reinforced concrete bridge of 45m length) and maintenance of gravel road of 44.00km.

22. BASIC PLAN

22.1 Applicable Works

The application and scope of works for the Pilot Project were specified as shown below so as to fulfil the objective of the Project:

- Road maintenance work was to be applied to the entire stretch of (a) Otwee- Anaka Rd. which is approx. 27.5 km including new construction of Bridge No.1 and some culverts as well as demolition of the existing bridge.
- The construction of approach roads to the major structure including the Bridge No.1 with an envisaged future plan applied for (a) Otwee-Anaka Rd.
- Road maintenance work was to be applied to the entire stretch of (b) Otwee- Wii Anaka Rd. which is approx. 44.7 km including new construction of Bridge No.2 and demolition of the existing bridge.
- The construction of approach roads to Bridge No.2 with an envisaged future plan applied for Otwee-Lolim Rd. in the DDP.

22.2 Design Conditions

22.2.1 Applicable Design Standard

In principal, the District Road Works Manuals prepared by the Ministry Works, Housing and Communication (hereinafter referred to as “the Manual”) in October 2003 was applied to the Pilot Project. Other manuals such as Road Design Manuals which are composed of three (3) sets of volumes: 1. Geometric Design Manual, 2. Hydrology and Hydraulics Design Manual, and 3. Pavement Design Manual were applied where necessary.

As for the Bridge Design Standard, the following standards were applied:

Main Standards:

- Road Design Manual Volume 4 : Bridge Design, Ministry of Works, Housing and Communications, 2005
- Overseas Road Note 9, A Design Manual for Small Bridges

Auxiliary -Standards:

- Latest British Standard BS 5400

- BS 8002:1994, Earth retaining structures
- BS8004: 1986, Foundations
- AASHTO LRFD 2007, Section 3

22.2.2 Road Classification

District Class I was used as the road classification for both (a) Otwee-Anaka Rd. and (b) Otwee- Wii Anaka (Lolim) Rd. after discussions with Amuru District.

22.2.3 Design Speed

The Manual prepares the requirements for each design class road as shown in Table 22.2.1.

Table 22.2.1 Design Class

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

Source: District Road Works Manuals

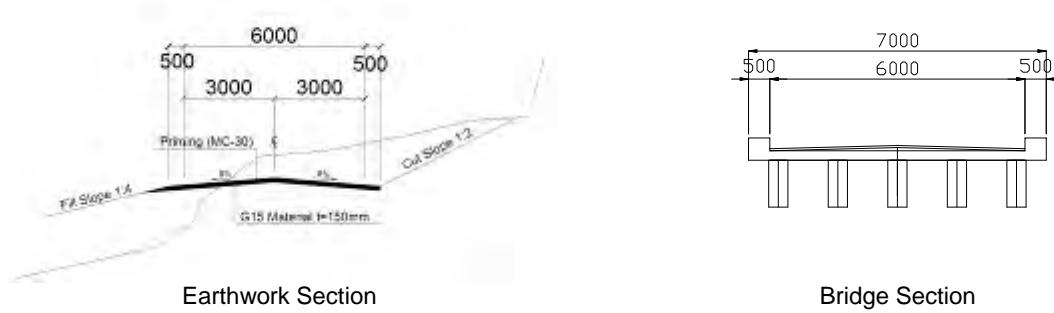
Since the terrain was identified as “Hilly” for both (a) Otwee-Anaka Rd. and (b) Otwee- Wii Anaka Rd, the design speeds were set at 50km/hr.

22.2.4 Typical Cross Section

The following cross sectional elements were applied to both roads with the exception of the maintenance sections.

Carriageway width was designed to be 6.0 m with the minimum requirement that the earth shoulder width for both sides would be designed to be 0.5 m with reference to the typical cross section of the District Road Class I in the Manual.

Eventually, the typical cross sections for the road and bridge sections were designed as shown in Figure 22.2.1 in consideration of the above requirements.



Source: JICA Study team

Figure 22.2.1 Typical Cross Section

22.2.5 Geometrical Design Requirements

The geometrical design parameters were applied in accordance with the requirements for design speed of 50 km/hr and hilly terrain as specified in the Manual, as shown in Table 22.2.2.

Table 22.2.2 Geometrical Design Parameters

| Parameter | Unit | Requirement | Remarks |
|---|------|-------------|---------|
| Recommended Minimum Vertical Grade | % | 2.0 | |
| Recommended Maximum Vertical Grade | % | 10.0 | |
| Maximum Grade Length at Maximum Vertical Grade | m | 500.0 | |
| Absolute Maximum Grade | % | 10.0 | |
| Maximum Grade Length at Absolute Maximum Vertical Grade | m | 250.0 | |
| Design Camber (As Built) | % | 8.0 | |
| Minimum Curve Radius below which Super-elevation is applied | m | 80.0 | |
| Minimum Curve Radius | m | 65.0 | |
| Safe Stopping Sight Distance | m | 65.0 | |
| Crest Curve K Value (or Safe Stopping Sight Distance) | - | 12.0 | |
| Sag K Value (or Safe Stopping Sight Distance) | - | 12.0 | |
| Sag K Value (for Comfort) | - | 2.5 | |

Source: District Road Works Manuals

22.2.6 Drainage

Since there was no mention of Design Storm return period for drainage facilities in the Manual, the Design Years for Gravel C Road from Road Design Manual Vol.2: Drainage Design were applied.

Table 22.2.3 Design Years for Drainage Facilities

| Structure Type | Geometric Design Standard | | | |
|------------------------------------|---------------------------|---------------|----------------|----------|
| | PIa, PIb | PIII Gravel A | PIII, Gravel B | Gravel C |
| Gutters and Inlets | 10/5 | 2 | 2 | - |
| Side Ditches | 10 | 10 | 5 | 5 |
| Ford/Low-Water Bridge | - | - | - | 5 |
| Culvert, Pipe (see Note) Span <2m | 25 | 10 | 5 | 5 |
| Culvert 2m<Span<6m | 50 | 25 | 10 | 10 |
| Short Span Bridges 6m<Span<15m | 50 | 50 | 25 | 25 |
| Medium Span Bridge 15m < Span <50m | 100 | 50 | 50 | 50 |
| Long Span Bridge span>50m | 100 | 100 | 100 | 100 |
| Check/Review Flood | 200 | 200 | 100 | 100 |

PIa=Paved Ia, PIb=Paved Ib, PII=Paved II, PIII=Paved III

Note 1: Span in the above table is the total clear-opening length of a structure. For example, the span for a double 1.2-meter diameter pipe is 2.4 meters, and the design storm frequency is therefore "culvert, 2m < span < 6m." Similarly a double box culvert having two 4.5-meter barrels should use the applicable design storm frequency for a short span bridge and a bridge having two 10-meter spans is a medium span bridge.

Source: Road Design Manual Vol.2: Drainage Design

As regards the discharge estimation, the Rational method was applied for the Run-off Modelling for the catchments up to 500km² while crossing pipe diameter of 900mm as minimum was specified in consideration of ease of maintenance.

22.2.7 Vertical Clearance at H.W.L. for Bridges

The waterway below the superstructure must be designed to allow passage of the design flood and floating debris carried on it. Table 22.2.4 shows vertical clearance at H.W.L. This value would be based on the results of hydraulic analysis.

Table 22.2.4 Vertical Clearance at H.W.L.

| Discharge (m ³ /sec) | Vertical clearance (mm) | Discharge (m ³ /sec) | Vertical clearance (mm) |
|------------------------------------|----------------------------|------------------------------------|----------------------------|
| < 0.3 | 150 | 30 to 300 | 900 |
| 0.3 to 3.0 | 450 | > 300 | 1200 |
| 3.0 to 30.0 | 600 | | |

Source: Overseas road note 9, DFID, UK

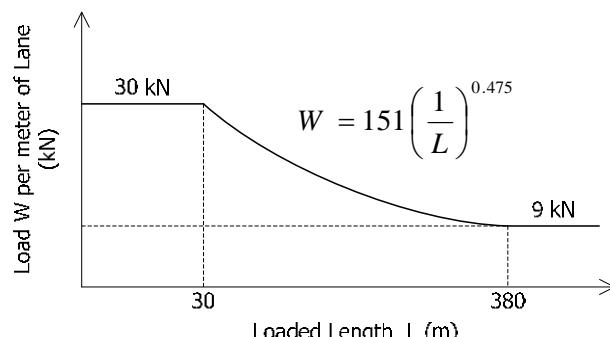
22.2.8 Live Load

Live load used in the design was HA loading. This loading includes impact.

HA Loading

HA Loading consists of a uniformly distributed load (UDL) and knife edge load (KEL) combined or of a single wheel load.

- Uniformly distributed load: Full UDL for two (2) notional lanes and one-third (1/3) UDL for all other lanes.
- Knife edge load: 120 kN per notional lane uniformly distributed over the full width of a notional lane. Full KEL for two (2) notional lanes and one-third (1/3) KEL for all other lanes.
- Single nominal wheel load: 100 kN uniformly distributed over a square contact area (300mm side) assuming an effective pressure of 1.1 N/mm²



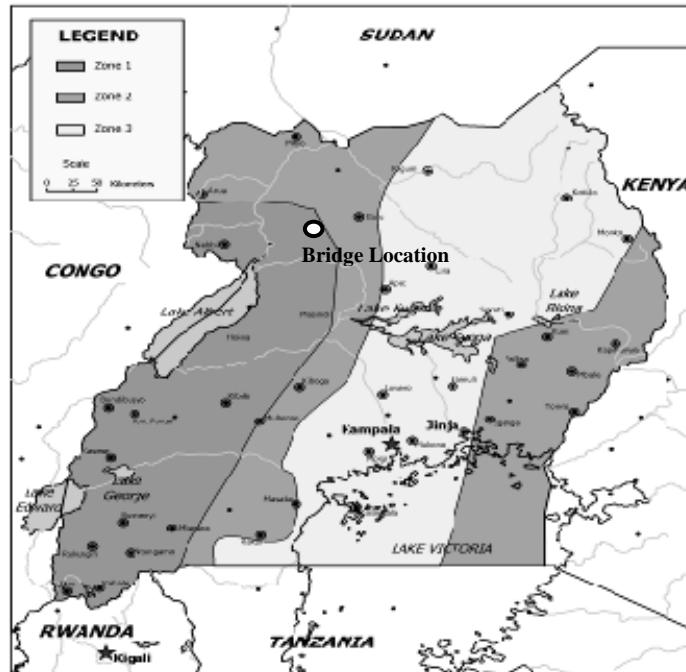
Source: Road Design Manual Vol4 Bridge Design, Ministry of Works, Housing and Communications, Uganda

Figure 22.2.2 HA Loading

22.2.9 Earthquake

(1) Seismic Zone

The project bridge is located in Nwoya District, which is classified as Seismic Zone 1 as shown in Figure 22.2.3.



Source: Road Design Manual Vol4 Bridge Design, Ministry of Works, Housing and Communications, Uganda

Figure 22.2.3 Seismic Map with Zone

(2) Acceleration Coefficient, A

As the project bridge is located in Seismic Zone 1, the acceleration coefficient A of 0.15 was applied in the design as shown in Table 22.2.5.

Table 22.2.5 Bedrock Acceleration Coefficient, A

| Seismic Zone | 1 | 2 | 3 |
|--------------|------|------|------|
| A | 0.15 | 0.07 | 0.05 |

Source: Road Design Manual Vol 4 Bridge Design, Ministry of Works, Housing and Communications, Uganda

(3) Importance Classification, IC

An Importance Classification (IC) was assigned for the purpose of determining the Seismic Performance Category (SPC) as follows:

- Essential bridges: IC - I
- Other bridges: IC - II

The project bridge was categorized as IC - II. From the following table, the Importance Classification (IC) of the Project bridge was classified as “IC = 3”.

Table 22.2.6 Seismic Performance Categories (SPC)

| Acceleration Coefficient | | | Importance Classification (IC) | |
|--------------------------|---|---------------|--------------------------------|-----------------------|
| A | | | I (Essential Bridges) | II (Other Bridges) |
| | A | \leq 0.05 | 1 | 1 |
| 0.05 | < | A \leq 0.07 | 2 | 2 |
| 0.07 | < | A \leq 0.15 | 3 | 3 |

Source: Road Design Manual Vol 4 Bridge Design, Ministry of Works, Housing and Communications, Uganda

(4) Site Effects

The effects of site conditions on bridge response were determined from a site coefficient, S, based on soil profile types defined as follows:

- **Soil Profile Type I:** Rock of any characteristic, either shale-like or crystalline in nature (such material may be characterized by a shear wave velocity greater than 762 m/sec, or by other appropriate means of classification; or Stiff soil conditions where the soil depth is less than 60 m and the soil types overlying rock are stable deposits of sands, gravels or stiff clays.
- **Soil Profile Type II:** A profile with stiff clay or deep cohesionless conditions where the soil depth exceeds 60 m and the soil types overlying rock are stable deposits of sands, gravels or stiff clays.
- **Soil Profile Type III:** A profile with soft to medium-stiff clays and sands, characterized by 9 m or more of soft to medium-stiff clays with or without intervening layers of sand or other cohesionless soils.

The Site coefficient (S) approximates the effects of the site conditions on the elastic response coefficient or spectrum and is given in Table 22.2.7.

Table 22.2.7 Site Coefficient, S

| | Soil Profile Type | | |
|---------------------|-------------------|------|------|
| | I | II | III |
| Site Coefficient, S | 1.00 | 1.20 | 1.50 |

Source: Road Design Manual Vol 4 Bridge Design, Ministry of Works, Housing and Communications, Uganda

22.2.10 Materials

(1) Concrete

Minimum compressive strength for each structural element was based on the design results, which were determined during design work with reference to BS5400 Part 4: Code of Practice for Design of Concrete Bridges and General Specifications for Road and Bridge Works.

(2) Reinforcing Bar

Reinforcing bars have to be of the ribbed type (Type-2) and in accordance with BS 4449 and General Specifications for Road and Bridge Works. The properties and strength of reinforcing bars were as shown in Tables 22.2.8 and 22.2.9.

Table 22.2.8 Properties and Strength of Reinforcing Bars

| Type | Yield Strength f_y (MPa) | Tensile Strength $f_{u, min}$ (MPa) | Modulus of Elasticity (MPa) |
|------------|----------------------------|-------------------------------------|-----------------------------|
| Grade 250 | 250 | 287.5 | 200,000 |
| Grade 460A | 460 | 483.0 | 200,000 |
| Grade 460B | 460 | 496.8 | 200,000 |

Note-1: Plain round steel bars in Grade 250, deformed (Type-2) high yield steel bars in Grade 460

Note-2: Grade 460 steel bars are in two ductility categories, 460A and 460B.

Source: BS 4449

Table 22.2.9 Properties and Stress Limit of Reinforcing Bars

| Nominal Diameter (mm) | Area (cm ²) | Mass (kg/m) |
|-----------------------|-------------------------|-------------|
| 8 | 0.503 | 0.395 |
| 10 | 0.785 | 0.616 |
| 12 | 1.131 | 0.888 |
| 16 | 2.011 | 1.579 |
| 20 | 3.142 | 2.466 |
| 25 | 4.909 | 3.854 |
| 32 | 8.042 | 6.313 |
| 40 | 12.566 | 9.864 |

Note: For Grade 250, only nominal diameters of 8, 10, 12 and 16 mm are preferred.

Source: BS 4449

22.3 Design Concept

22.3.1 Road Design

The Pilot Project roads were split into those sections that require improvement and those sections that require maintenance, with due consideration of the need for prevention of future conflict between the road administrators and land owners given that most of sections of the existing roads pass through private plots.

The design defines improvement and the maintenance as follows:

- **Improvement:** Horizontal and vertical alignment are newly designed in consideration of the future road network in the district. The cross sections are designed in accordance with the Manual. Drainage structures and safety facilities are also included in the design.
- **Maintenance:** Horizontal and vertical alignment remain unchanged and the work is done within the width of the existing road. No concrete structure is designed in such sections.

(1) Identification of Improvement Sections

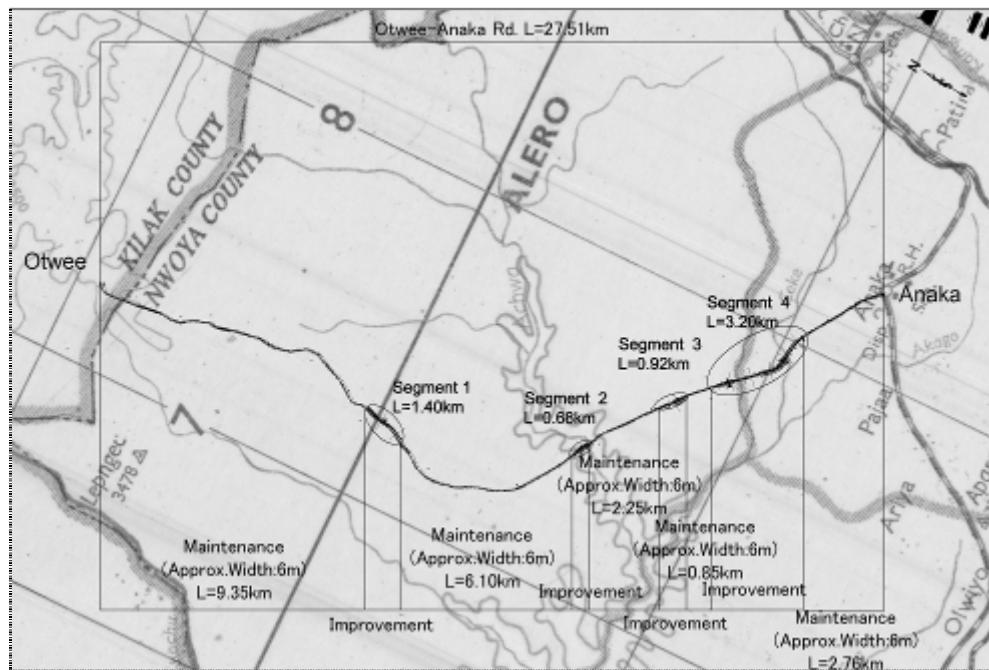
Generally, improvement was specified for sections where some problems such as poor drainage exist and make the road impassable.

Along the Otwee-Anaka Rd., there are some swamps and sag points where the storm water tends to pool. Those points become impassable during the rainy season due to the drainage

problem: therefore the vertical alignment would have to be raised and the drainage structures would require improvement.

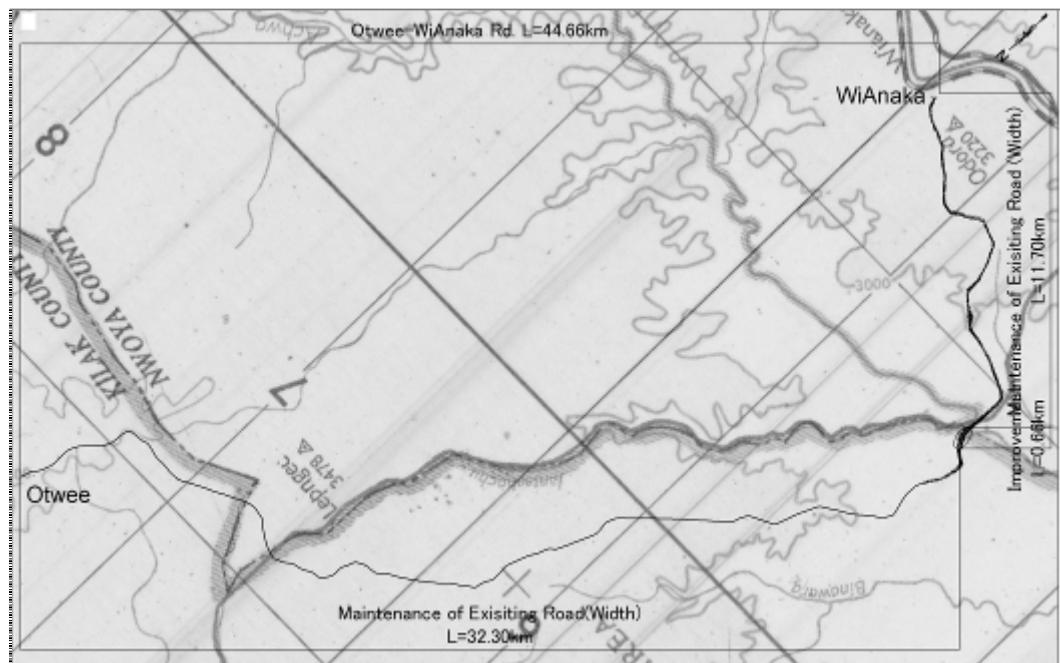
The bridges were planned at different locations of the existing road network in consideration of cost effectiveness and ease of construction: therefore the approach roads to new bridges would also have to be designed which can also be classified as improvement.

The locations of the sections to be improved are shown in Figures 22.3.1 and 22.3.2.



Source: JICA Study Team

Figure 22.3.1 Locations of Sections to be Improved on Otwee-Anaka Road



Source: JICA Study Team

Figure 22.3.2 Locations of Sections to be Improved on Otwee-Wii Anaka Road

(2) Design Principles

The following design principles were considered for road design on the sections to be improved.

1) Horizontal Alignment Design

- Compliance with specified parameters for given design requirements (speed)
- Harmonization with land use
- Balancing of size and length of curves
- Balancing of horizontal , vertical and cross-sectional parameters
- Visibility
- Ease of construction
- Constraints due to natural conditions such as terrain, geological features and existing property ownership
- Minimization of negative social impacts
- Cost effectiveness and benefit

The horizontal alignment would have to be designed with due consideration to mobility, safety and comfort to foster a balance with the design parameters.

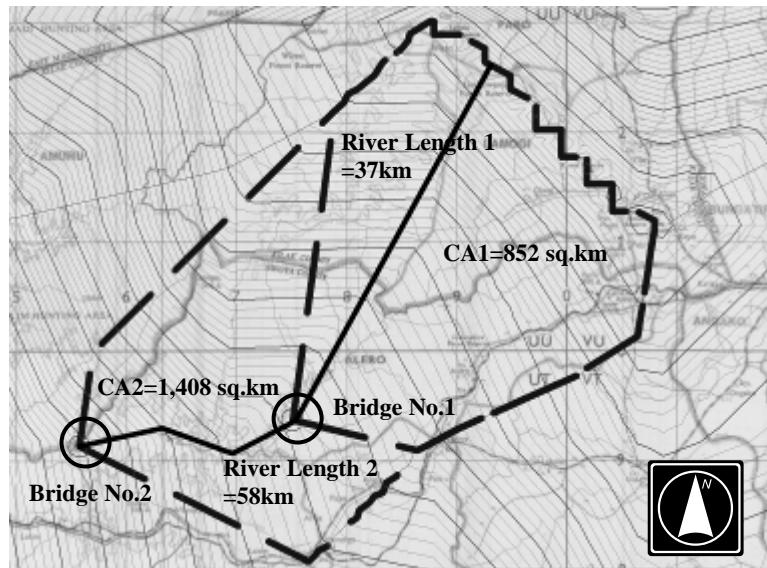
2) Vertical Alignment Design

- Compliance with parameters as specified by the Ugandan Standard
- Harmonization with horizontal alignment
- Minimizing vertical change

22.3.2 Hydrological Analysis

(1) Catchment Area

The delimitation and determination of the catchment areas and river lengths for the bridges was initially made using topographical maps at 1:50.000 scale. A map with the catchment areas is shown in Figure 22.3.3.



Source: JICA Study Team

Figure 22.3.3 Catchment Area for Bridges

(2) Rainfall Analysis

Daily rainfall data at Gulu station has been collected for 20 years by the Ministry of Water and Environment, Department of Meteorology, Uganda.

A statistical analysis was done on the rainfall data: four (4) statistical distribution methods (Lognormal Distribution, Iwai, Gumbel and Gumbel -cho method) were used. The most conservative design rainfall was selected from among them: this was established to be the Lognormal Distribution method. The result of analysis by each method is shown below.

Table 22.3.1 Result of Rainfall Analysis

| Return Period | Lognormal Distribution Method | Iwai Method | Gumbel Method | Gumbel-Cho Method | Maximum | Minimum | Remarks |
|---------------|-------------------------------|-------------|---------------|-------------------|---------|---------|---------|
| 1/2 | 3.7 | 4.2 | 7.3 | 7.3 | 7.3 | 3.7 | |
| 1/3 | 7.3 | 7.6 | 12.2 | 12.2 | 12.2 | 7.3 | |
| 1/4 | 10.9 | 10.7 | 15.4 | 15.4 | 15.4 | 10.7 | |
| 1/5 | 14.3 | 13.5 | 17.8 | 17.8 | 17.8 | 13.5 | |
| 1/8 | 23.5 | 20.6 | 22.5 | 22.5 | 23.5 | 20.6 | |
| 1/10 | 29 | 24.6 | 24.7 | 24.7 | 29 | 24.6 | |
| 1/15 | 41.3 | 33.2 | 28.6 | 28.6 | 41.3 | 28.6 | |
| 1/20 | 52.2 | 40.4 | 31.3 | 31.3 | 52.2 | 31.3 | |
| 1/25 | 61.9 | 46.6 | 33.4 | 33.4 | 61.9 | 33.4 | |
| 1/30 | 70.8 | 52.2 | 35.2 | 35.2 | 70.8 | 35.2 | |
| 1/40 | 86.8 | 62 | 37.9 | 37.9 | 86.8 | 37.9 | |
| 1/50 | 100.9 | 70.3 | 39.9 | 39.9 | 100.9 | 39.9 | |
| 1/60 | 113.8 | 77.8 | 41.6 | 41.6 | 113.8 | 41.6 | |
| 1/80 | 136.7 | 90.7 | 44.3 | 44.3 | 136.7 | 44.3 | |
| 1/100 | 156.8 | 101.8 | 46.4 | 46.4 | 156.8 | 46.4 | |
| 1/150 | 199.3 | 124.5 | 50.1 | 50.1 | 199.3 | 50.1 | |
| 1/200 | 234.7 | 142.8 | 52.8 | 52.8 | 234.7 | 52.8 | |
| 1/250 | 265.4 | 158.3 | 54.9 | 54.9 | 265.4 | 54.9 | |
| 1/300 | 292.9 | 171.9 | 56.6 | 56.6 | 292.9 | 56.6 | |
| 1/400 | 341 | 195.2 | 59.2 | 59.2 | 341 | 59.2 | |
| 1/500 | 382.3 | 214.8 | 61.3 | 61.3 | 382.3 | 61.3 | |

Source: JICA Study Team

22.3.3 Flood Hydrology

The Hydrology and Hydraulics Design Manual introduces several methods for the run-off estimation. The TRRL (Transport and Road Research Laboratory) method and East African flood model are employed in many cases. However the TRRL method is not applicable for

catchments of more than 200 sq. km area and as such, it was not applicable since the area of the catchment for the Pilot Project is larger than 800 sq. km.

The Rational Method is one of the better known methods for the estimation and it is employed for cases with wider catchments in East African countries. Consequently, it was decided that the Pilot Project design would apply the Rational Method for the run-off estimation. The details of the method are discussed below.

The Rational formula is defined as:

$$Q = \frac{1}{3.6} C \times I \times A$$

Where

Q: Discharge (m^3/s)

C: Runoff coefficient

I: Average rainfall intensity over the whole catchment for a duration corresponding to the time of concentration

A: Catchment area (km^2)

Note: In the Alternative Rational Method, rainfall intensity is derived from following formula.

$$I_T = \frac{P_T}{T_c} ARF$$

The Rational formula incorporates the following assumptions:

- The rainfall has a uniform area distribution across the total contributing catchment
- The rainfall has a uniform time distribution for at least a duration equal to the time of concentration
- The peak discharge occurs when the total catchment contributes to the flow occurring at the end of the critical storm duration, or time of concentration.
- The runoff coefficient, *C* remains constant for the storm duration, or time of concentration
- The return period of the peak flow, *T*, is the same as that of the rainfall intensity

It was assumed that the flows in the various catchments were in a defined water course. Time of concentration was hence calculated using the following formula:

$$T_c = \left(\frac{0.87L^2}{1000S} \right)^{0.385} : \text{Defined Watercourse}$$

$$T_c = 0.604 \left(\frac{rL}{S^{1/2}} \right)^{0.467} : \text{Overland Flow}$$

Where

T_c: time of concentration (hour)

L: hydraulic length of catchment, measured along flow path from the catchment boundary to the point where the flood needs to be determined (km)

S: average slope (m/m)

In the pilot project design, an “alternative” rational application was employed.

The modified recalibrated Hershfield relationship could be used to determine point rainfall, which would then be converted to intensity by dividing the point rainfall by the time of concentration for storm durations of up to 6 hours. For durations between 6 and 24 hours, linear interpolation was used between the calculated point rainfall from the modified Hershfield equation and the 1 day point rainfall. The Modified Hershfield relationship is given as:

$$P_T = 1.13(0.41 + 0.64 \log(T)) \times (-0.11 + 0.27 \log(t)) \times (0.79M^{0.69}R^{0.20})$$

Where

- P_T : precipitation depth for duration of t minutes and return period of T years
- t: duration in minutes
- T: return period
- M: 2-year return period daily rainfall
- R: average number of days per year when thunder was heard

Note: it was assumed that the average number of days on which it stormed was 80.

The point rainfall above is still subject to an Areal Reduction Factor (ARF). Rainfall from flood producing storms is generally not evenly distributed temporally or spatially in a catchment. For this reason it is necessary to reduce the rainfall depth according to the catchment size and storm duration.

The ARF can be calculated using equation:

$$ARF = (9000 - 12800\log(A) + 9830\log(60T_c))^{0.4}$$

22.3.4 Design Peak Flow for New Bridges

The design peak flows by the return periods for Bridge No.1 and No.2 were estimated as shown in Table 22.3.2.

Table 22.3.2 Result of Rainfall Analysis

| Bridge No. | Catchment | Return Period | Rainfall Intensity (24h) | Thunder (R) | Point Rainfall | Area Reduction Factor (ARF) | Average Intensity (IT) | Combined Run-off Coefficient (CT) | Peak Flow |
|------------|--------------------|---------------|--------------------------|-------------|----------------|-----------------------------|------------------------|-----------------------------------|---------------------|
| | (km ²) | (yrs) | (mm) | (days) | (mm) | | (mm/h) | (%) | (m ³ /s) |
| 1 | 852 | 2 | 3.7 | 80 | 7.454 | 83.96 | 0.76 | 18.8 | 33.8 |
| | | 10 | 29.0 | 80 | 16.448 | 83.96 | 1.68 | 21.3 | 84.4 |
| | | 20 | 52.2 | 80 | 20.321 | 83.96 | 2.07 | 22.5 | 110.5 |
| | | 50 | 100.9 | 80 | 25.442 | 83.96 | 2.60 | 25.0 | 153.7 |
| | | 100 | 234.7 | 80 | 29.316 | 83.96 | 2.99 | 25.0 | 177.1 |
| 2 | 1,408 | 2 | 3.7 | 80 | 7.876 | 82.36 | 0.56 | 18.8 | 40.9 |
| | | 10 | 29.0 | 80 | 17.379 | 82.36 | 1.23 | 21.3 | 102.3 |
| | | 20 | 52.2 | 80 | 21.472 | 82.36 | 1.52 | 22.5 | 133.8 |
| | | 50 | 100.9 | 80 | 26.882 | 82.36 | 1.90 | 25.0 | 186.2 |
| | | 100 | 234.7 | 80 | 30.975 | 82.36 | 2.18 | 25.0 | 214.5 |

Source: JICA Study Team

22.3.5 Bridge Design

(1) Introduction

Detailed bridge design was developed using the structural concept below.

- 1) RC Bridge (span length 15m and 10m)
 - Bridge No.1 (Otwee - Anaka Road): 35.00 m length (10.00 + 15.00 + 10.00)
 - Bridge No.2 (Otwee – Wii Anaka Road): 45.00 m length (10.00m + 15.00m + 10.00m + 10.00m)
- 2) Oval shape piers and Inverted T shape abutments
- 3) Spread footing for foundations

(2) River Characteristics

The characteristics of the river are as follows:

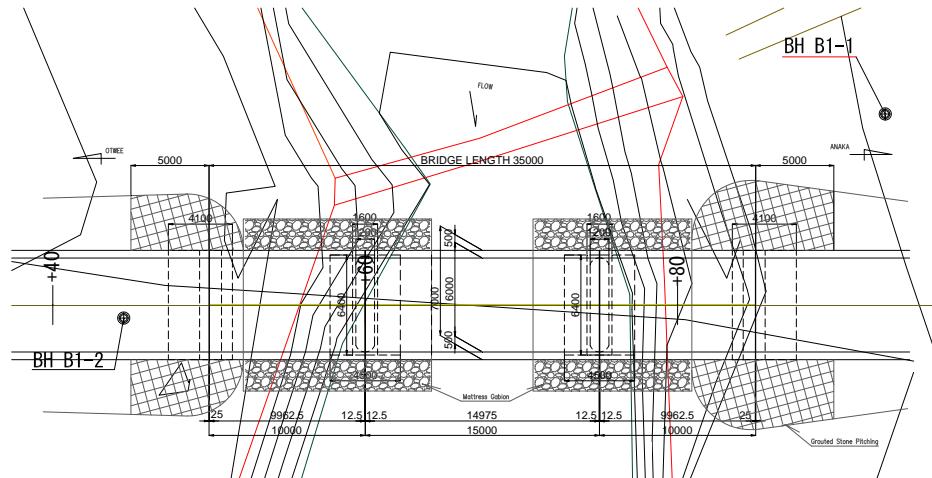
- 1) Bridge No.1 and No.2 are located on the same river (Aswa River).
- 2) Flood water level is relatively high (from interviews).
 - Bridge No.1 F.W.L: 909.28 (Approx. 1.6m higher than existing bridge)
 - Bridge No.2 F.W.L: 809.27 (Approx. 1.0m higher than existing bridge)
- 3) The river course is quite stable.
- 4) It is believed that rock is exposed in the riverbed.

(3) Geological Conditions

1) Drilling

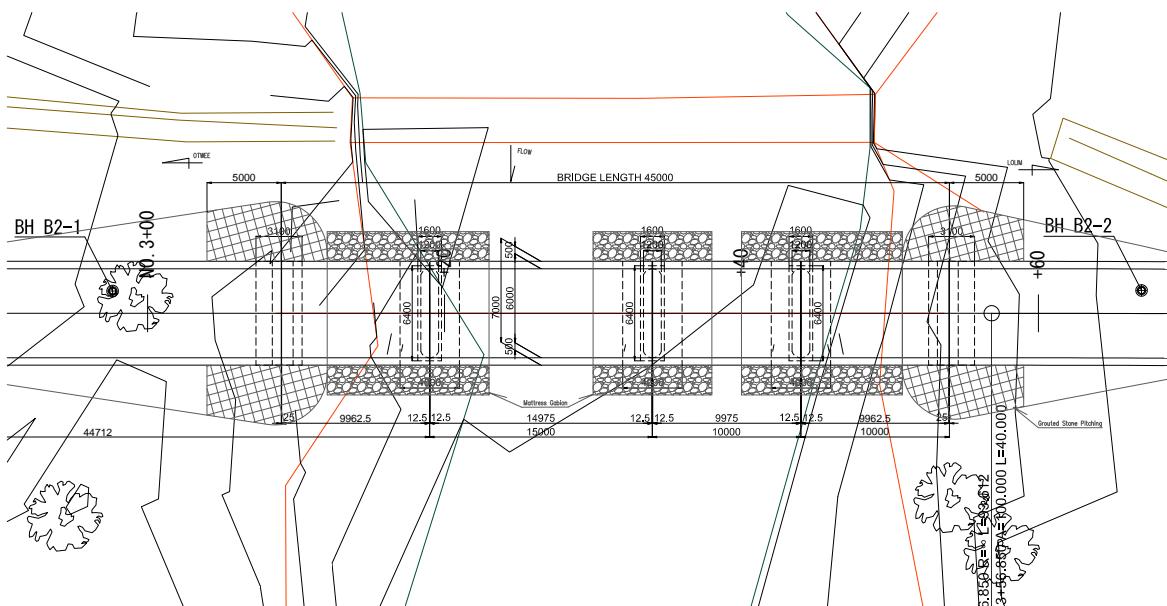
Figures 22.3.4 and 22.3.5 show the locations of the boreholes used in the drilling investigations. There were executed on both sides of the river (Bridge No.1: BH B1-1 & B1-2, Bridge No.2: BH B2-1 & B2-2).

Figures 22.3.6 and 22.3.7 show the columnar sections and assumed geological profiles at Bridge Locations.



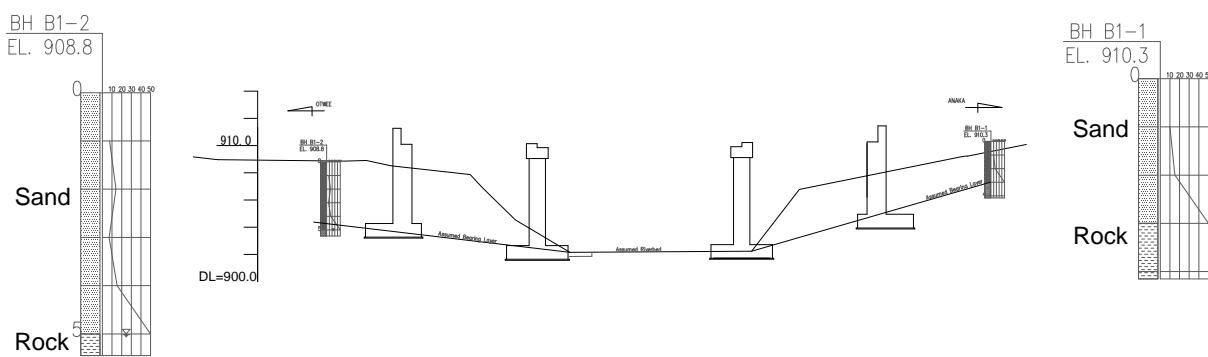
Source: JICA Study Team

Figure 22.3.4 Location of Boreholes on Bridge No.1



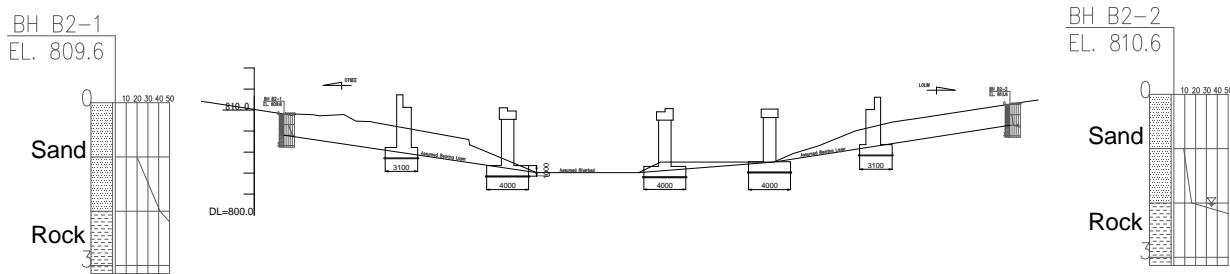
Source: JICA Study Team

Figure 22.3.5 Location of Boreholes on Bridge No.2



Source: JICA Study Team

Figure 22.3.6 Boring Logs and Assumed Geological Profiles (Bridge No.1)



Source: JICA Study Team

Figure 22.3.7 Boring Logs and Assumed Geological Profiles (Bridge No.2)

(4) Existing Bridge

1) Existing Bridge on Otwee - Anaka Road

The existing bridge is a wooden pedestrian bridge. A new bridge is necessary in consideration of future traffic demands.

2) Bridge on Otwee – Wii Anaka Road

a) Existing Bridge Condition

The existing bridge, which crosses Aswa River, is located approximately 31km south of Otwee. It was constructed as a private bridge about 40 years ago. During its 40 year lifetime thus far, the concrete slab of the bridge was washed away during a flood, and a temporary wooden slab was then placed on the original H-beam.

The foundation shapes of bridge could not be identified exactly. However, it seems spread foundations were used for the bridge since rocks are exposed around the bridge location.

Although the passage of pedestrians and motorbikes across the bridge is possible, it is a very dangerous situation for bridge users.

b) Visual Inspection of substructure

Visual inspection of damaged items below was carried out for the existing substructure.

- Cracking / Peeling
- Re-bar exposure
- Displacement / Settlement
- Free lime
- Deterioration / Discoloration
- Scouring

The result of the strength testing for existing structure using Schmidt Hammer shows that the necessary strength was not provided.

c) Evaluation and Conclusion for Existing Bridge

Abutment: According to the results of the visual inspection, the abutment is believed to be a stone masonry structure and not an RC structure. Besides, there was scouring around the abutment. It was thus deduced that adequate supporting strength for vehicle loads would not be provided in the future.

Piers: It was also concluded that it would be very difficult to repair and reuse the existing piers for the following reasons:

- There were many large cracks and a great deal of damage to all piers
- A lot of free lime and alkali-aggregate reactions were seen on the wall surfaces
- Concrete strength in bridge substructure is not adequate
- Condition of the foundation was not verifiable

(5) Bridge Length and Span Arrangement for New Bridges

Bridge length and span arrangement were decided in consideration of the items below:

- River width
 - High Water Level
 - Geological conditions
 - Road profile
 - Height of Abutment (less than 10m)
- 1) Bridge on Otwee - Anaka Road (Bridge No.1)
 - Bridge Length: 35.00 m
 - Span arrangement: 10.00m + 15.00m + 10.00m
 - 2) Bridge on Otwee – Wii Anaka Road (Bridge No.2)
 - Bridge Length: 45.00 m
 - Span arrangement: 10.00m + 15.00m + 10.00m + 10.00m

(6) Selection of Bridge Types

Since the proposed bridges would be small scale bridges of around 40m length, the bridge types considered were RC, PC or Steel.

Based on the comparison results shown in Table 22.3.3, RC Bridge type was selected for the new bridges crossing Aswa River.

As for the bridge position on the Otwee-Anaka Road (Bridge No.1), the Preliminary Study proposed construction of the new bridge 20m downstream from the existing bridge. This Study, however, decided to construct it next (downstream) to the existing wooden bridge as this would make the bridge length shorter and would retain the required road network function.

As for the bridge on Otwee-Wii-Anaka Road (Bridge No.2), site investigations revealed that the substructures of the existing bridge could not be utilized for the new bridge. It was decided that the location of the new bridge should be next (downstream) to the existing bridge in order to keep the required road network function. In addition, it was decided that the existing bridge should be removed after the construction of the new bridge.

Table 22.3.3 Comparison of Bridge Types

| Bridge Type | Cross section / Span arrangement | Descriptions |
|--------------------------|---|--|
| RC Bridge | <ul style="list-style-type: none"> • Bridge Length: 35m (Bri. No.1), 45m (Bri. No.2) • Span arrangement: <ul style="list-style-type: none"> - Bridge No.1 : 10m+15m+10m - Bridge No.2 : 10m+15m+10m+10m <p style="text-align: center;"><u>Bri. Cross-section (Span: 15m)</u></p> | <ul style="list-style-type: none"> • This type has advantages of material availability and ease of construction compared to other options; which may give a chance for local contractor's participation. • Local contractors have great experience in construction of this bridge type. • All construction materials can be arranged in Uganda which gives a benefit of shortening the construction time. • Construction cost is lowest among the options. <p>Evaluation : +++</p> |
| PC Bridge | <ul style="list-style-type: none"> • Bridge Length: 35m (Bri. No.1), 45m (Bri. No.2) • Span arrangement: <ul style="list-style-type: none"> - Bridge No.1 : 35m (Simple span) - Bridge No.2 : 35m(PC)+10m(RC) <p style="text-align: center;"><u>Bri. Cross-section (Span: 35m)</u></p> | <ul style="list-style-type: none"> • Prestressing tendons need to be imported and cement would also have to be imported in order to meet the requirement of high concrete strength. • Possible delays in importation of materials. • The fabrication of the girders requires high skill compared to other bridge types. • Local contractors do not have a lot of experience in construction of this bridge type. • Construction cost is moderate. <p>Evaluation : ++</p> |
| Steel Bridge (Composite) | <ul style="list-style-type: none"> • Bridge Length: 35m (Bri. No.1), 45m (Bri. No.2) • Span arrangement: <ul style="list-style-type: none"> - Bridge No.1 : 17.5m+17.5m (H beam) - Bridge No.2 : 17.5m+17.5m (H beam)+10.0m(RC) <p style="text-align: center;"><u>Bri. Cross-section (Span: 17.5m)</u></p> | <ul style="list-style-type: none"> • Steel girders need to be imported. • A diversion canal would be necessary due to provision of pier in middle of the river. • Construction cost is highest compared to other bridge types. • Maintenance costs are higher compared to those of other bridge types due to extra maintenance items such as painting. <p>Evaluation : +</p> |

Note: +++ Appropriate, ++ Moderate, + Not appropriate

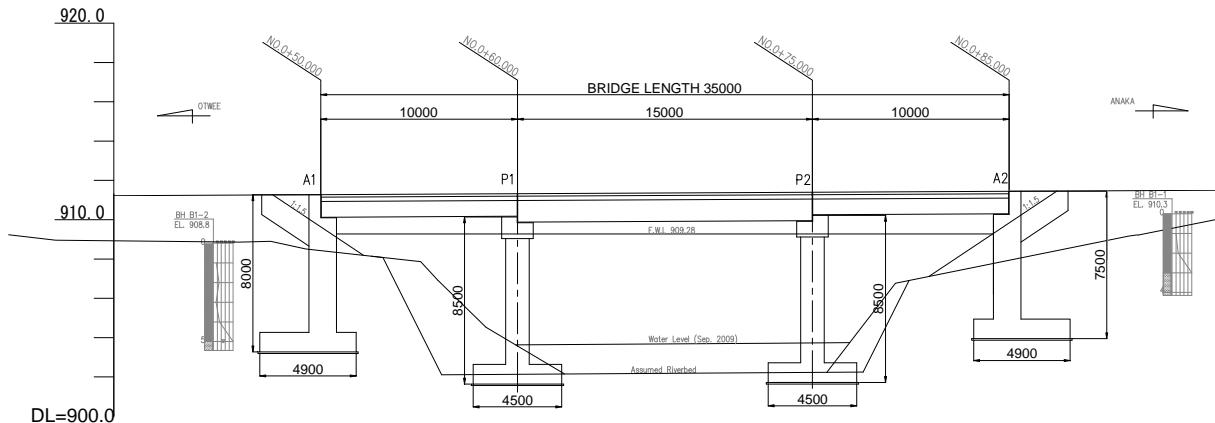
Source: JICA Study Team

(7) Bridge Design

1) Bridge Layout

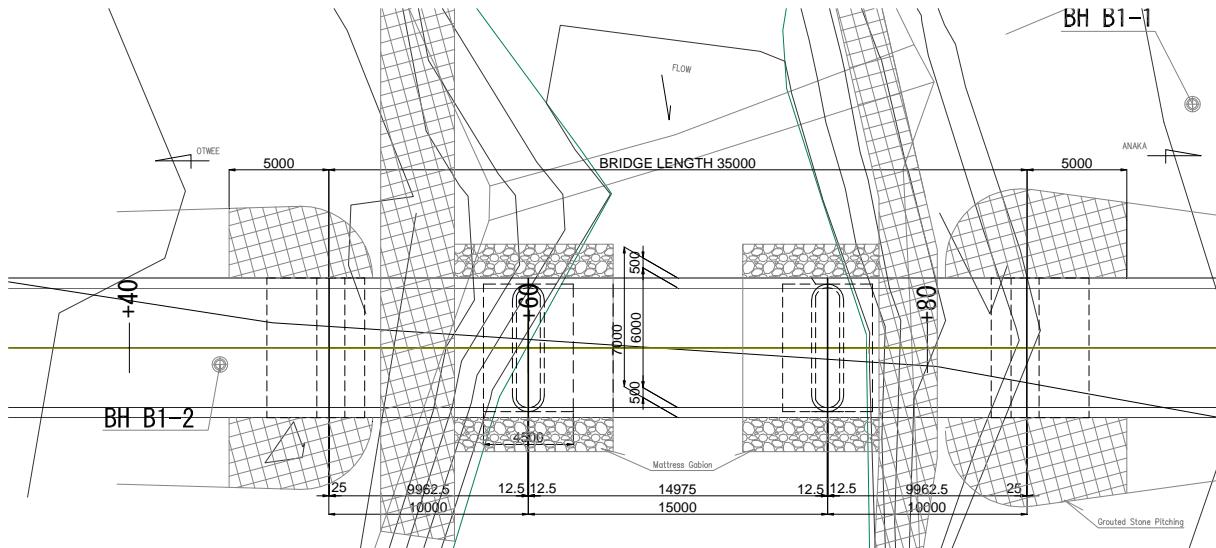
a) Bridge No.1 (Otwee – Anaka Road)

Three simple spans, of 10.00m + 15.00m +10.00m, for a total bridge length of 35.00 m, was adopted. P1 Pier would be located at the right bank while P2 Pier would be located at the left bank. The profile and the plan of the bridge are shown in Figures 22.3.8 and 22.3.9 respectively.



Source: JICA Study Team

Figure 22.3.8 Profile of Bridge No.1 (Otwee - Anaka Road)



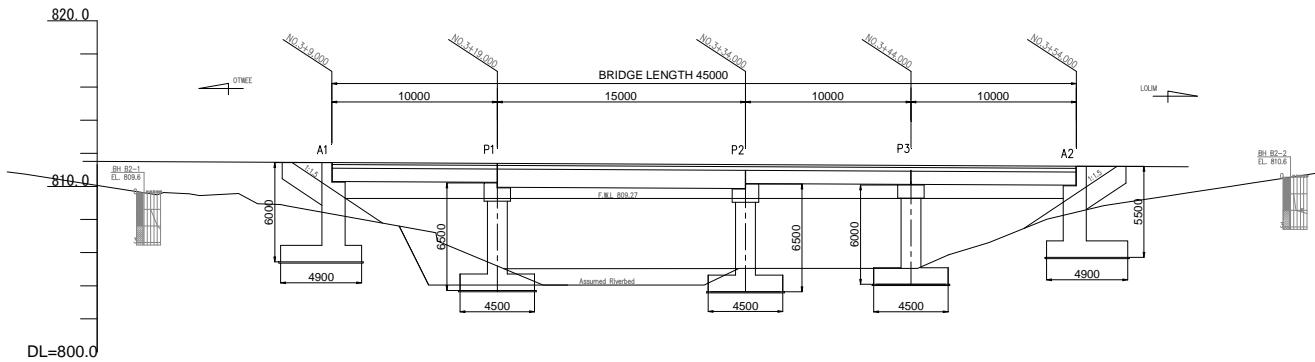
Source: JICA Study Team

Figure 22.3.9 Plan of Bridge No.1 (Otwee - Anaka Road)

b) Bridge No.2 (Otwee – Wii Anaka Road)

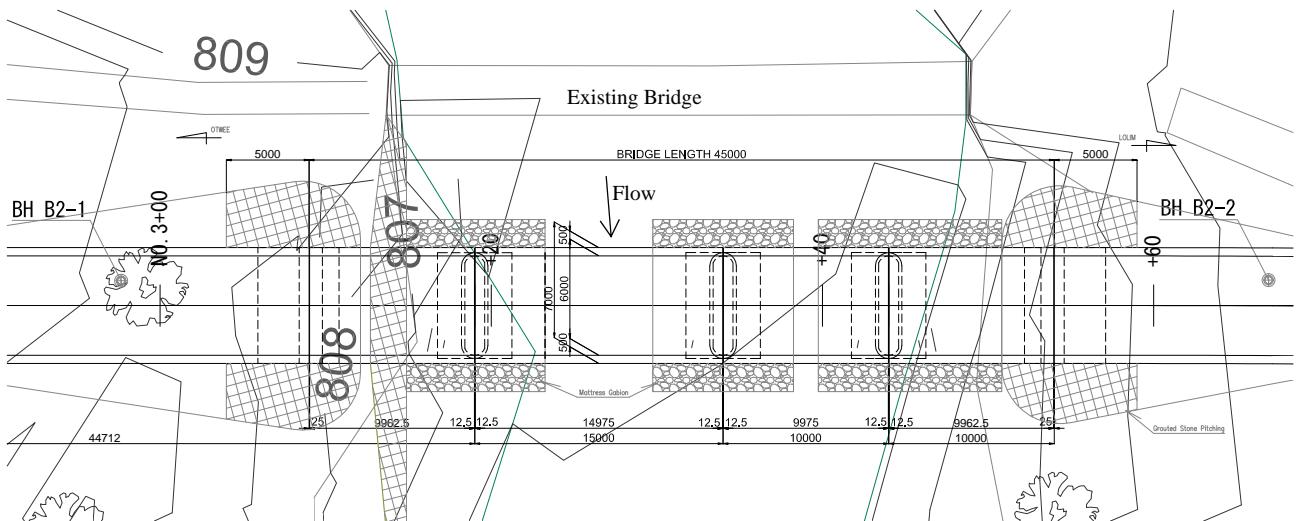
Four simple spans, of 10.00m + 15.00m +10.00m + 10.00m for a total bridge length of 45.00 m, was adopted. P1 Pier would be located at the right bank side and P2 and P3 Piers would be

located at the left bank side. The profile and the plan of the bridge are shown in Figures 22.3.10 and 22.3.11 respectively.



Source: JICA Study Team

Figure 22.3.10 Profile of Bridge No.2 (Otwee – Wii Anaka Road)



Source: JICA Study Team

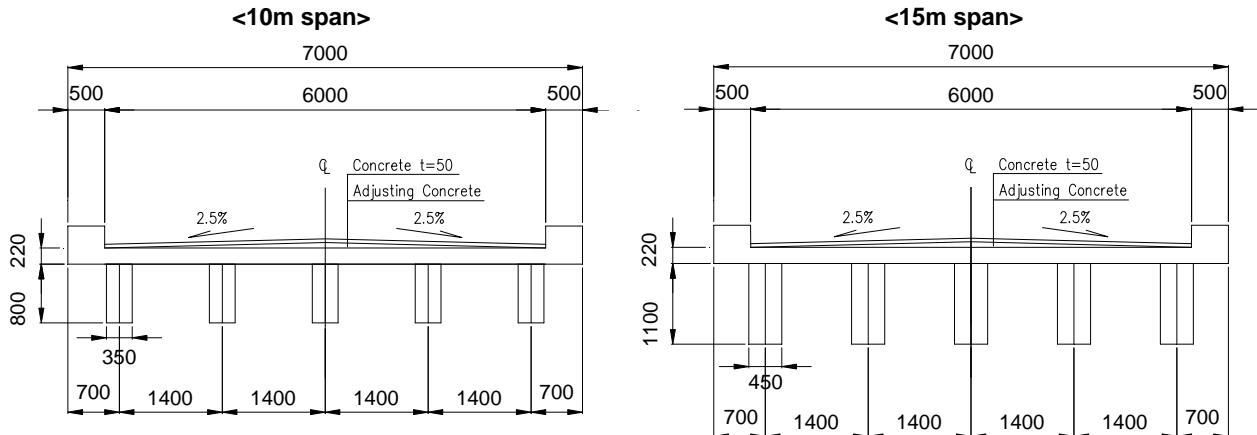
Figure 22.3.11 Plan of Bridge No.2 (Otwee – Wii Anaka Road)

2) Superstructure

The main span length of 15.00m was decided upon so as to avoid having to construct piers in the river (in consideration of constructability of the substructure).

Structural Dimensions

The typical cross-section of the bridge is shown in Figure 22.3.12. The girder depth is 0.8m for the 10m span and 1.1m for the 15m span.



Source: JICA Study Team

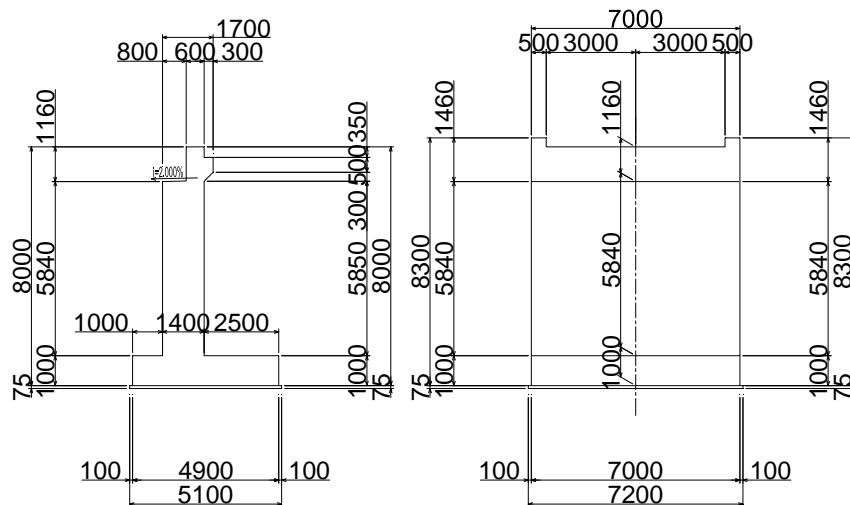
Figure 22.3.12 Typical Cross Section of RC Girder

3) Substructure

Abutments & Piers

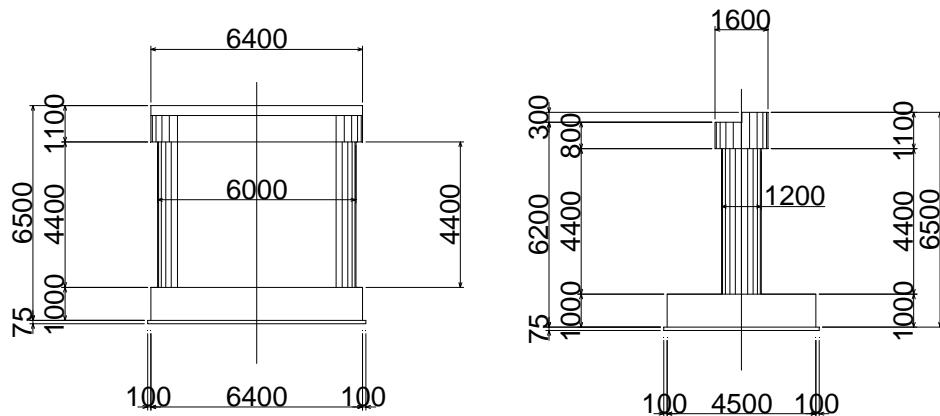
As for the abutments, the concrete inverted T shape ($H=5.5\text{-}8.0\text{m}$) was adopted, given its cost efficiency. As for the piers, the concrete oval type was adopted in order to reduce resistance to water flow around the piers.

A general view of the Abutment and Pier is shown in Figures 22.3.13 and 22.3.14 respectively.



Source: JICA Study Team

Figure 22.3.13 General View of Abutment A1 (Bridge No.1)



Source: JICA Study Team

Figure 22.3.14 General View of Piers P1 & P2 (Bridge No.2)

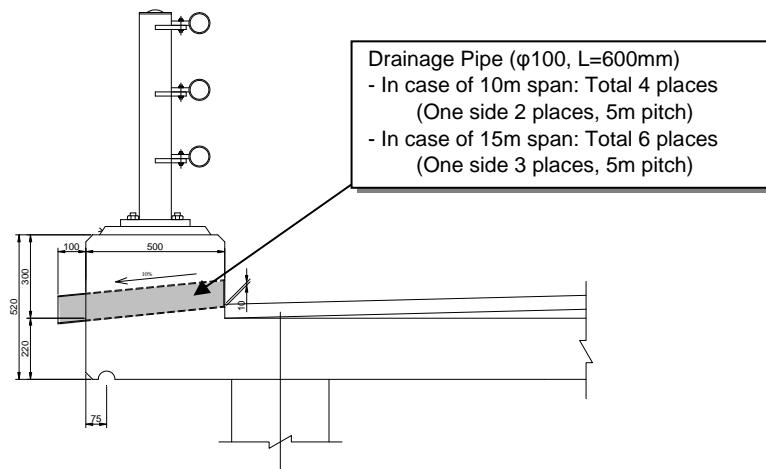
Foundations

Based on the geological information, appropriate bearing layers of rock are found at shallow depths on both banks, such that all foundations of the bridges could be set directly on such rock (see Figures 22.3.6 and 22.3.7).

4) Miscellaneous Facilities

Deck Drainage

A drainage system should have sufficient capacity to collect surface water on the bridge decks efficiently. Drainage pipes will be installed under the parapet at each side of the bridge to remove the storm water from the bridge deck.



Source: JICA Study Team

Figure 22.3.15 General View of Drainage System

Bank protection and scour protection

Abutments would be protected by grouted stone pitching. Riprap would be applied for bank protection. In addition, gabion boxes (6mx2mx0.3m with 60x80mm mesh) were specified for prevention of scouring of piers.

22.4 Environmental and Social Considerations

22.4.1 Procedure of Environmental Approval of the Project

(1) EIA Legal Requirements

Projects which are subject to a mandatory EIA in Uganda are listed in the Third Schedule of the Environmental Impact Assessment Regulations 1998. In the field of road development, the list includes the following criteria, which are most relevant for the project.

- Major roads
- Roads in scenic, wooded, mountainous areas
- Activity out of character with its surroundings, with major changes in land use

The legal definition of major roads was not found. District roads are in practice regarded as major roads in Uganda. It is however not clear if the Lolim project road should be considered as a major road subject to EIA or not, since it is a very short section (8km), and no major impact on the environment is expected. References to scenic, wooded and mountainous areas are found in the National Environment (Hilly and Mountainous Areas management) Regulations, 2000. The Pilot Project area does not belong to an area managed under such regulations. Bridges and borrow pits were not found in the Third Schedule document. It seems that, in practice, they can be classified according to the third criteria. The Third schedule lacks transparency about the EIA requirements for the Pilot project. The consideration of the technical guidelines developed by the Ministry of Works and Transport (MoWT) in the road sector is necessary for the analysis of the EIA requirements.

The National Environment Management Authority (NEMA) is the authority responsible for the notification of EIA requirements, and for the approval of projects, through the delivery of environmental certificates. The decision of NEMA to require an EIA or to deliver a certificate is based on the screening of the project by the lead agency. In the case of the Pilot Project, the lead agency is the Environmental Unit of the MoWT. The screening procedure is based on the environmental guidelines of the MoWT for roads. The procedure for environmental approval of the project starts with the submission of the Project Brief by the developer to NEMA. The developer of the Pilot Project is the district of Amuru.

(2) Environmental Guidelines of the MoWT

The environmental guidelines of the MoWT for the road sector are the Environmental Impact Assessment Guidelines for Road Projects, and the Environmental Guidelines for District Engineers, Volume 5B of the District Administrative and Operational Guidelines, 2003 (District Road Works Manuals series). The implementation of the project needs to be in compliance with these guidelines.

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

- **Case 1:** Projects that certainly do not have any significant impact on the environment
- **Case 2:** Projects likely to have some minor impacts on the environment but for which adequate and sufficient mitigation measures have been identified
- **Case 3:** Projects that have some significant environmental impacts, where adequate mitigation measures are readily available

- **Case 4:** Projects having a number of (very) significant impacts on the environment (whether adequate mitigation measures can be identified or not)

(3) Classification of the Project According to the Environmental Guidelines of the MoWT

Table 22.4.1 below shows that the Pilot Project was not expected to belong to the cases 1 or 4, since the no-impact and the major impact scenarios cannot be upheld. Accordingly, the project was deemed as being more likely to fit within cases 2 or 3.

Table 22.4.1 Conditions of EIA requirements

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

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

(4) Project Brief and Screening

The Project Brief is an official document including a description of the project, an evaluation of the potential impacts and a presentation of the mitigating measures. The purpose of the Project Brief document is to clarify the type of EIA requirements of the project. The Project Brief is therefore a key component of the EIA requirement procedure. The project may be approved by NEMA without EIA requirement if the Project Brief shows that the project has a minimal impact and if mitigation measures have been identified (Case 2). In case of insufficient information in the Project Brief regarding a significant issue or potential impact of the project, NEMA may require an environmental impact review (EIR) report before approval. The NEMA shall notify the project developer within 21 days after submission of the Project Brief. During this period of time, the lead agency must provide its results of screening to the NEMA within 14 days.

(5) Submission of the Project Brief to NEMA

The District of Amuru prepared a Project Brief of the Pilot Project in coordination with the JICA study team. The conclusion of the Project Brief was that the negative impacts would be minor while positive impacts would be significant. The important mitigation measures had been identified. The Project Brief was submitted to NEMA on Oct. 26, 2009. The District received formal approval for the environmental aspects of the Pilot Project from NEMA on Feb.10, 2010.

The Project Brief was prepared according to the following steps:

- A field visit to the Pilot Project area by the JICA Study Team together with the Environment and Forestry District Officers (Oct. 7, 2009)
- Public consultation meetings with the local communities of Corner Lukung, Lungulu B, and Lulyango, held by the JICA study team (Oct. 15 and 16, 2009).
- Public consultation meetings with the local communities along the Otwee - Anaka road held by the District of Amuru (Oct. 21 and 23, 2009).

22.4.2 Procedure of Land Acquisition and Compensation

(1) Legal Requirements for Acquisition of Land

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 a road reserve. The road reserve is mandatory under the Road Act 1964, and Roads Act, Cap 358 Laws of Uganda 2000. The Minister of Works and Transport has authority to declare an area a road reserve. The roads Act authorises a road authority to dig and take away 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 is set at 30m (15m from the centreline of the road on each side). Upgrading a road to a district road class is compulsory and cannot be rejected by the land owners. However, the District must proceed with the acquisition of the land within the new limits of the road reserve.

2) Land Act

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 acquisition of property must be done with fair and adequate compensation prior to the 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 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 on the land boundaries, and to advise the District Land Board.

(2) Legal Requirements for Compensation

The Land Act 1998 refers to the Constitution of the Republic of Uganda 1995 for the need of 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, such as crops, trees and buildings. The latter 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 to 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 from 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 amounts to be paid. The criteria for evaluation of the compensation fees 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.

(3) Land Acquisition and Compensation Guidelines

1) UNRA Guidelines

The MoWT has not set up a land acquisition or land compensation policy for road projects. UNRA is in the process of preparing a land acquisition management system (LAMS) document (final draft June 2009) in line with its strategy for land acquisition of road reserve country wide. 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 roads network. The land acquisition specialist of UNRA provided additional information illustrating the right procedure to be followed in the case of district road projects.

2) Compensation Procedure

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

- An initial assessment based on consultations with 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.

(4) Procedure in the Case of District Roads

There is no standard procedure for land acquisition or compensation in the specific case of district roads. The legal requirements for land acquisition and compensation of a road reserve for a district road are not different from those for a national road. In practice, in the case of customary land tenure, which is the most common case, the acquisition of land within the road

reserve is based on an agreement with the local communities, in which they offer their land for the benefit of public use.

Accordingly, there is no formal acquisition of land, and therefore no full compliance with the legal requirements of the Land Act. The implicit assumption is that land will be compensated for in the future. In such conditions, there is no guarantee that land claims will not occur during or after the implementation of the project. Basically, the scope of the agreements with the local communities is an offer of land for the project roads, and a compensation for the improvements, with an evaluation of the latter by the District Valuer Officer.

(5) Procedure in the Case of the Pilot Project

In the specific case of the Pilot Project, the Amuru district organized public meetings with the local communities on the 21st and 22nd of Oct. 2009, with the purpose of obtaining a written agreement with the local communities for the acquisition of the road reserve. Where the project affects the land properties in the leasehold tenure system, the district engaged in negotiations to obtain the consent of the land owners for the implementation of the project and reach an agreement on compensation.

22.4.3 Environmental Conditions of the Pilot Project Area

(1) Land Tenure and Right of Way

1) Land Tenure

Land tenure is mostly of customary type along the Otwee - Anaka road, and of leasehold type along the Otwee - Wii Anaka and Lolim roads. Table 22.4.2 is a draft summary of the main types of land tenure, according to the information provided by the Chairman of the Land Board in Alero sub-county. In several cases, leases have expired. The district of Amuru was undertaking clarification and negotiation with the land owners.

The table does not include the land in leasehold tenure with public holding, which is the land vested in the District Land Boards because it is unclaimed in terms of customary use, or alienated in other forms of tenure. This category of land is likely to be found in few places within the Pilot Project area.

Table 22.4.2 Land Tenure System in the Pilot Project Area

| Project road sections | | CUSTOMARY HOLD TENURE | | LEASEHOLD TENURE | |
|-----------------------|-----------------------------------|-----------------------|--|------------------------------|---|
| | | Individual holding | Communal holding | Individual holding (ranches) | Group holding |
| NORTH ASWA RIVER | Otwee to Aswa River / Bridge No.1 | 16 holdings | Holdings intertwined with individual holdings, but a large concentration of them in the mid-section of the project road. | 4 holdings | None |
| | Otwee to Aswa River / Bridge No.2 | None | 2 holdings | 3 holdings | 1 holding (West Acholi Cooperative Union Farmers) |
| SOUTH ASWA RIVER | Anaka to Aswa River | Few holdings | Few holdings | None | None |
| | Wii Anaka to Aswa River | 2 holdings | Probably few | 3 holdings | None |
| | Lolim to Aswa River | None | None | 2 holdings | 1 holding (West Acholi Tobacco Growers Union) |

Source: JICA Study Team

2) Right of Way

The Land Act 1998 in Article 71 stipulated that all land shall be subject to all existing public rights of way, reserved to and vested in the Government on behalf of the public, and that all such rights of way shall be maintained by the public uninterrupted. Community roads and district roads are thus subject to a right of way.

The Amuru DDP (including Nwoya District before July 2010) is the official document which provides the list of important community roads in Amuru. The DDP is the result of decisions made in the District Technical planning Committee meetings and District Executive Committee meetings of Amuru District. A study of DDP 2008/09 – 2010/11 provides a list of important community roads in Amuru. Included in this list are the Otwee - Anaka and Otwee - Lolin roads. The most recent DDP 2009/10 – 2011/12 provides the list of community access roads upgraded into district feeder roads in June 2009. According to this list, the Otwee - Anaka road and the Otwee - Lolin road are community roads upgraded to District Roads Class I. All these road sections have consequently been accorded a right of way.

The road section between Wii Anaka and the Aswa River is a private community road. The District and the land owners have agreed to use this road as a community access road for the purpose of ferrying construction materials to the bridge construction site until the completion of Lolin road.

(2) Population

1) Population Data

The population data is that of the America Refugee Committee (ARC), which is the most reliable and updated. However, the population in the area which lies between the Otwee - Wii Anaka road and the Albert Nile is not taken into account in this data. Population data is not available for this area.

Similarly, there is no data about the movement of population between districts, sub-counties or parishes. In fact, there is no assessment of the geographical patterns of population exchanges between villages, transit sites and camps. The movement of people back to their home land or how they move between sub-counties, parishes and villages is unknown.

According to the UNHCR GIS data clerk, there should be potential for the return of people from south to north through the Otwee - Anaka road and Bridge No.1. There is however no information about the population and the possible return of IDPs through the Otwee - Wii Anaka road and Bridge No.2.

2) Distribution of Population in the Pilot Project Area

The geographical distribution of population in the sub-counties crossed by the project roads is shown in Table 22.4.3. The population in this area is one of IDPs in a process of return to their homeland. As shown in the table, about 74% of the total population present in the area are returnees, most of them now living in the return villages. The main IDPs camps are those of Purongo and Anaka in the south (Tegot, Lolin, Wii Anaka, Wii Anono, Purongo, Otwiyo, Aparanga, Anaka, Agung), and those of Amuru in the north (O mee, Amuru). The data on population in the IDPs camps of Purongo sub-convey is given in Table 22.4.4. It shows that the return process is approaching its final phase, with the exception of the small camp of Tegot.

Table 22.4.3 Geographical Distribution of Population in the Pilot Project Area According to Sub-counties

| | District | Sub-counties | Population in villages | Population in transit sites | Population in camps | Total population |
|------------------|----------|--------------|------------------------|-----------------------------|---------------------|------------------|
| NORTH Aswa river | Amuru | Amuru | 29783 | 4572 | 12455 | 46810 |
| | Nwoya | Alero | 19523 | 3379 | 1659 | 24561 |
| SOUTH Aswa river | Nwoya | Anaka | 13439 | 2449 | 9225 | 25113 |
| | Nwoya | Purongo | 6779 | 1480 | 5202 | 13461 |
| TOTAL | | - | 69524 | 11880 | 28541 | 109945 |

Source: ARC and NRC 2009

Table 22.4.4 Population in the IDPs Camps in Purongo (Nwoya District)

| Camps | Parish | Population in 2009 | % of population already moved outside the camp (from 2006) |
|-----------|---------------|--------------------|--|
| Tegot | National Park | 541 | 3 |
| Lolim | Latoro | 175 | 77 |
| Wii Anaka | Latoro | 595 | 66 |
| Wii Anono | Pabit | 363 | 83 |
| Purongo | Pabit | 2067 | 79 |
| Otwiyo | Patina | 1461 | 45 |
| TOTAL | | 5202 | 71 |

Source: UNHCR / ARC August 2009

3) Population along the Otwee - Anaka Road

Otwee - Anaka road crosses 5 local communities which belong to 4 different parishes and 2 sub-counties, as shown in Table 22.4.5. The total population of the parishes of concern amounts to 12,012 persons, of which 10,314 persons live in villages, 1,175 in transit sites, and 523 in a camp. There are 43 villages, 7 transit sites and 1 camp in the area covered by these parishes. Corner Lukung, which is a small community, is not taken into account because of the lack of data.

Table 22.4.5 Population along the Otwee - Anaka Road

| District | Sub-county | Parish | | Type of settlement | Population |
|----------|------------|-----------|---------------|--------------------|------------|
| Nwoya | Alero | Panokrach | Corner Lukung | | No data |
| | | | Lungulu A | transit site | 54 |
| | | Bwobonam | Lungulu B | transit site | 152 |
| | | Paibwor | Lulyango | transit site | 365 |
| | Anaka | Pangora | Bidati A | village | 127 |

Source: ARC / Data of June (Pagak) and Sept. 2009

4) Population along the Otwee - Wii Anaka Road and Lolim Road

Otwee - Wii Anaka road crosses the Lebgnec transit site in Panokrach parish (Alero). The road runs into Wii Anaka in the south. There is no community along the new Lolim road alignment. The population of Lebgnec amounts to 189 persons.

5) Conditions of Access to Basic Services

The Pilot Project area is almost in breach of the national standards regarding distance from a primary school. The distance to a primary school should not be more than 2.5km, which is equivalent to 1 to 1.5 hours walk. Lebgnec, Wii Anaka, Tagot, and Omee are the communities in or around the Pilot Project area where a primary school is less than 2.5km away. Anaka has a secondary school. All the communities located on the western side of the Otwee - Wii Anaka road are very far from any school.

The conditions of access to health care services are very similar to those for schools. With the exception of the north-east (Amuru health center) and south (Latoro health center, Anaka hospital) borders of the Pilot Project area, there is no community located at less than 5km distance from health care services. The people living in the western part of the Otwee - Wii Anaka road are particularly affected by the distances and the road conditions.

(3) Patterns of Return of the Internally Displaced Persons

1) Data on the returning patterns in the Pilot Project Area

The Pilot Project area mostly lies at the center of the Alero sub-county. While the Otwee - Anaka road is a major axis of return for the IDPs population, as shown by the presence of transit sites, the Otwee - Wii Anaka road crosses an area with very few settlements, with the exception of Lebgnec. The available data does not enable the estimation of the importance of this road to the return of IDPs.

2) Survey of the Population Return Conditions in the Pilot Project Area

A simple and short interview survey of the population in Alero was conducted by the JICA Study Team. Its purpose was to get information on the population movement trends, including return conditions and living conditions criteria. The survey area was the area extending on the western side of the Otwee - Wii Anaka road, on the right bank of the Aswa river. This area has no specific name and it is commonly referred to as the Alero Animals Corridor, in reference to its potential for wildlife conservation (section 3.5.6). It is recommended that the designation of this area as the Alero game reserve should not be undertaken.

The survey was limited to 3 days in the field, with 2 questionnaires and 2 targets:

- The local community of Lebgnec (group questionnaire);
- The households of the Alero Animals Corridor (individual questionnaire).

The Alero Animals Corridor is a large area such that the survey covered only the most easily accessible and populated zones. The surveyed zones were the villages of Karatye, Nyamcacu, Alingir, Got Ojwang and Omee. These villages are not LC1 administrative units but ethnic territories. The access road to these villages connects to the Otwee - Wii Anaka road about 4km south of Lebgnec. The access road is divided into 2 main trunks toward the south-west and the north-west. It was assumed that this area was one of the most populated in the Alero Animals Corridor, according to the information obtained from the Lebgnec community.

The study was conducted for 3 days on November 6th, 9th and 13th, 2009. The first day was focused on the Lebgnec community. On the second day, focus was shifted to the households along the road crossing Karintye, Nyamcacu, Alingir, and Got Ojwang, covering a distance of 18km from Lebgnec. The third day focused on the households along the road crossing the Karatyte and O mee villages, on the northern side. In addition, an inhabitant of Alingir was interviewed on November 17, in the Alero Sub-county Council.

No distinction was made between men and women. The interviews were conducted with women when the men (household heads) were absent, or with men and women together. A total of 10 households were visited on the second day, and 4 on the third day. The interviews conducted on the third day of the survey were more discussion-oriented than those of the second day.

3) Results of the Survey and Conclusion for the Pilot Project

The main results of the survey are as follows:

- The population in the Alero Animals Corridor is basically a population of returnees. There are 2 types of social patterns for return to the homeland: Individual return and clan return. Clan return is a return to the homeland or to the land formerly occupied by the same clan. There are 2 types of geographical patterns for return.
- There is almost no case of new settlement. Only one case has been identified (Got Ojwang 3).
- The return of the IDPs population is basically on the Gulu Amuru Lebgnec axis. The survey did not show any significant flow of returnees from the main camps located in Purango or Anaka sub-counties.
- There is a potential flow of returnees from Karuma, Latoro, and Alero. These returnees are likely to use the Otwee - Wii Anaka Lolim road through Bridge 2. However, this potential for return seems to be quite limited, in terms of population size and time. Based on the indications given by the returnees during the survey, the expected number of returning households likely to use this route amounts to 30 from Karuma, 200 from Alero and probably very few from Latoro. The normal pattern of return from Alero is through the Otwee - Anaka road. Once rehabilitated, the Otwee - Anaka road will still remain the preference for the returnees. The return process shall most probably be effective between December 2008 and April 2009. The complete return, i.e. the return of all complete households, will however be achieved over a longer time frame.
- The conditions of living in the Alero Animals Corridor area are very hard because of the poor conditions of the road, the absence of market areas, of schools and health services in close proximity and the requirement to get potable water from natural streams far from the homes during the dry season.
- The trips for getting the basic services necessary for living are clearly organized along a diagonal going from Pakwach in the south-west to Amuru in the north-east, through Lebgnec. Most of the people go to Amuru or Lebgnec for shopping or services, generally by foot or by bicycle. From Got Ojwang, people have a preference for Latoro and Pakwach; however crossing the Aswa river by foot is a limiting factor. Anaka is attractive for its market and hospital, but it is not the main destination of frequent trips. Lebgnec is very important for getting supplies of basic products and for milling of grain crops.
- There is a strong demand for improvement of the Alingir - Got Ojwang road, which is in a very poor state. The people on the Western side are more concerned with opening up access to Latoro parish. The people on the eastern side are more interested in the improvement of the Wii Anaka road towards Lebgnec and Amuru rather than that

towards Wii Anaka or Lolum, which has some advantages such as better access to Anaka hospital and to Kampala.

The main conclusions for the Pilot Project are as follows:

- The most important finding regarding the preferences for road improvements is that the improvement of the road along the axis of Amuru – Lebgne – Latoro is the most preferable by the people living in the Alero Animals Corridor. Comparatively, the improvement of the Otwee - Wii Anaka road or Lolum road through Bridge No.2 does not seem to be an important issue for those people.
- Construction of Bridge No.2 without new community access to the Alero Animals Corridor will not induce significant benefits for IDP return although it seems that the Otwee - Lolum road will be one of the main roads to support the district's economy in the near future.
- The basic problem of the lack of services will not be resolved through road improvement alone. The development of community services is necessary.
- The ranch farmers will be the main beneficiaries of the rehabilitation and construction of the Otwee - Wii Anaka road and construction of Bridge No.2 due to improved access to marketing places such as Pakwach and Nebbi districts.
- The future Otwee - Lolum road will give better access to the people whose original villages are located between Aswa River and Anaka River, hence the road will contribute to the return of IDPs.
- Having huge area for future cultivation, the Alero Animals Corridor has the capacity to accept more IDPs, even for the people who lost their original lands during the long-running conflicts.

(4) Natural Conditions

1) Water Courses and River Habitats

The hydrographic system is basically oriented in an east to west direction, and all the rivers flow from the nearby Kilak hills in the north-west into the Albert Nile River in the West. The Aswa River and the Ome River are the main streams. The Pilot Project area occupies the upstream part of the Aswa River watershed.

The Aswa river banks have a protection zone of 100m from the highest mark of the river. Woodland and riparian forests are present in the Aswa valley upstream of the crossing point of Bridge No.1. The crossing point itself could formerly have been a riparian forest, according to the wetlands map of the Wetlands Management Directorate. It actually looks like a remnant and degraded part of this woodland, reduced to a narrow alignment of bush tree vegetation along the river banks. The Ojwayo woodland forest near Lungulu and along the Otwee - Anaka road seems to be an extension of the riparian forest of the Aswa River and its tributary, in the upstream part of Bridge No.2.

The crossing point of the Pilot Project Bridge No.2 is not a wetland, but a flooding river bed. It seems that there is minimal swampy vegetation developing upstream of this point. The project Bridge No.2 crossing point is however not recorded as a wetland, according to the wetlands map of the Wetlands Management Directorate.

2) Grassland and Woodland Habitats

The open grassland habitat is largely predominant in the Pilot Project area. This habitat can be classified into 3 main categories:

- The bush lands, where the density of small trees can be high, but the canopy is open. This habitat is typical of the Otwee - Anaka road, where bush land alternates with remaining pieces of woodlands. It is also typical of the Otwee - Wii Anaka road, on the northern side of Lebgnec.
- The palm trees grassland, where the Palmyra palm trees (*Borasus Aethipium*) are scattered in the open grassland. This landscape is typical of the Aswa river valley, extending a few kilometres on the right and left sides of the river. All sections of the project roads are concerned.
- The open grassland, where the vegetation cover is that of tall grass savannah interspersed with some tree and shrub growths. Trees are generally of small or medium size, rarely of big size, and are mostly *Ficus* species. There are very few *Acacia* species. These *Acacia* are of very small size. This landscape is found everywhere between the 2 precedent types of vegetation cover.

Some of the common tree species identified in the open grassland of the Pilot Project area include: *Albezzia Spp*, *Ficus Spp*, *Vitex doniana*, *Loxiflora platycalyx*, *Acacia sebiriana*, *Acacia Orkii* and *Erythrina exesparata*. These tree species and others not identified here are grass land tree species common in Amuru, Nwoya and Gulu districts. They prefer well drained and relatively deep soils. Grass species identified include *Hyperania Spp*, *Panicum maximum*, Couch Grass, Elephant Grass (pocket at the bank of the Aswa River), and *Sporobola Spp*.

The woodland habitat is mainly concentrated north of the Aswa River. Its main coverage is near Lungulu, where it is known as the Ojwayo forest. This woodland has been described above as an extension of the Aswa river wetland. The proposed Otwee - Anaka road passes through the western bit of this forest class of wetlands. There are small woodland spots between Lebgnec and Corner Lukung, along the Otwee - Wii Anaka road.

This vegetation is more or less degraded because of the opening of crop fields. Destruction is observed in the wood lands and bushes, where farmers practice bush burning and dry trees to give way to open fields. Charcoal making and ring barking of trees to make bee hives are also common.

3) Nature Protection Areas

There is no nature protection area in the Pilot Project area. However, a part of the area extending on the western side of the Otwee - Wii Anaka road, on the right side of the Aswa river, is proposed for wildlife conservation under management of the Uganda Wildlife Agency (UWA). The proposed area lies in the western end of the Alero Animals Corridor.

4) Wildlife

Table 22.4.6 provides specific data on the wildlife in the Aswa River area of the Madi Corridor (Wildlife Conservation Society, 2009). This area lies around the Aswa river downstream of Bridge No.2 of the Pilot Project. Table 22.4.6 shows that the main evidence of species concerns the Monkeys, the Water Bucks, and the Bush Bucks. The survey did not include the birds, but it is assumed that a rich fauna of bird species could be supported by the riparian forests along the Aswa River. The local residents mention that all the main streams of this area, including the Aswa River, are rich in crocodile populations.

Table 22.4.6 Mammalian Wildlife in the Pilot Project Area

| Groups | Species | Evidence from sightings | Evidence from spoor (dung, tracks skeletal and foot prints) |
|---------------|------------------------------|-------------------------|---|
| Large mammals | Buffalo | | ✓ |
| Antelopes | Duiker | ✓ | ✓ |
| | Waterbuck | ✓ | ✓ |
| | Uganda Kob | ✓ | ✓ |
| | Bush buck | ✓ | ✓ |
| | Hartebeest | | ✓ |
| | Oribi | ✓ | |
| | Reedbuck | | ✓ |
| Pigs | Warthog | | ✓ |
| | Bush pig | ✓ | ✓ |
| Primates | Baboon | ✓ | ✓ |
| | Vervet monkey | ✓ | |
| | Black & white colobus monkey | ✓ | |
| Rodents | Giant rat | | ✓ |
| | Cane rat | | ✓ |
| | Hare | | ✓ |

Source: Occurrence, distribution and relative abundance of medium to large size wild mammal species in Madi wildlife corridor, Wildlife Conservation Society, 2009

(5) Sensitivity of the Pilot Project Area

The sensitivity of the pilot project area to the potential impacts of the project is described in general terms in Table 22.4.7 for the natural environment, and Table 22.4.8 for the social environment. The criteria used have been compiled from the checklist criteria for category III projects in Annex 5 of the EIA Guidelines for road projects (MoWT version 2008). These criteria conform to the specific conditions of the project area, and to the JICA guidelines. In the field of social environment, poverty, vulnerability, livelihood and gender are the major concerns because of the IDPs population.

The tables show that the natural and living environment along the Otwee - Anaka road is the most sensitive area to any possible impact of the project. Since this road is going to be a district road and is likely to be widened to 6m instead of the present 3m, the most potential impacts likely to occur as a result of implementation of the project are along this road alignment.

Table 22.4.7 Checklist of Sensitivity of the Natural Environment in the Pilot Project Area

| Criteria | Road Otwee - Anaka | | Road Otwee - Wii Anaka | | New Road Lolim |
|--------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | Section North of Aswa River | Section South of Aswa River | Section North of Aswa River | Section South of Aswa River | Section South of Aswa River |
| Grassland savannah | ■ | ■ | ■ | ■ | ■ |
| Woodland | ■ | | ■ | | |
| Aswa river banks | ● | ● | ● | ● | |
| Aswa river bed | ● | ● | ● | ● | |
| Forest products | ■ | | ● | | |
| Reserved trees | ■ | | | | |
| Wildlife resource | ● | ● | ● | ● | ● |

■ Most relevant / ● Less relevant / no indication : not relevant

Source: JICA Study Team

Table 22.4.8 Checklist of Sensitivity of the Social Environment in the Pilot Project Area

| Criteria | Road Otwee - Anaka | | Road Otwee - Wii Anaka | | New Road Lolum |
|------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | Section North of Aswa River | Section South of Aswa River | Section North of Aswa River | Section South of Aswa River | Section South of Aswa River |
| Crop fields | ■ | ■ | ■ | ● | ● |
| Valuable fruit trees | ■ | ● | ■ | | |
| Housing settlements | ■ | ■ | ● | ● | |
| Customary land rights | ■ | ■ | ● | ● | |
| Locally valuable cultural assets | ● | ● | | | |
| IDPs return settlements | ■ | ■ | ■ | | |
| Unemployment | ■ | ■ | ■ | | |
| Access to health / social services | ■ | ■ | ■ | | |
| Poverty, vulnerable groups | ■ | ■ | ■ | | |

■ Most relevant / ● Less relevant / no indication: not relevant

Source: JICA Study Team

(6) Environmental Conditions along the Pilot Project Roads

1) Field Observations

Field observations were done through several visits to the field site. One visit was organized by the JICA study team together with the Environment District Officer and the Forestry District Officer, on October 7, 2009.

2) Public Consultation

Public consultation meetings were held on the 15th and 16th of October, 2009, in 3 selected IDPs transit sites along the Otwee - Anaka road. The sites for public consultation meetings were selected in consideration of the importance of the population. They are, from North to South: Corner Lukung, Lungulu B, and Lulyango. Meetings were held in the form of informal discussions with the Te Rwot Kweri of each community. The purpose of these meetings was to present the Pilot Project, to get the opinions of the residents, and to develop an idea of the sensitivity of land issues in these communities.

The main issues discussed during these consultations are summarized in Table 22.4.9 below. A few issues mentioned in the table were considered as potential issues but were not raised by the residents. The land issue is one of them. In Lulyango, the land issue was considered by the JICA Study Team, but was not raised by the population.

The most important points raised at these meetings were:

- The possible loss of standing crops, which was perceived as the most important issue. People required that compensation should be allocated to them if the project is going to affect crops.
- Encroachment on woodland and possible loss of forest cover was not perceived as possible damage. The people however clearly required that trees planted by the villagers should be compensated for.
- The requirement for job opportunities was strongly expressed in each community. The residents expect job opportunities during the construction works. They feel that they must be given priority for the allocation of jobs on the road sections in their area.

- Graves were also a major concern for the people. One of them is directly affected by the project in Lungulu B, and another one possibly in Lulyango. People required an appropriate relocation in case of potential damage.
- The improved access to school and hospital in Anaka was regarded as a decisive advantage of the project by all the residents.
- The risk of damage to the houses and increased insecurity for the children was raised in Lungulu B, where a housing hut is located in the ROW.

Table 22.4.9 Main Issues Discussed during the Public Consultations

| Issues | Corner Lukung | Lungulu B | Lulyango |
|---|---------------|-----------|----------|
| Water supply | | ✓ | ✓ |
| Access to hospital, health center | ✓ | | ✓ |
| Access to school | ✓ | | |
| Transportation of crops and products | ✓ | ✓ | ✓ |
| Land ownership rights | | | |
| Compensation for crops | ✓ | ✓ | ✓ |
| Compensation for important trees | ✓ | ✓ | |
| Forest clearance | | | |
| Employment opportunities from the project | ✓ | ✓ | ✓ |
| Opportunities for marketing products | | ✓ | ✓ |
| Risk of damage to houses | | ✓ | |
| Noise and nuisances | | | |
| Hut house | | ✓ | |
| Insecurity from road traffic | | ✓ | |
| Graves | | ✓ | ✓ |
| Forest resources (charcoal) | ✓ | | |

Source: JICA Study Team

3) Summary of Environmental Conditions

The environmental conditions specific to each road of the Pilot Project are summarized in Table 22.4.10. These conditions have been identified from direct observation in the field, interviews and public consultation meetings with the local communities.

Table 22.4.10 Environmental Conditions along the Pilot Project Roads

| | Otwee - Anaka Road and Bridge No.1 | | Otwee - Wii Anaka Road and Bridge No.2 | | New Lolim Road |
|---------------------|---|---|--|--|---|
| | North Aswa and Bridge 1 | South Aswa | North Aswa and Bridge 2 | South Aswa | |
| Natural environment | - Woodland - Small riparian forest along Aswa river - 4 reserved trees - Grassland | - Grassland | - Woodland - Grassland | - Grassland | - Grassland - Very few Palmyra palm reserved trees possibly in the ROW |
| Social environment | - 1 grave roadside - 1 hut in the ROW - Crop fields and valuable trees | - 1 grave roadside but possibly outside ROW - Crop fields - Few isolated planted trees possibly in the ROW - 1 or 2 huts possibly in the ROW | - Crop fields and valuable trees | - Few isolated planted trees possibly in the ROW | - Few isolated planted trees possibly in the ROW |

Source: JICA Study Team

22.4.4 Potential Impacts of the Project on the Environment

(1) Negative Impacts of the Pilot Project

The main negative impacts of the project on the environment are minor impacts on the natural and social environment, as summarized in Table 22.4.11 below. The negative impacts mainly concern the Otwee - Anaka road, which was defined as the most sensitive area.

There is no anticipated major impact, since there are no protected areas that could be affected by the project, and no involuntary resettlement of the population.

The main anticipated negative impacts of the project are the relocation of 1 or 2 houses, the relocation of 1 or 2 graves, the compensation for the loss of standing crops and valuable trees, the loss of 4 trees of a reserved tree species (*Melicia Excelsia*), the physical damage to nearby houses, and the partial clearance of woodlands. All these are likely to be minor impacts on the environment, provided that adequate and sufficient mitigation measures are undertaken.

The relocation of 1 or 2 huts is not regarded as a significant impact for the following reasons: The relocation of huts is easy; the residents themselves are ready to give their consent; and the settlements affected are transit homes in transit sites. Relocation should however be facilitated as much as possible by the district authorities, because the residents belong to vulnerable groups of society.

Land claims are a possible impact as far as land acquisition is concerned, in the case of customary land tenure. This impact is however considered more as a latent problem of compliance of the project with the legal requirements rather than as a possible negative impact during the implementation of the project.

The depletion of the forest resources and the degradation of the wildlife are more likely to occur as a result of improved access in the long term. The vegetation is already more or less degraded due to the opening of crop fields. Destruction is observed in the woodlands and bushes, where farmers practice bush burning to give way to open fields. Charcoal making and ring barking of trees to make bee hives are also common. These activities have the potential to increase return of displaced persons to their former lands resulting in reduced vegetation cover in the coming years if no conservation measures are taken. The capacity to manage the natural resources will be a critical factor. This potential impact is however a combined result of the project itself and of the management institutions.

Minor negative impacts are the impacts induced by construction works. Typical minor impacts include: the risk of erosion affecting the road shoulders or the topographic slopes, the risk of degradation of water quality of the natural streams, the increased risk of traffic accidents, and others. All these impacts are likely to be minor impacts on the environment, provided that adequate and sufficient mitigation measures are undertaken.

Table 22.4.11 Summary of Negative Impacts of the Pilot Project

| | | Otwee - Anaka road and Bridge No.1 | Otwee - Wii Anaka road and Bridge No.2 |
|---------------------|--|------------------------------------|--|
| Natural environment | Clearance of bush lands | -- | - |
| | Depletion of the forest resources | - | - |
| | Degradation of the wildlife resources | - | - |
| | Loss of protected tree-species | - | |
| | Risk of erosion on slopes | - | - |
| | Risk of degradation of river water quality | - | - |
| | Degradation of river banks | - | - |

| | | Otwee - Anaka road and Bridge No.1 | Otwee - Wii Anaka road and Bridge No.2 |
|--------------------|---------------------------|------------------------------------|--|
| Social environment | Relocation of huts | - | |
| | Relocation of graves | - | |
| | Loss of standing crops | - | |
| | Damage to houses | - | |
| | Land claims | - | |
| | Risk of traffic accidents | - | - |

Anticipated to be: - - - very important / - - important / - less important; no indication: no effect

Source: JICA Study team

(2) Positive Impacts of the Pilot Project

The expected benefits of the project are summarized in Table 22.4.12 below, for each road alignment and bridge project. This table shows that the predominant positive impacts are anticipated for the Otwee - Anaka road, mainly because of the facilitation of the IDPs return, and improved access to public or private services. It is assumed that there is still potential of return of the IDPs population along the Otwee - Anaka road. Return of IDPs to their homelands is generally considered as a contributing factor to reduction of their poverty and vulnerability, because of the improved access to land resources. IDPs Return can also have negative impacts such as the loss of access to basic services like markets, shops, schools and health centres.

In the case of the Otwee - Wii Anaka road, the positive impacts in the short term are uncertain. There is no evidence of increased and facilitated IDPs return after implementation of the project without any additional community access roads to the Alero Animals Corridor. The level of improvement of access to basic services, and the contribution to the reduction of poverty, vulnerability and gender inequality are uncertain given the current situation.

The positive impacts of the project, however, largely compensate for the few minor and mitigated negative impacts that could occur from implementation of the project. The project will be particularly important for the people living along the Otwee - Anaka road, since it will facilitate access to health and social facilities of Anaka, and greatly facilitate the return of IDPs from South to North across the Aswa River.

Table 22.4.12 Summary of Positive Impacts of the Pilot Project

| | Otwee - Anaka road South Bridge No.1 | Otwee - Wii Anaka road North | Otwee - Wii Anaka road South Bridge No.2 |
|--|--------------------------------------|------------------------------|--|
| Facilitation of IDPs return | +++ | +++ | + |
| Improvement of access to health centres / hospital | +++ | +++ | ++ |
| Improvement of access to schools | +++ | +++ | + |
| Improvement of access to district authority | +++ | +++ | +++ |
| Transportation of crops and products | +++ | +++ | +++ |
| Marketing of crops and local products | +++ | ++ | +++ |
| Creation of job opportunities | ++ | ++ | ++ |
| Contribution to poverty reduction | ++ | ++ | + |
| Contribution to reduction of vulnerability | ++ | ++ | + |
| Contribution to improvement in gender equality | + | + | + |

Anticipated to be: +++ very important / ++ important / + less important; no indication: no effect

Source: JICA Study Team

(3) Checklist of Impacts of the Pilot Project

The checklist of the impacts is a summary of the positive and negative impacts of the project taking into consideration the mitigation measures. The criteria of review of the impacts have been selected according to the JICA guidelines and MoWT guidelines in the field of environmental evaluation of road projects. Table 22.4.13 shows the checklist of impacts on the physical and natural environment while Table 22.4.14 shows the checklist of impacts on the social environment. In Table 22.4.14, the Otwee - Wii Anaka road with bridge No.2 project has been divided into north and south sections because of the big differences in the anticipated impacts.

Table 22.4.13 Impacts of the Pilot Project on the Physical and Natural Environment with Mitigation Measures

| Criteria | Impacts and measures | PROJECT | |
|----------------------------|--|---------|---|
| | | 1 | 2 |
| Air pollution / Dust | Exhaust gases of trucks and heavy machines during construction are sources of air pollutants. This will however not affect the ambient air quality and direct exposure of the population is almost non-existent. The traffic of motor vehicles after project completion will be very limited. As a district road, the traffic on the Otwee - Anaka road is estimated at more than 50 vehicles / day, which is not a source of air pollution. This traffic density will generate more dust in comparison with the present situation, but this impact is minor. | B | B |
| Water pollution | The residual cleaning water used for the preparation of concrete will not be discharged into the Aswa river before treatment. Treatment techniques include pond sedimentation and filtration. The residual engine oils or any other dangerous water contaminants will be managed properly for elimination in an adapted facility, to avoid any contamination of the surface or groundwater. Works will be completed preferably during the dry season in order to avoid siltation in and increased turbidity of the river water. | B | B |
| Soil contamination | There is no known soil contaminated site in the project site. The proper management of oils during the works will prevent any risk of contamination due to discharge or accidental leakage. | B | B |
| Waste | Works will be a source of green waste, inert waste, and some construction waste. The waste management issue for this project is not a major issue, but dangerous substances for water, like oils, must be properly managed. The discharge of any waste in the Aswa river bed or along the river banks must be avoided. For that purpose, waste disposal during the construction of bridges should be properly handled and the waste treated with appropriate methods. Green waste will be used by the local communities. Inert waste materials generated by the rehabilitation and maintenance of roads will be managed in coordination with the district authorities and local communities. | B | B |
| Noise | The noise is not 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. The impact of the project during and after construction on the ambient noise level will be negative, since current ambient noise is almost non-existent. However, the negative impact will be minor. | B | B |
| Morphology | The fill sections for rehabilitation of the Otwee - Anaka road are short and of very limited height (0.5m). The Otwee-Wii Anaka road has cut sections, but the impact on the morphology will still remain minor. The restoration of the borrow pits to their initial state will prevent morphological damage. The current morphology of the Aswa river bank will be modified by works at the bridge crossing points only, for the construction of the abutments. After restoration of the working sites, this morphological modification will have minor impact. | B | B |
| Soil stability and erosion | The construction work on the bridges is likely to disturb the soil stability of the river banks and to induce erosion of the slopes. The area affected is restricted to the bridge construction site. This site will be restored to its initial state as required in the specific conditions of contract with the contractor. Roadside erosion is likely to occur after construction. Such risk is reduced through appropriate design and road maintenance activities. | B | B |
| Natural risks (floods) | Since the rehabilitation and construction of roads will cross several natural streams, the proper design of the culverts will ensure that no undesirable flood risk will be possible at the crossing points. The project will minimally alter the | B | B |

| Criteria | Impacts and measures | PROJECT | |
|-------------------------------------|---|---------|---|
| | | 1 | 2 |
| | water runoff conditions from their present state. The construction of bridges and box culverts according to flood control standards will not affect the surface water drainage patterns of the area. Human settlements are located outside the flood prone areas. The risk of flood in the housing settlement areas due to bad management of water runoff will be mitigated through the proper design of drainage along the Otwee - Anaka road. | | |
| Increased runoff | The main potential impact is a change of water runoff patterns in the Otwee - Anaka road sections crossing the settlement areas. In these sections, the roadside water drainage will be carefully constructed to avoid any uncontrolled runoff which could be a potential source of damage to the nearby houses. | B | B |
| Water resources | Water resources for the local communities are generally the groundwater (wells) during the rainy season and natural streams during the dry season. The project will not affect these resources. During the construction of the bridges, the withdrawal of water from the Aswa River for the preparation of concrete will not have any effect on the availability of water downstream, and will not affect possible water users downstream. Basic measures will be undertaken during construction to avoid any impairment of the quality of the water in Aswa River. | B | B |
| Wildlife resources | Wildlife resources are important for the conservation of a rich biodiversity and for livelihood in Amuru. Hunting pressure for bush meat during the dry season should increase due to the presence of the workers in the work camps. The impact is however limited and temporary. Once rehabilitated, the Otwee - Anaka road will support a very limited traffic not likely to affect fauna. The Otwee - Wii Anaka road itself will not contribute to opening the remote areas of the Madi corridor in western Alero, and its impact on wildlife resources of this area will remain negligible. | B | B |
| Natural habitats Savannah land | The Otwee - Wii Anaka road will have negligible impact on the grassland savannah habitat. The rehabilitation of the Otwee - Anaka road will affect the woodlands due to clearance of vegetation to widen the road reserve. The direct effect is however limited since the road already exists. The indirect effect due to facilitated access to the woodland resources (more specifically for making charcoal) and to the market places could result in the degradation of the woodland habitat. This long term effect is however uncertain and will depend on the management capacity of communities to preserve the resources. | B | B |
| Natural habitats Aswa River | The wetland ecology in Aswa River has not been surveyed. It is however assumed that the riparian forest at the level of bridge 1 could be important as a refuge for wildlife and habitat for birds. In addition, the Aswa River banks have a protected buffer zone of 100m wide. This habitat will be temporarily affected during the construction of the bridge, with direct effects like the felling of trees along the river banks for a short distance of about 20m. This impact will be limited to the immediate vicinity of the bridge, and the site will be restored after construction. Permission for works in the Aswa River bed will be required by the construction company from the Water Resources Management Department. The project should not affect the Aswa River ecology (birds, aquatic ecosystem). After construction, the 2 bridges will not hinder the possible function of the river bed as a biological corridor for wildlife, along the river. | B | B |
| Loss of important biological areas | There is no protected area in the project area. There is no impact on important biological areas. | D | D |
| Protected species Reserved trees | It is not yet clear if there are protected plant species in Uganda. There is however a protection system for reserved trees, not yet legally established, but to be considered in practice. Along the Otwee - Anaka road, there are 4 specimens of Melicia Excelsia tree which are potential reserved trees. These trees will certainly need to be cut down for the extension of the road reserve. This should be done in close coordination with the District Forestry officer. The impact is considered as acceptable, provided that a compensating measure is agreed upon with officer. | D | D |

MAIN COMPONENTS OF THE PROJECT

1. Otwee - Anaka road with bridge No.1

2. Otwee - Wii Anaka road with bridge No.2

RANKING AND NATURE OF THE POTENTIAL IMPACTS

A: Major, B: Minor, C: Not Identified, D: Negligible or absence of impact

Indication +: positive impact. No indication: negative impact

Source: JICA Study Team

Table 22.4.14 Impacts of the Pilot Project on the Social Environment with Mitigation Measures

| Criteria | Impacts and measures | PROJECT | | |
|--|---|---------|-----|-----|
| | | 1 | 2a | 2b |
| Field crops and valuable trees | The loss of standing crops and the loss of valuable trees, which are trees planted by the villagers, are a major concern for the people of the local communities of the Pilot Project area. Compensation is strongly expected as understood by the JICA Study Team from the public consultation meetings that were held. This impact should however be minor because of the limited surface area of concern, which was however not surveyed, and the limited quantity of crops at the time of implementation, which however depends on the implementation schedule and notification by the district to the local communities. This impact will be minor if properly compensated for, as required by the Land Act 1998. | B | B | B |
| Involuntary resettlement of population | The project does not involve any involuntary resettlement of the population. | D | D | D |
| IDPs Return process | It is assumed that there is still a potential dynamic of return along the Otwee - Anaka road. This road and Bridge No.1 should facilitate and contribute towards acceleration of the return of the IDPs to their homelands between Otwee and Anaka. In the case of the Otwee - Wii Anaka road and Lolim road, together with Bridge No.2, the impact on the IDPs return process is uncertain. The conditions are as follows: The return pattern seems to be from Amuru and Gulu for the majority of the returnees. The return potential is strongly hindered by the remoteness of Alero. The return potential from Purango seems to be low. Therefore, there is no evidence that the Lolim road and Bridge No.2 will significantly contribute to the return of the IDPs population. | A + | A + | B + |
| Risk of damage to settlements | There are 1 or 2 hut houses located in the ROW that are likely to be directly affected. One is located in Lungulu B and will obviously need relocation. This impact will not be significant for the following reasons: the relocation of huts is easy; the residents themselves are ready to give their consent; and the settlements affected are transit homes in transit sites. Relocation should however be facilitated as much as possible by the district authorities, because the residents are vulnerable people. The proper design of the road will prevent the possible risk of damage resulting from bad drainage in settlement zones. These points have already been explained. The risk of direct damage during road works will be managed by the constructor. | B | B | B |
| Gender equality, children | It is unclear how the project will contribute to alleviate the tasks or the work load of the women, or contribute towards reduction of gender inequality. The improved access to schools and health services will certainly contribute to the rights of children, and reduce the work load of women since they generally take care of the children as regards family health and education. This impact could be more or less important according to the local conditions. The improved access to the market places and the possibility for the women to sell their products on the markets is certainly the most important positive impact of the project towards gender equality. This impact should be a major one on the Otwee - Anaka road together with Bridge No.1. There is however no evidence that it will be important in the case of the Otwee - Wii Anaka road, and more particularly for the Lolim road and Bridge No.2. | B + | B + | D |
| Poverty, vulnerability | Return of IDPs to their homeland is generally considered as contributing towards reduction of poverty and vulnerability because of the access to land resources. In case of return to the remote areas such as those in western Alero, the return process will instead have negative impacts such as the loss of access to basic services like markets, shops, schools and health centres. In the case of the Otwee - Anaka road and bridge No.1, the project should strongly contribute towards alleviating poverty and reducing vulnerability. The majority of the people who will benefit from better access to services are vulnerable groups. On the whole, the project will have a positive impact in this aspect. | A + | A + | D |

| Criteria | Impacts and measures | PROJECT | | |
|----------------------------------|--|---------|--------|--------|
| | | 1 | 2a | 2b |
| Employment | The implementation of the project will be an opportunity to create jobs during the period of work. The public consultation held in the local communities of the Otwee - Anaka road made it clear that residents want to be given priority as regards employment as part of the labour force for the road works in their communities. The use of this local labour force will be a condition of contract with the contractor. | B + | B + | B + |
| Access to public health services | The Pilot Project area lies outside the limits of the areas covered by hospital or health centres, which should be a distance not exceeding 5km. The project will then help to facilitate access to the existing health services. The greatest contribution will be the improved access to the Anaka hospital along the Otwee - Anaka road. | A + | A + | B + |
| Public health | The impact of the project on public health will be positive because of better health care resulting from improved access. The possible negative effects of the project in the work camps during construction will be negligible. The use of local residents in the road works, the small size of the work camps, and the short period are not factors that could increase the health risk. Basic hygiene facilities will be provided in the work camps. | B + | B + | B + |
| Working environment | The workers will not be exposed to any specific environmental risk. The working conditions are those of rural road works, and the protection of workers will be implemented according to the standard rules included in the contract procurement to avoid accidents. | B | B | B |
| Traffic accidents | During construction, the risk of traffic accidents is high. Walking, bicycles, and motorbikes are the basic means of transportation. The secure movement of the pedestrians and cyclists during construction and road-works will thus be an important task. Appropriate plans for deviation and management of the traffic will be carried out in order to reduce the risks of road accidents. The workers will be sensitized in order to adopt safe driving in the housing areas. The control of speed in sensitive zones will reduce such risk to acceptable levels. After construction, the anticipated traffic on the district road of Otwee - Anaka is expected to rise to more than 50 motor vehicles per day. Such traffic is very low and the induced risk of traffic accidents is limited. It is however a new risk compared with the present situation. The speed of vehicles must be reduced in the housing areas. The impact should be minor. | B | B | B |
| Social disruption | The employment of the local residents in the works will prevent the generation of conflicts with the local communities, and mitigate the risk of social disruption. The improved rural accessibility will facilitate the return of IDPs along the Otwee - Anaka road, which is a positive impact towards the social reintegration of this population. | B + | B + | D |
| Cultural assets | There is no protected or important cultural or historical patrimony in the project area. Along the Otwee - Anaka road, there is 1 grave in Lungulu B that will need relocation, and 1 grave in Lulyango that could need relocation. Relocation or compensation will be done in agreement with the local residents. The impact will be negligible. | B | D | D |

MAIN COMPONENTS OF THE PROJECT

1. Otwee - Anaka road with bridge No.1

2a. Otwee - Wii Anaka road / North

2b. Otwee - Wii Anaka road / South, with bridge No.2

RANKING AND NATURE OF THE POTENTIAL IMPACTS

A: Major, B: Minor, C: Not Identified, D: Negligible or absence of impact

Indication +: positive impact. No indication: negative impact

Source: JICA Study Team

22.4.5 Mitigation Measures and Compliance of the Project with Institutional Requirements

(1) Mitigation Measures

The main mitigation measures that must be undertaken to ensure that the project will not have negative impacts on the environment are listed in Table 22.4.15.

(2) Checklist of Compliance with Legal and Technical Requirements

Table 22.4.16 below is a simple checklist for review of the basic conditions of compliance of the project with the most important legal or technical requirements.

Table 22.4.15 Main Mitigation Measures

| | Basic measures for mitigation of the impacts | Conditions of implementation |
|---------------------|---|---|
| Natural environment | Preliminary treatment of cleaning water used after preparation of the concrete for the construction of the bridge | Procurement condition |
| | Proper storage and elimination of the residual engine oils in coordination with the district authority | Procurement condition |
| | Implementation of the works during the dry season as much as possible | Planning schedule |
| | Proper elimination of the waste generated by the works and work camps during the construction of the bridges | Procurement condition District Environment Officer |
| | Strict prevention of discharge of waste into the Aswa River or along the river banks | Water Resources Management Dept District Environment Officer |
| | Management of the road inert waste materials in coordination with the district authorities and the local communities. | District Environment Officer |
| | Restoration of the morphology and vegetation at the bridge working sites to their initial state | Procurement condition |
| | Permit application for the felling of reserved trees | District Forestry Officer |
| | Permit application for works in the Aswa River | Water Resources Management Dept |
| Social environment | Restoration of the borrow pit sites to their initial conditions | District Forestry Officer |
| | Compensation for damaged standing crops and planted valuable trees | District authority |
| | Relocation of the few huts affected by the project (possibly through compensation) | District authority |
| | Relocation of graves affected by the project | District authority |
| | Priority employment of the local labour force for the road works | Procurement condition |
| | Proper installation of basic hygiene facilities in the work camps. | Procurement condition |
| | Appropriate plans for deviation and management of the traffic and speed | District authority Police |

Source: JICA Study Team

Table 22.4.16 Checklist of Compliance

| Requirements | Compliance conditions |
|---|---|
| Land Act | Based on the Land Act, it is required that land acquisition and compensation for the improvements in the road reserve are properly implemented. It is possible that the project will not be fully compliant with this law since land acquisition will be done through an agreement document between the district and the local communities. It is however recommended that compensation for the improvements will be fully achieved, in order to avoid frustration and possible claims. Full compliance with the Land Act and its regulations is difficult in practice due to the lack of formal procedure. |
| National Forestry and Tree Planting Act | There isn't yet any regulation pertaining to the protection of reserved trees. The reserved trees affected by the project will however be compensated for through coordination with the District Forestry Officer. |
| MoWT guidelines | The MoWT guidelines will be the technical reference for site restoration and soil erosion prevention, which are measures integrated in the contract conditions. |
| EIA regulations and EIA procedure | The Project Brief has been submitted to NEMA. The District received formal approval for the environmental aspects of the Pilot Project on February 10, 2010. |
| Water Act | A permit will be requested by the contractor from the Water Resources Management Department as required by the Water Act and its regulations. The Aswa River has a protection zone of 100m. Prevention of pollution, waste discharge, and restoration of the site after works will be a basic condition for compliance. |
| Waste Management (water Act Chap 152) | Coordination with the local communities and local authorities to eliminate waste in conformity with the legal requirements. |

Source: JICA Study Team

PART 2: PREPARATION AND IMPLEMENTATION OF PILOT PROJECT

SECTION 6: IMPLEMENTATION OF PILOT PROJECT

23. BID CONDITIONS AND RESULTS OF BIDDING

23.1 Qualification Criteria

The qualification criteria are decided in consideration of availability of contractors with necessary engineering and financial capacity. As such, the following requirements, in general, are introduced.

- Compliance to the Conditions of Contract
- Reliable Construction Schedule
- Reliable Construction Plan
- Reliable Bid Security
- Site Visit Certificate

23.1.1 Qualifications of Bidder

The most important subject focused on during the bidding was the engineering experience in reinforced concrete bridge construction. However, most of the major bridge construction projects in Uganda were financed by foreign donors who adopted international bidding. As a result, those projects, without exception, have been carried out by international contractors.

MoWT recommended 10 Ugandan contractors with experience in bridge concrete work. The recommended contractors were further assessed by the Study Team.

As for the criteria concerning financial and engineering aspects, they were decided in consideration of the six general requirements as specified under the Japan's Loan Project. However some modifications were made so as to ensure appropriate competition among Ugandan contractors.

(1) Average Annual Volume of Construction Work over the past 5 years

The Guideline for Japan's Loan Project requires 250 % of project cost as average annual volume of construction work.

Since the project cost was estimated at 4.5 billion Ushs for a Lot, the requirement was that the average annual construction volume would be 11.3 billion Ushs. However, only three Ugandan contractors satisfied this requirement; this was too small a number to ensure appropriate competition.

When the requirement was set at 4.0 billion Ushs which is almost equivalent to the project cost, six Ugandan contractors satisfied it. Since the project expected at least six contractors to

participate in the bidding, the 4.0 billion Ushs requirement was useful as the average annual volume of construction works.

Consequently, it was decided that 4.0 billion Ushs be set as the average annual volume of construction works.

(2) Previous Experience in Works of Similar Nature

The Guideline for Japan's Loan Project requires, at least, 250 % of project cost as previous experience in similar construction work.

According to the assessment by the Study Team, there was no Ugandan contractor who satisfied this requirement. Therefore the requirement was lowered to experience with at least 2 projects in works of a similar nature. The project experience includes not only reinforced concrete bridge works but also steel girder and composite bridge works.

(3) Arrangement of Construction Machinery

The Guideline has no statement on the arrangement of construction machinery.

The project was designed to have only gravel road and reinforced concrete bridge construction works which do not require specialized construction machinery. The erection of the precast girder was the only work item that would require specialized machinery in the form of a 60 ton crane.

Hence, it was decided that the following machinery, as shown in Table 23.1.1, was required.

Table 23.1.1 Required Machinery

| Machinery | Specification | Nos. |
|------------------|---------------|------|
| Excavator | 0.7 cu. m | 2 |
| Bulldozer | 21 t | 1 |
| Dump Truck | 15 t | 10 |
| Motor Grader | 3.1 m | 1 |
| Vibration Roller | 10 t | 1 |
| Tyre Roller | 10 t | 1 |
| Concrete Mixer | 0.5 cu. m | 2 |
| Crawler Crane | 60 t | 1 |

Source: JICA Study Team

(4) Work Experience of Personnel

As mentioned above, the project does not require particular engineering skill. Consequently, the following general requirements were set regarding the work experience of personnel.

Table 23.1.2 Required Work Experience of Personnel

| Personnel | Experience Requirement |
|---------------------------------|--|
| Contract Manager (CM) | 8 yrs. total exp. and 5 yrs in similar works and 1 cont. as Manager of similar works |
| Chief Engineer (CE) | 5 yrs. total exp. and 5 yrs in similar works and 1 cont. as Manager of similar works |
| Concrete Works Foreman (CWF) | 5 yrs. total exp. and 3 yrs in similar works |
| Form/ False Works Foreman (FWF) | 3 yrs. total exp. and 3 yrs in similar works |

Source: JICA Study Team

(5) Lines of Credit

A total of 1.5 billion Ushs was required as the Lines of Credit in consideration of necessary financial capacity of eligible contractors.

(6) Contractor's Classification

The Contractor's Classification has been introduced by MoWT.

According to the assessment by the Study Team, the contractors with class B or lower did not have enough capacity to implement a project of such scale. Therefore the criteria for eligible contractors was set at class A or A+ contractors.

23.2 Bidding Schedule

The PPDA (Public Procurement and Disposal Act) specifies that a minimum of 22 working days shall be given to the bidders in case of open domestic bidding in either the case of pre-qualification or post-qualification. When the procurement is required urgently, the procuring entity may select post-qualification in order to minimize the procurement duration for selecting the contractor.

In addition, PPDA provides the Standard Bidding Documents (SBD) and the bid documents, which shall comply with the SBD, prepared by the procuring entity.

In accordance with PPDA provisions concerning the open domestic bidding, bidding documents for the Pilot Project were prepared under the post-qualification method, and approved by JICA.

The original bidding schedule was as follows:

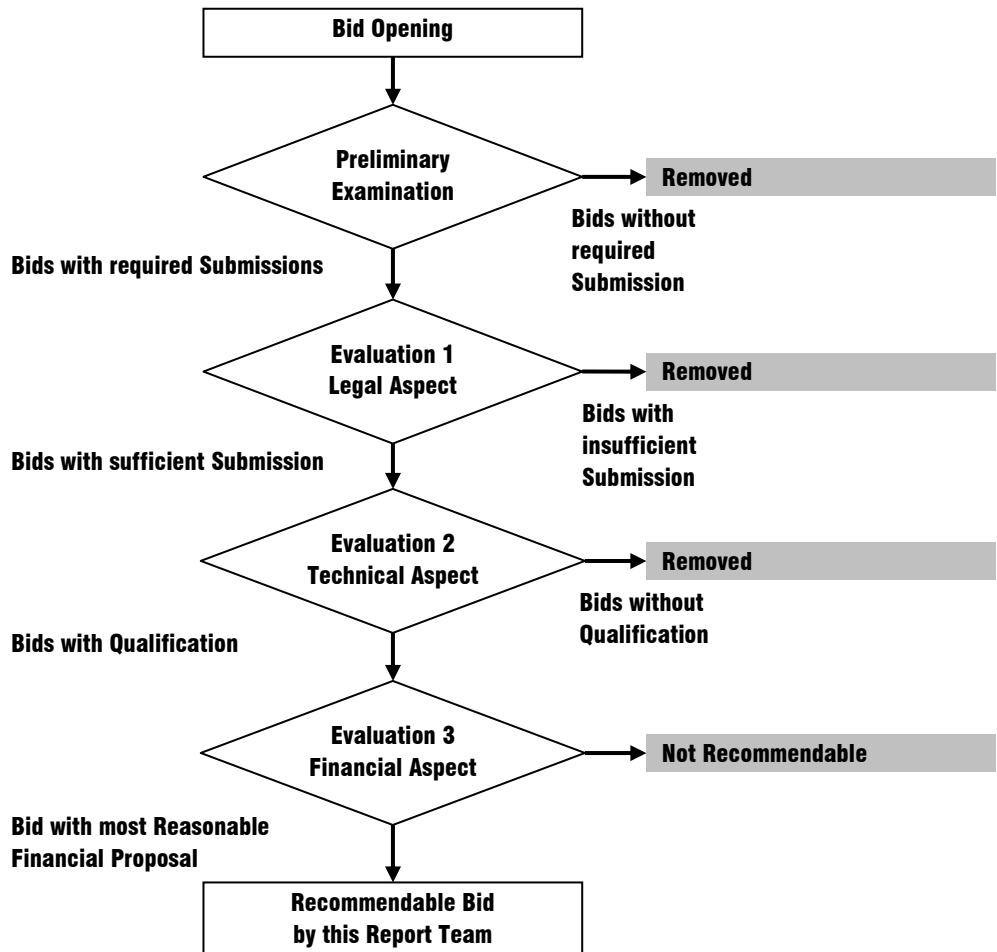
- Bid Notice (Newspaper): 26th November 2009
- Release of Bid Documents: 30th November 2009
- Official Site Visit: 9th December 2009
- Request for Clarification (Q&A): 23rd December 2009
- Deadline to submit Bids: 12:00 noon on 13th January 2010
- Bid Opening: 12:30 on 13th January 2010

23.3 Bid Evaluation Method

The bid evaluation stage started just after the bid opening ceremony. The submitted bidding documents were opened in the presence of all participants at the ceremony.

After opening the bidding documents, the screening of the bids, called Preliminary Examination, was carried out by the participants, the Employer (JICA), C/P (MoWT and Amuru District) and the Study Team. This screening was conducted to ascertain whether the bidders had submitted all the required documents. The detailed contents of the bidding documents were not examined at this stage. The bids without required submissions were removed at this stage as a result of the Preliminary examination.

After the Preliminary Examination, other evaluations were carried out step by step as shown in Figure 23.3.1 and the bids without sufficient submissions and/or that did not fulfil criteria requirements were removed in the subsequent steps. The bids which passed all steps proceeded to the final evaluation (Financial Aspect).



Source: JICA Study Team

Figure 23.3.1 Evaluation Procedure

In the final evaluation, the price comparison among the remaining bids was carried out and the bid which offered the most reasonable price was selected as the Recommendable Bid for each lot.

23.4 Result of Bidding

The actual evaluation and results of bidding are shown in Appendix 2 “Result of Bidding for Pilot Project”.

24. IMPLEMENTATION PLAN

24.1 Implementation Policy

The pilot project is expected to be completed as early as possible. In order to minimise the contractor's mobilization period as well as the whole construction period, implementation of the works by an excellent local contractor, if available in Uganda, was strongly expected.

However, in Uganda, many large scale concrete bridge construction projects have been carried out by the foreign contractors to date, and therefore, a preliminary investigation of the construction industry was carried out by interviewing the Ministry of Works and Transport in Uganda (MoWT) as well as Ugandan local contractors, in order to clarify the availability of Contractors for the Pilot Project.

24.2 Construction Planning and Cost Estimate

24.2.1 Construction Planning

(1) Introduction

This section describes the proposed construction plan for two pilot project routes including construction method for new bridges, resources for material and equipment, construction procedures and work schedule, adherence to site regulations and the work quantities.

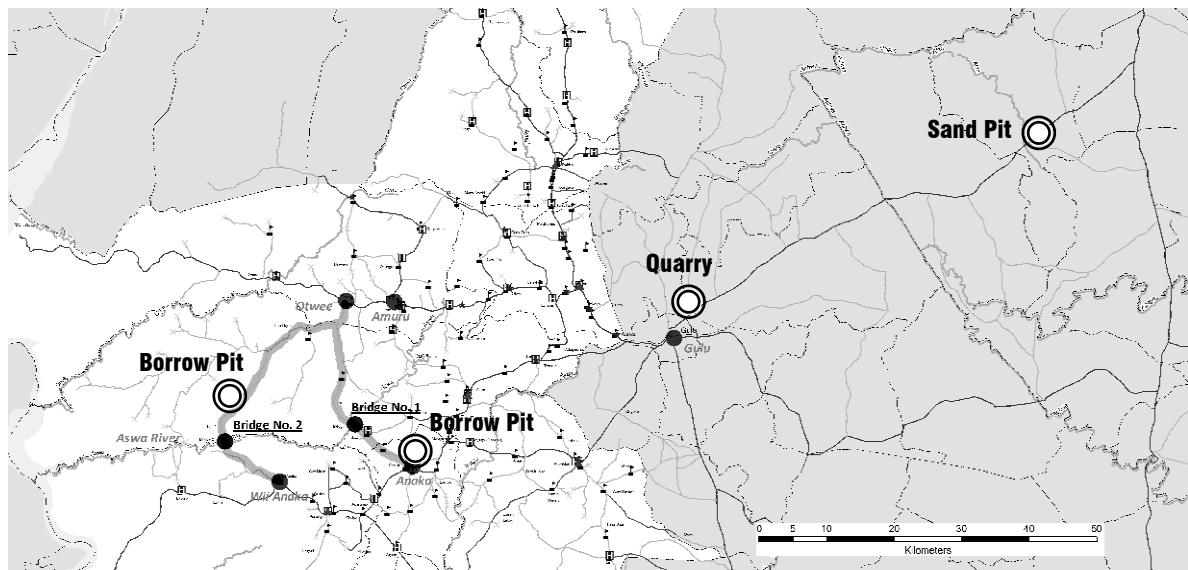
The pilot project roads are as follows;

- **Otwee-Anaka Road:** Road Length=27.51km, Width=6.0m
- **Otwee-Wii Anaka Road:** Road Length=44.66km, Width=3.0m (6.0m only at Bridge No.2 and the approach road sections)

(2) Procurement Source for the pilot project

The Study Team conducted sampling and testing at the MoWT laboratory in Gulu for soil, aggregate and river sand. According to the tests results, all materials were suitable for use in concrete and base course layers.

Locations of quarry, borrow pit and river sand pit are as shown in Figure 24.2.1.



Source: JICA Study Team

Figure 24.2.1 Location of Quarry, Borrow Pit and River Sand Pit

(3) Procurement of other Major Materials and Construction Equipment

1) Material

Main materials, such as cement and re-bars are available in the local market, including those imported from Kenya.

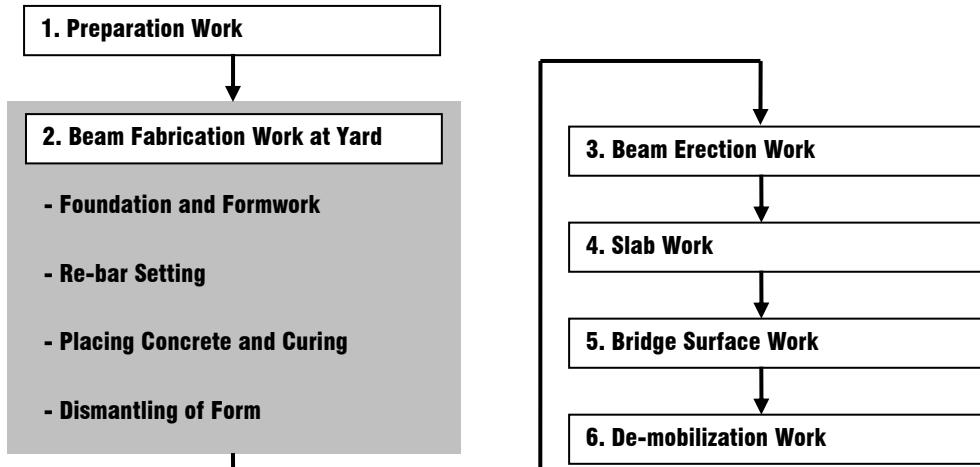
2) Equipment

Major construction equipment for the road and bridge works is also locally available.

(4) Bridge Construction Plan

1) Superstructure

The standard construction procedure for the superstructure is as shown in Figure 24.2.2. In consideration of river flooding, an onsite pre-cast fabrication method was adopted together with a crane erection method.

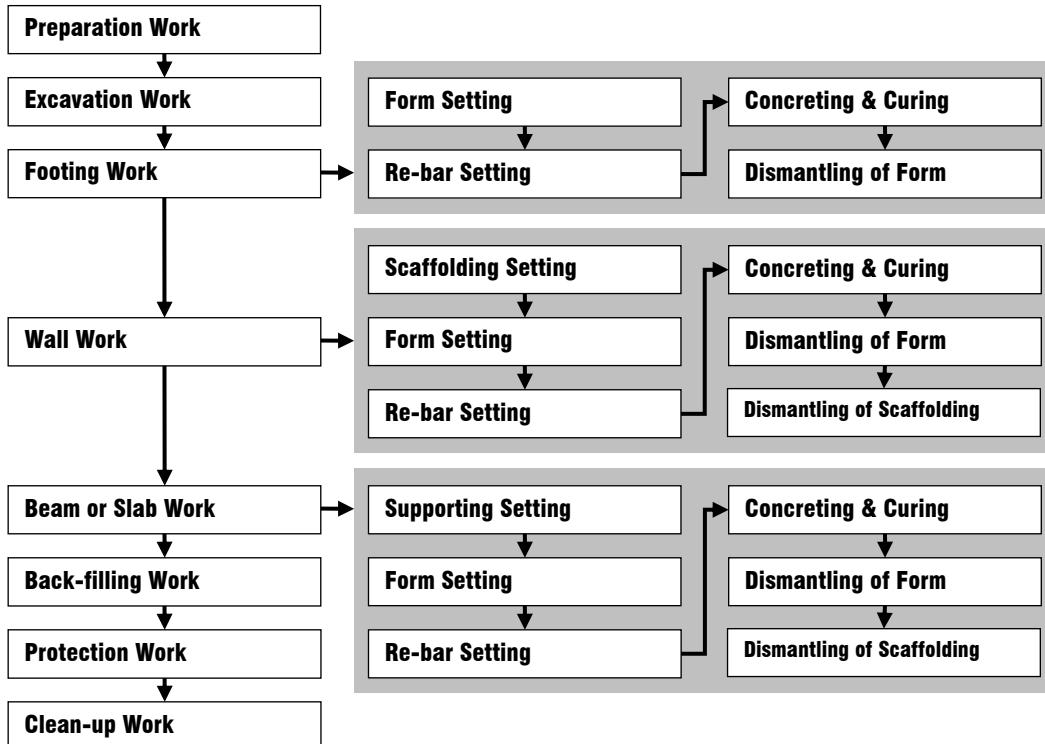


Source: JICA Study Team

Figure 24.2.2 Construction Procedure for Superstructure

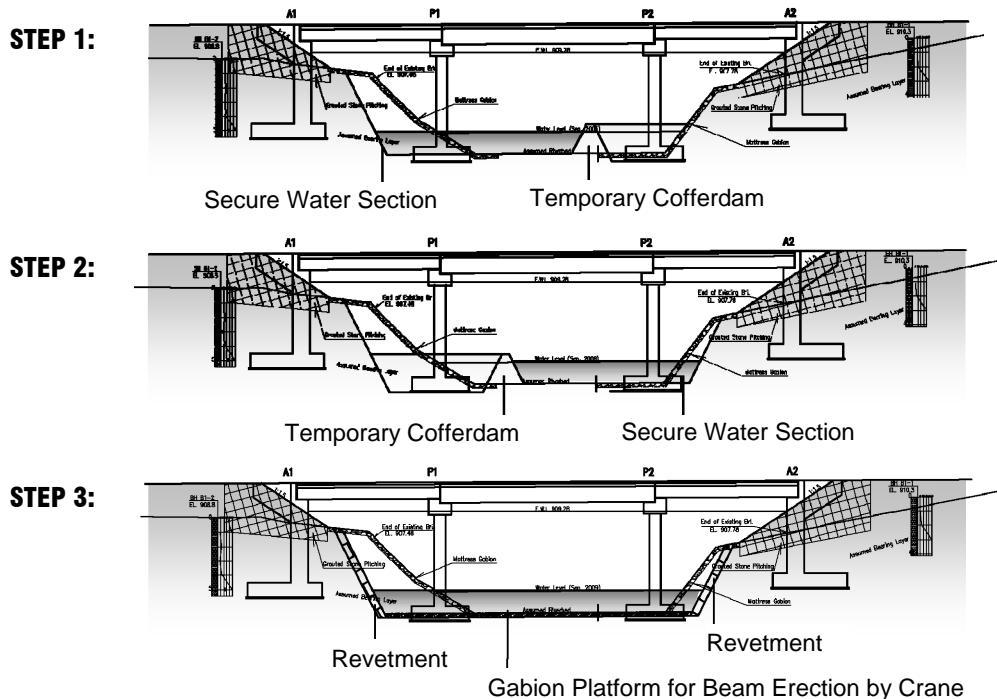
2) Substructure

The construction of the foundation and substructure had to be undertaken with the following procedure, shown in Figure 24.2.3. A temporary cofferdam method was adopted for the substructure construction as shown in Figure 24.2.4.



Source: JICA Study Team

Figure 24.2.3 Construction Procedure for Substructure & Foundation

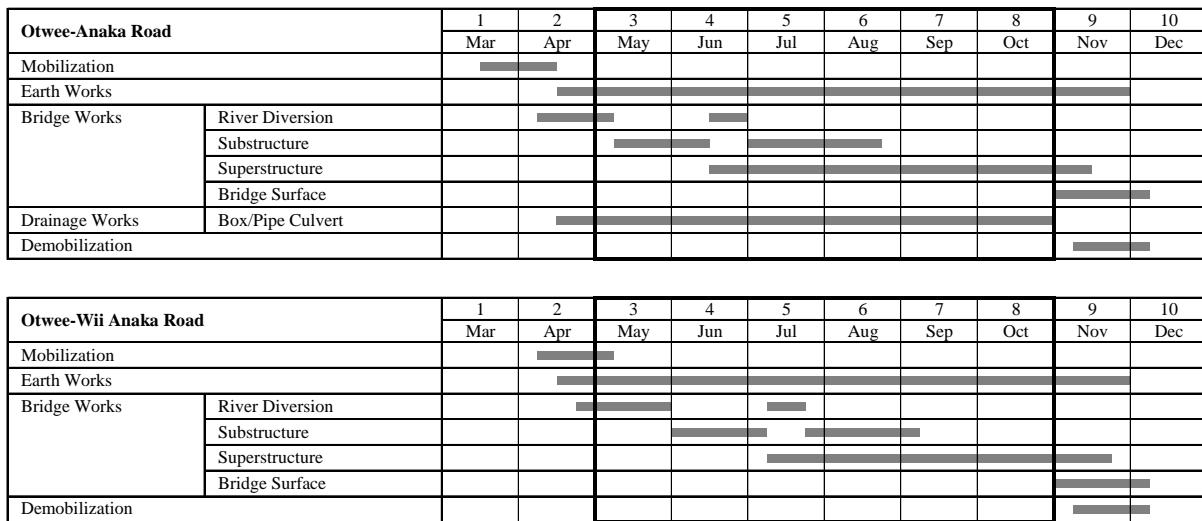


Source: JICA Study Team

Figure 24.2.4 Construction Plan for Substructure

(5) Construction Schedule

A provisional construction schedule for the pilot project was estimated on the basis of quantities of construction works, local conditions, etc. Construction schedules for the two routes of the pilot project are as shown in Figure 24.2.5.



Source: JICA Study Team

 : Rainy Season

Figure 24.2.5 Construction Schedules for Pilot Project

24.2.2 Cost Estimate

Cost estimation was done based on unit cost data from similar existing projects by MoWT and the JICA study team. The unit costs in the Bill of Quantities were assigned under the assumption that a local contractor would be procured.

24.3 Tender Assistance Policy

As the first step of Tender Assistance, the relevant provisions of public procurement under the laws and regulations of Uganda were reviewed. The procedure of public procurement is provided for in the Public Procurement and Disposal Act (hereinafter referred to as “PPDA”) and the procuring entity shall comply with this procedure. PPDA provides for 5 different procuring methods based on the value of procurement as shown below.

Table 24.3.1 Procurement Method based on the Value

| Value of Procurement | Method of Procurement |
|---------------------------|--|
| Less than 2 million Ushs. | Micro procurement (Buy from the supplier without quotation) |
| 2 – 30 million Ushs. | Quotation from 3 different suppliers or contractors |
| 30-70 million Ushs. | Selected Bidding |
| Over 70 million Ushs. | Open Competitive Bid |
| Emergency or Special Case | Direct procurement |

Source: MoWT

In terms of public procurement implemented by a foreign donor, the procurement procedures are provided for as follows.

- **International Bidding:** The donor's procurement rules may be applied as long as bidding is competitive.
- **Domestic Bidding:** the procuring entity shall comply with the PPDA.

Accordingly the procurement method for the Contractor for the pilot project shall be Open Domestic Bidding.

PPDA also specifies that a minimum of 22 working days shall be given to the bidders in case of open domestic bidding in either the case of pre-qualification or post-qualification. When the procurement is required urgently, the procuring entity may select the case of post-qualification in order to shorten the period for procuring the contractor.

In addition, PPDA has provided the Standard Bidding Documents (SBD) and the bid documents prepared by the procuring entity shall comply with this SBD.

In accordance with all the above rules and provisions of the Open Domestic Bidding, the Draft Bidding Documents for the pilot project were prepared for the post-qualification method and submitted to JICA for review and comment.

24.4 Construction Supervision Policy

The provisional plans of construction supervision are generally as follows.

Since the JICA (the Employer) field office was established in Gulu, it was thus recommended that the Consultant's main office for the supervision of the Pilot Project be established in Gulu as well. Furthermore, the Consultant's site office would have to be set up within the Contractor's site camp.

With the consideration of the volume of the supervision works, a few local engineers and administrative staff would have to be employed to support a Japanese supervisor.

Refer to Appendix 3 "Summary of Construction Supervision for Pilot Project".

PART 2: PREPARATION AND IMPLEMENTATION OF PILOT PROJECT

SECTION 7: EVALUATION ON PILOT PROJECT

25. BASELINE SURVEY

25.1 Introduction

In order to evaluate the outcome and impact of the Pilot Project, an Origin-Destination (OD) survey and community interview survey were conducted prior to the commencement of the construction (March 2010). The same kind of surveys will be done after the completion of the project. The changes, such as the change in the amount of traffic, including pedestrians, trip purpose and distance, would be expected to show the outcome effectively.

25.2 Origin-Destination survey

25.2.1 Objective and methodology

The OD survey was carried out by the local staff at the location of Lot 1 and Lot 2 based on the contents of survey shown in Tables 25.2.1 and 25.2.2. The first survey before construction began was conducted at the beginning of March 2010.



Source: JICA Study Team

Figure 25.2.1 Photos of OD survey

Table 25.2.1 Contents of OD survey

| | Lot 1 (Otwee- Anaka) | Lot 2 (Otwee-Wii Anaka) |
|-----------------|--|--|
| Location | Beside the existing bridge on Aswa River for Lot 1 | Beside the existing bridge on Aswa River for Lot 2 |
| Date | 2010/3/2 (Tue) | 2010/3/4 (Thu) |
| Time | 7 a.m. – 7 p.m. (12hours) | |
| Interviewee | All passers-by | |
| Method | Interview to passer-by with interview form | |
| Interview Items | See Table 25.1.2 | |

Source: JICA Study Team

Table 25.2.2 Interview items

| Interview Items | Choices | |
|---------------------|--|--|
| Direction | • From South to North • From North to South | |
| Age | • Adult (>20yrs) • Children (<20yrs) | |
| Transportation Type | • Vehicle • Motorcycle • Bicycle | • Walk • Others |
| Trip Purpose | • To work (including farming) • To school • Business (sales, meeting, etc) | • Private (shopping, Social, etc) • To go home • To go to hospital |
| Trip Frequency | • Everyday • A few days a week • Once a week | • A few days a month • Once a month • A few days a year |
| Commodity Type | • Animal & Animal Products • Vegetable Products • Foodstuffs • Petrol and Mineral Products • Chemicals & Allied Industries • Plastics / Rubbers • Animal Skins, Leather & Furs • Wood & Wood Products • Textiles | • Footwear / Headgear • Metals incl. hoes • Machinery / Electrical • Vehicles and Other Transportation • Miscellaneous • Unknown • Grass • People (carried) |

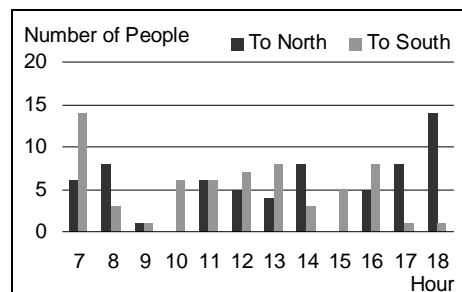
Source: JICA Study Team

25.2.2 Result of Origin-Destination survey

(1) Lot 1 (Otwee-Anaka Road)

1) Number of the passers-by

- Total number of the passers-by was 128 people in both directions every 12 hours.
- The number of the passers-by in each direction was almost the same.
- There are many people going southwards in the morning and northwards in the evening which means that the bridge is used by the people living on the north side of the river.

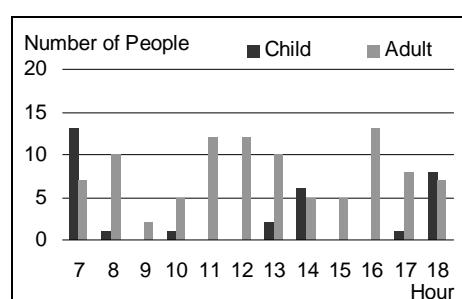


Source: JICA Study Team

Figure 25.2.2 Number of passers-by per direction

2) Age

- Three quarters of the total passers-by were over 20 years old.
- Most of children go across the river in the morning and evening which means that most of them use the bridge to go to school.
- Adults pass over the river in the early morning, around noon and in the evening.

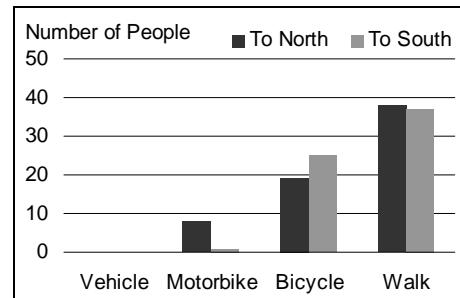


Source: JICA Study Team

Figure 25.2.3 Number of passers-by by age

3) Transportation type

- More than half of the passers-by go across the bridge by foot and about one third use bicycles.
- A total of 9 people on 4 motorbikes were counted on the bridge. Only one motorbike was going south, the others were going north.
- No vehicles were seen passing the bridge during the survey.

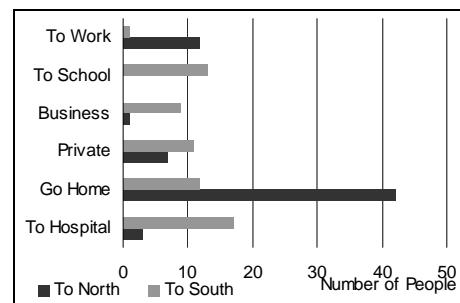


Source: JICA Study Team

Figure 25.2.4 Number of passers-by by transportation type

4) Trip purpose

- Over 40 people travelled northwards with the purpose of going back home which means that most of the people crossing the river live on the north side of river.
- There are several trip purposes for those moving southwards. ‘To the hospital’ has the largest number of people with 17 people per 12 hours, followed by going ‘To school’ then private reasons and business.
- The other purpose for moving northwards besides going home is to work (including farming).

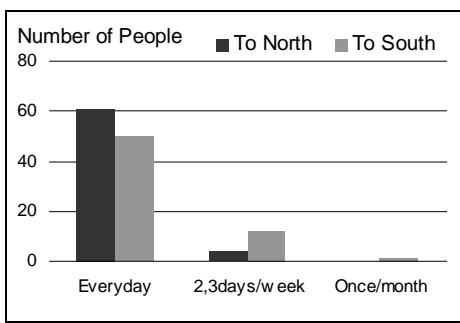


Source: JICA Study Team

Figure 25.2.5 Number of passers-by per trip purpose

5) Trip frequency

- A total of 87% of passers-by travel across the river on a daily basis.
- A total of 12.5% of passers-by use the bridge a few days per week and only one person among interviewees passes once a month.

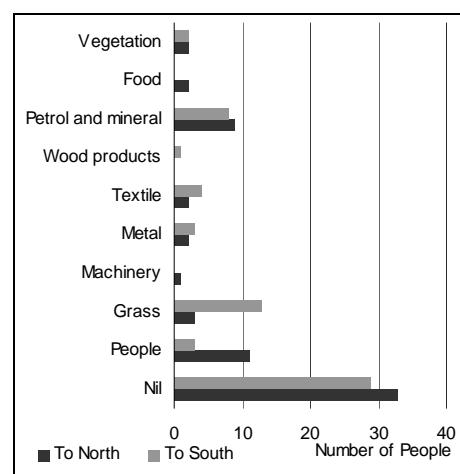


Source: JICA Study Team

Figure 25.2.6 Number of passers-by by trip frequency

6) Commodity type conveyed

- Almost half of the passers-by convey nothing when they cross the bridge.
- The commodity that is most conveyed by passers-by to the south is the grass which is mainly used as roofing material for their huts.
- Some motorbikes and bicycles are used as taxis to carry people.



Source: JICA Study Team

Figure 25.2.7 Commodity type conveyed by passers-by

- The OD pair which has the largest number of trips is between Lacic and Lulyango at 33 trips, followed by between Lukai and Lulango at 32 trips.
- There were 18 trips from Lacic to Paduny, which is the biggest trading centre around this area.

Table 25.2.3 OD table (Lot 1)

Unit: Person

| | | Destination | | | | | | |
|--------|----------|-------------|---------|-------|----------|-------|-------|--------|
| | | Lacic | Longulu | Lukai | Lulyango | Nyoya | Ongai | Paduny |
| Origin | Lacic | 1 | | | 18 | | | 18 |
| | Longulu | | | | | | | 1 |
| | Lukai | | | | 18 | | | 5 |
| | Lulyango | 15 | | 14 | | | | |
| | Nyoya | | | | 4 | | | |
| | Ongai | | | | | 3 | | |
| | Paduny | 1 | 4 | 2 | | | | 7 |

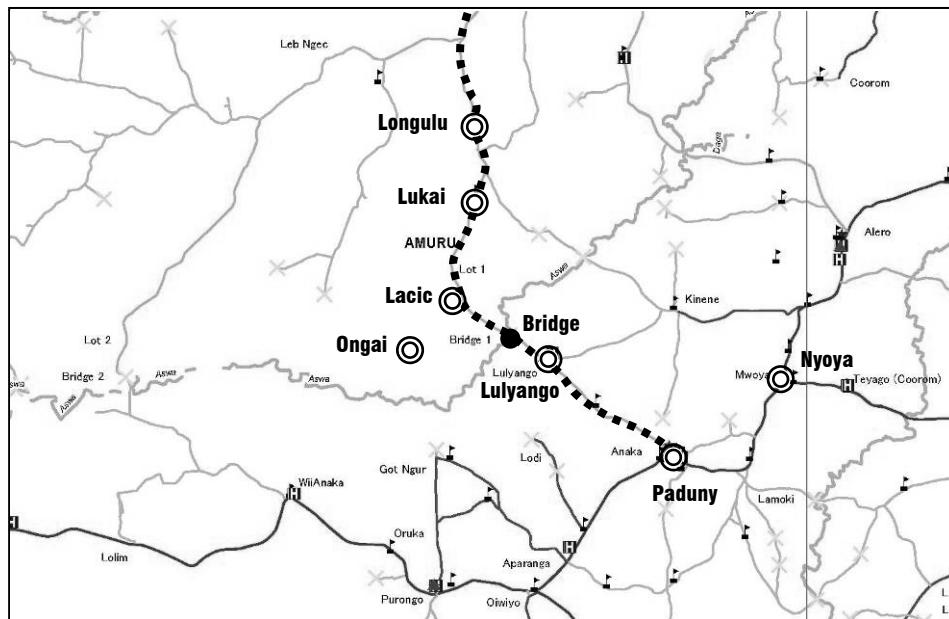
Source: JICA Study Team

Table 25.2.4 Travel time per OD pair(Lot 1)

Unit: Minutes

| | | Destination | | | | | | |
|--------|----------|-------------|---------|-------|----------|-------|-------|--------|
| | | Lacic | Longulu | Lukai | Lulyango | Nyoya | Ongai | Paduny |
| Origin | Lacic | | | | 138 | | | 155 |
| | Longulu | | | | | | | 140 |
| | Lukai | | | | 141 | | | 142 |
| | Lulyango | 147 | | 147 | | | | |
| | Nyoya | | | | 438 | | | |
| | Ongai | | | | | 163 | | |
| | Paduny | 145 | 135 | 480 | | | | 137 |

Source: JICA Study Team



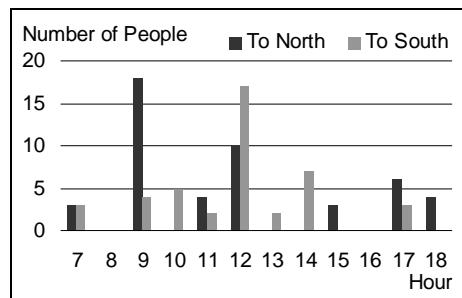
Source: JICA Study Team

Figure 25.2.8 Map for Origin and Destination (Lot 1)

(2) Lot 2 (Otwee-Wii Anaka Road)

1) Number of the passers-by

- Total number of the passers-by was 91 people in both directions every 12 hours.
- The number of the passers-by travelling northwards across the river was a little larger than those moving southwards.
- There are many people going northwards in the morning and southwards around noon.

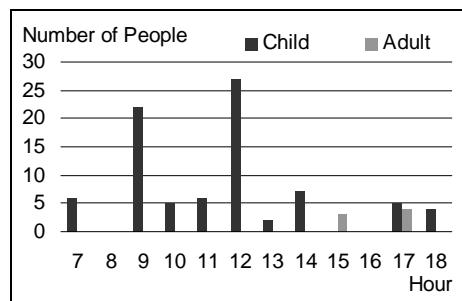


Source: JICA Study Team

Figure 25.2.9 Number of passers-by by direction

2) Age

- Over 90% of total passers-by were over 20 years old. Only a few children are seen in the evening.

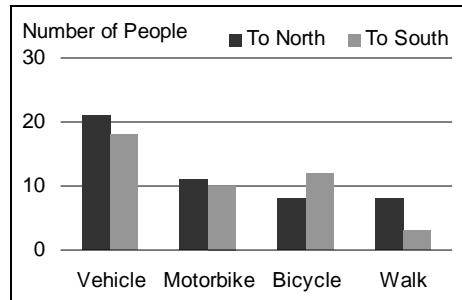


Source: JICA Study Team

Figure 25.2.10 Number of passers-by by age

3) Transportation type

- A total of 39 people on 19 vehicles went across the bridge by vehicle.
- There were 14 motorbikes passing. Half of them carried a passenger.
- Almost the same number of bicycles as the motorbikes passed the bridge.
- Unlike Lot 1, only 12% of all passers-by cross the river by foot.

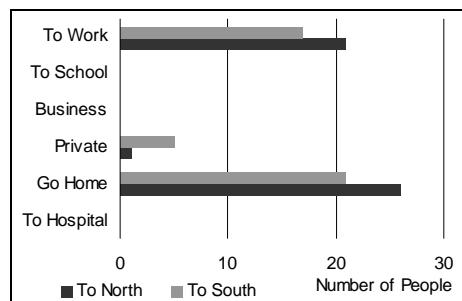


Source: JICA Study Team

Figure 25.2.11 Number of passers-by by transportation type

4) Trip purpose

- There were only 3 purposes for crossing the bridge and these were; work, private matters and going home.
- It is clear that this bridge is normally used for commercial purposes such as farming and carrying the agricultural products. It's not normally used for social purposes.



Source: JICA Study Team

Figure 25.2.12 Number of passers-by by trip purpose

5) Trip frequency

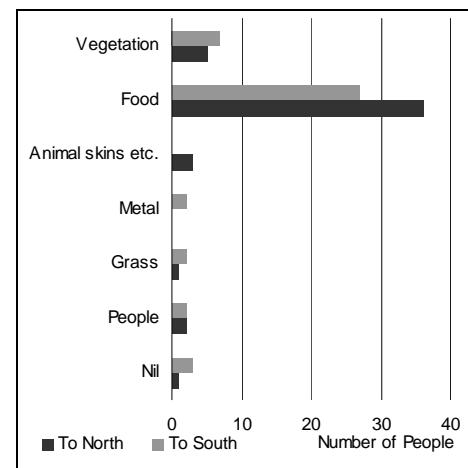
- All passers-by answered that they passed this bridge everyday.
- This route and bridge is used by the people who pass this route regularly.

6) Commodity type conveyed

- A total of 70% of passers-by carry food products.
- Almost all passers-by convey a commodity of some sort which means that this route is used mainly for business purposes.

7) Origin-Destination and travel time

- The OD table below shows the number of passers-by in the sub-villages which have over 5 passers-by.
- The OD pair which has the largest number of trips is between Latoro and Lebngec at 35 trips.
- The trip distances are much longer than for Lot 1. Some of the passers-by come from origins or are travelling to destinations outside of Amuru District, such as Gulu and Pakwach.



Source: JICA Study Team

Figure 25.2.13 Commodity types conveyed by passers-by

Table 25.2.5 OD table (Lot 2)

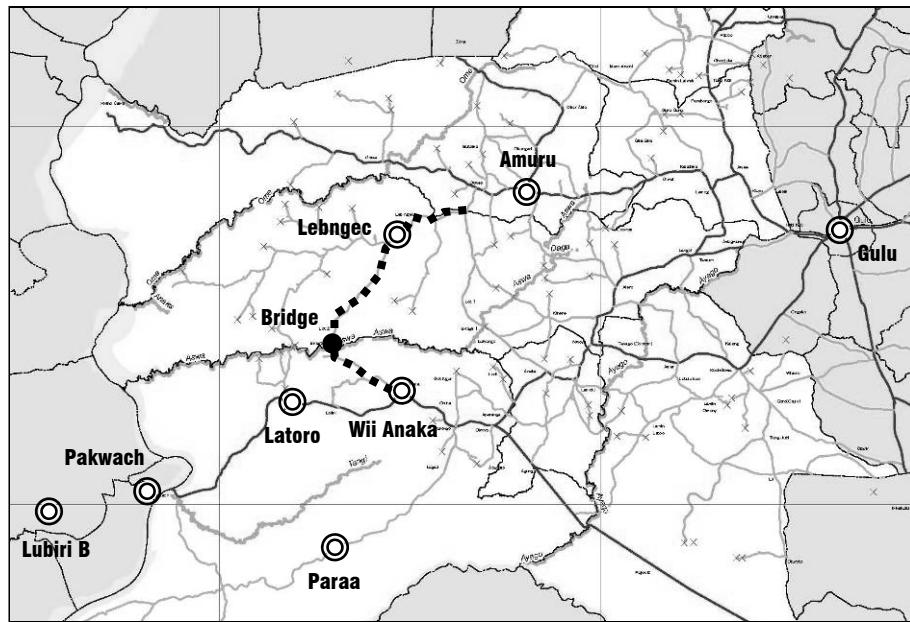
| | | Destination | | | | | | | | Unit: Person | |
|--------|-----------|-------------|------|--------|---------|----------|---------|--------|-----------|--------------|---|
| | | Amuru | Gulu | Latoro | Lebngec | Lubiri B | Pakwach | Parara | Wii Anaka | | |
| Origin | Amuru | | | 7 | | | | | | | |
| | Gulu | | | 2 | | | | | | | 6 |
| | Latoro | 6 | | | 22 | | | | | | |
| | Lebngec | | | 13 | 1 | | | | 7 | | 2 |
| | Lubiri B | | | | 5 | | | | | | |
| | Pakwach | | | | 5 | | | | | | |
| | Parara | | | | | | | | | | |
| | Wii Anaka | | | | 7 | | | | | | |

Source: JICA Study Team

Table 25.2.6 Travel time per OD pair (Lot 2)

| | | Destination | | | | | | | | Unit: Minutes | |
|--------|-----------|-------------|------|--------|---------|----------|---------|--------|-----------|---------------|-----|
| | | Amuru | Gulu | Latoro | Lebngec | Lubiri B | Pakwach | Parara | Wii Anaka | | |
| Origin | Amuru | | | 197 | | | | | | | |
| | Gulu | | | 300 | | | | | | | 300 |
| | Latoro | 405 | | | 147 | | | | | | |
| | Lebngec | | | 162 | | | | | 120 | | 435 |
| | Lubiri B | | | | 120 | | | | | | |
| | Pakwach | | | | 290 | | | | | | |
| | Parara | | | | | | | | | | |
| | Wii Anaka | | | | 245 | | | | | | |

Source: JICA Study Team



Source: JICA Study Team

Figure 25.2.14 Map for Origin and Destination (Lot 2)

25.3 Community Interview Survey

25.3.1 Methodology

It is expected that the Pilot Project will bring a change to the lives of the people who live near the bridges, in terms of accessibility in particular. Therefore, in addition to the origin-destination survey, interview surveys in several communities on the roads were conducted.

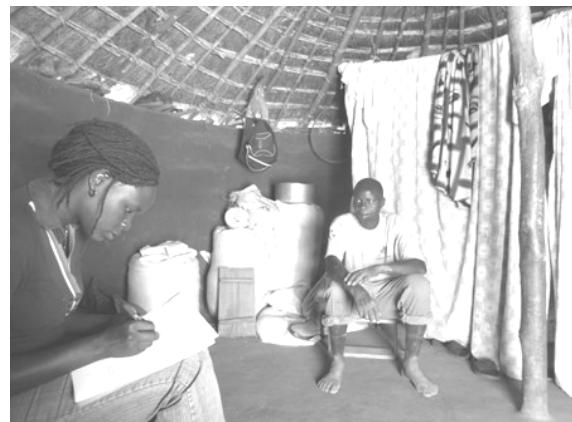
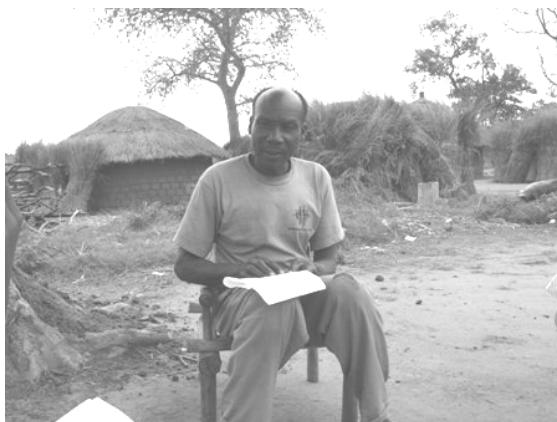
Two sub-villages (Tee Rwot Kweri¹) were selected on the northern side of the bridge. Also, two sub-villages were selected on the southern side of the bridge. As a result, four sub-villages were selected for one bridge. The same number of sub-villages was also selected for the other bridge. So, eight sub-villages were selected for the interview survey in total. At the selected sub-villages, sub-village leaders were asked about the characteristics and details regarding the pertinent sub-villages; such as population, accessibility to major trading centres, agriculture, and accessibility to social services.

The outline of the community interview survey is shown in the tables below. The questionnaire is attached to the report as an appendix.

Table 25.3.1 Outline of the Survey

| | Lot 1 (Otwee- Anaka) | | Lot 2 (Otwee- Wii Anaka) | |
|------------------------------|--|--|--|--|
| | Northern | Southern | Northern | Southern |
| Target Sub-village (Village) | Lungulu (Bwobonam B), Lacici (Lulyango) | Lulyango Center (Lulyango), Bidati (Bidati) | Denga (Pamin aware), Abongo Luduka (Latek Odong) | Lamin Olango (Pajengo), Ayero Olwangi (Pamin Olango) |
| Survey Date | 18 Mar. 2010 | 4 Mar. 2010 (Lulyango Center), 12 Mar. 2010 (Bidati) | 30 Mar. 2010 (Denga), 26 Mar. 2010 (Abongo Luduka) | 1 Apr. 2010 |
| Methodology | Interview survey by prepared questionnaire | | | |
| Interviewee | Sub-village Leader | | | |
| Interview Items | See Table 25.2.2 | | | |

Source: JICA Study Team



Source: JICA Study Team

Figure 25.3.1 Photos of Community Interview Survey

¹ A LC I (village) is composed of several sub-villages called Tee Rwot Kweri. It can be said that Tee Rwot Kweri is the smallest community unit in the region although it is not an administration unit.

Table 25.3.2 Interview Items

| | Lot 1 (Otwee- Anaka) | Lot 2 (Otwee- Wii Anaka) |
|---|---|---|
| Interview Information | 1. Date 2. Interviewee 3. Occupation | |
| Address of the Site | 1. Sub-county 2. Parish 3. Village 4. Sub-village (Tee Rwot Kweri) | |
| Outline of the Site | 1. Population 2. Number of households 3. Population by type (Returned villagers, villagers in transition, villagers outside the village) | |
| Transportation | 1. Access from the village to Anaka (on foot, by bicycle, by motorcycle, by car) 2. Access from the village to Amuru (on foot, by bicycle, by motorcycle, by car) | 1. Access from the village to Purongo (on foot, by bicycle, by motorcycle, by car) 2. Access from the village to Packwach (on foot, by bicycle, by motorcycle, by car) 3. Access from the village to Amuru (on foot, by bicycle, by motorcycle, by car) |
| Agriculture | 1. Information regarding agriculture (major crops, major cash crops) 2. Amount and selling prices of major cash crops (planted area, amount produced per acre, amount sold per acre, selling prices per bag, number of sole bag) 3. Information regarding agricultural marketing (where to sell, how to sell, how to transport) 4. Cost of transportation of the goods (destination, origin, transportation mode, cost of goods transport per amount) | |
| Education | <u>Access to Primary School</u> 1. Percent of children going to primary school 2. Name of primary schools children go to 3. Access to the first school (on foot, by bicycle, by motorcycle, by car) 4. Access to the second school (on foot, by bicycle, by motorcycle, by car) <u>Access to Secondary School</u> 5. Percent of children going to secondary school 6. Percent of children residing outside the village 7. Name of secondary schools children go to 8. Access to the first school (on foot, by bicycle, by motorcycle, by car) 9. Access to the second school (on foot, by bicycle, by motorcycle, by car) | |
| Health | 1. Name of health centres people go to 2. Access to the first health centre (on foot, by bicycle, by motorcycle, by car) 3. Access to the second health centre (on foot, by bicycle, by motorcycle, by car) | |
| Water | 1. Number of water sources people use 2. Access to the nearest water source (on foot, by bicycle, by motorcycle, by car) 3. Type of the nearest water source 4. Condition of the nearest water source 5. Access to the second nearest water source (on foot, by bicycle, by motorcycle, by car) 6. Type of the second nearest water source 7. Condition of the second nearest water source 8. Access to the third nearest water source (on foot, by bicycle, by motorcycle, by car) 9. Type of the third nearest water source 10. Condition of the third nearest water source | |
| Expected changes the bridge construction will bring | Open ended | |

Source: JICA Study Team

25.3.2 Result of Community Interview Survey

Results of selected items are described below by Lot. The entire results are attached to the report as an appendix.

(1) Lot 1 (Otwee-Anaka)

1) Northern Side

Lungulu and Lacici sub-villages were selected as survey sites for the northern side of Bridge No.1. A summary of the interview survey is shown in Table 25.3.4. At these sub-villages, people sell their agricultural products to middlemen who come from Gulu. Also, people go to Anaka to sell their agricultural products. The most popular secondary school in Anaka is Pope Paul secondary school and the most popular health unit among people in these sub-villages is Anaka Hospital. However, it takes several hours on foot to reach Anaka from their village. Looking at these results, the connection between these sub-villages to Anaka is stronger than the connection between them to Amuru despite the fact that there is Aswa River between the sub-villages and Anaka.

The survey also asked what kinds of changes people on the target road expect due to the bridge construction. Table 25.3.3 shows answers from the sub-villages. They answer that the bridge construction will make access to Anaka hospital much easier. In addition, transportation of agricultural products to major trading centres would be much easier and cheaper.

Table 25.3.3 Expected Changes (Lot 1, Northern Side)

| Survey Item | Lungulu | Lacici |
|------------------|--|---|
| Expected Changes | <ul style="list-style-type: none">• It will bring the Anaka hospital closer especially when using a vehicle.• It will widen the market for agricultural products since accessing Pakwach, Nebbi will be made easier and cheaper through Anaka.• The bridge constructed will enable a road to be constructed since it has been the main obstacle.• Secondary school going children will be able to commute from home.• It will help in connecting with business people from other areas like Amuru and Pabbo.• Growth and development is expected since Lungulu may become a busy route.• Villages may become more motivated to work harder since transportation will be made easier. | <ul style="list-style-type: none">• School going children will easily access school through the bridge.• Transportation of agricultural products in bulk will be made easier since the road will be accessible even by vehicles.• Our area will become a sub-county since there will be a road passing through, trade will flourish bringing growth and development.• Transportation costs will be reduced.• Lukai P/S will return to their old site faster since construction materials will be easily transported and we'll be able to stay with our children instead of taking them to neighbouring areas of education.• Accessing Anaka Hospital will be made easier especially for emergency cases where vehicles are used. |

Source: JICA Study Team

Table 25.3.4 Summary of Results (Lot 1, Northern Side)

| Target (Sub-village or Village) | | Lungulu | Lacici |
|---------------------------------|---|--|---|
| Sub-county, Parish | | Alero, Bwobonam | Alero, Paibwor |
| Population | | 400+ | 600+ |
| Number of Households | | 160 | 248 |
| Population by type | | | |
| Returned villagers | | 320 | 400 |
| Villagers in transition | | 80 | 200 |
| Villagers outside | | 5HH | 60 |
| Access to Anaka | | | |
| | On foot | 5 hrs | 4 hrs |
| | By bicycle | 2 hrs | 2 hrs |
| | By motorcycle | 30 min. | 1 hr |
| | By car | 1.5 hrs | 2 hrs |
| Access to Amuru | | | |
| | On foot | 3 hrs | 6 hrs |
| | By bicycle | 1.5 hrs | 3 hrs |
| | By motorcycle | 30 min. | 1.5 hrs |
| | By car | 40 min. | 1 hr |
| Marketing Information | | | |
| | Cash crop | Rice | Rice |
| | Selling place | <ul style="list-style-type: none"> • Sell to middlemen who come to the village from Gulu • Sell to villagers in surrounding villages • Sell to other villagers in the village | <ul style="list-style-type: none"> • Sell to middle men who come to the village from Gulu • Sell to middlemen at Anaka • Sell to villagers in surrounding villages • Sell to other villagers in the village |
| | Transportation | - | By bicycle |
| | Cash crop | Groundnuts | Groundnuts |
| | Selling place | <ul style="list-style-type: none"> • Sell to middlemen who come to the village from Gulu • Sell to other villagers in the village • Sell to middlemen at Amuru • Sell to villagers in surrounding villages | <ul style="list-style-type: none"> • Sell to middlemen who come to the village from Gulu • Sell to middlemen at Anaka • Sell to villagers in surrounding villages • Sell to other villagers in the village |
| | Transportation | By bicycle | By bicycle |
| Cost of transportation | | | |
| | Route | - | Anaka-Paidha |
| | Way of transportation | - | As a passenger of a private truck |
| | Cost in UGX | - | 5,000 per person (one way) and 3,000 per bag |
| Education | | | |
| | Popular primary school | Lungulu P/S | Kinene |
| Access to the school | | | |
| | On foot | School within the sub-village | 4 hrs |
| | By bicycle | - | 2.5 hrs |
| | By motorcycle | - | 1.5 hrs |
| | By car | - | 2.5 hrs |
| | Nearest secondary school | Anaka Pope Paul | Anaka Pope Paul |
| | % of secondary school students living outside | 100% | 100% |
| Health | | | |
| | Popular health unit | Anaka Hospital | Anaka Hospital |
| Access to the health unit | | | |
| | On foot | 5 hrs | 3.5 hrs |
| | By bicycle | 3 hrs | 2.5 hrs |
| | By motorcycle | 1.5 hrs | 1.5 hrs |
| | By car | 2 hrs | 3 hrs |

Source: JICA Study Team

2) Southern Side

On the southern side of Bridge No.1, Lulyango centre sub-village and Bidati sub-village were the survey sites. Since they are close to Anaka, one of the major trading centres in Amuru, it seems that their connection with Anaka is very strong. They sell their agricultural products to middlemen who come from Anaka as well as bringing them to Anaka for selling. Additionally, they mostly use Anaka hospital as their main health facility. It should be noted that few secondary school students live outside the sub-villages, compared to other surveyed sub-villages.

As shown in Table 25.3.5, they expect the bridge construction to improve accessibility to district headquarters (Otwee). They also expect the bridge construction to change the lives of the people who live on the northern side of the Aswa River. Furthermore, they expect economic expansion in their own sub-villages.

Table 25.3.5 Expected Changes (Lot 1, Southern Side)

| Survey Item | Lulyango Centre | Bidati |
|------------------|--|--|
| Expected Changes | <ul style="list-style-type: none"> • Connection with the district headquarters • Easier access for school going children living across the river • Access to Anaka hospital for people living across the bridge • Transportation of agricultural products to trading centres and middlemen coming to buy them will be made easier. • Boost in market and economy since many middlemen will be able to access products providing increased income to villagers | <ul style="list-style-type: none"> • Easier access to the district headquarters • Markets for the village community will expand to the other neighbouring areas across the river, especially the district headquarters • Bidati may become a busy trading centre with the increased numbers of vehicles moving through the village leading to development and increased income • People living on the other side of the river will have easier access to Anaka hospital instead of using the Alero route |

Source: JICA Study Team

Table 25.3.6 Summary of Results (Lot 1, Southern Side)

| Target (Sub-village or Village) | | Lulyango Centre | Bidati |
|---------------------------------|---|---|---|
| Sub-county, Parish | | Alero, Paibwor | Anaka, Pangora |
| Population | | 1500 | 500 |
| Number of Households | | 300 | 92 |
| Population by type | | | |
| Returned villagers | | 1000 | 430 |
| Villagers in transition | | 250 | 40 |
| Villagers outside | | 250 | 27 |
| Access to Anaka | | | |
| | On foot | 3 hrs | 1 hr 20 min. |
| | By bicycle | 1.5 hrs | 30 min. |
| | By motorcycle | 30 min. | 7-8 min. |
| | By car | 30 min. | 11 min. |
| Access to Amuru | | | |
| | On foot | 6 hrs | 10 hrs |
| | By bicycle | 4 hrs | 5-6 hrs |
| | By motorcycle | 2 hrs | 1.5 hrs |
| | By car | 1.5 hrs | 2.5 hr |
| Marketing Information | | | |
| | Cash crop | Rice | Rice |
| | Selling place | <ul style="list-style-type: none"> • Sell to middlemen who come to the village from Anaka • Sell to middlemen at Anaka • Sell to middlemen in Gulu | <ul style="list-style-type: none"> • Sell to middle men who come to the village from Anaka • Sell to middlemen at Anaka |
| | Transportation | - | By bicycle |
| | Cash crop | Groundnuts | Groundnuts |
| | Selling place | <ul style="list-style-type: none"> • Sell to middlemen who come to the village from Anaka and Gulu • Sell to middlemen at Anaka | <ul style="list-style-type: none"> • Sell to middlemen at Anaka • Sell to villagers at surrounding villages • Sell to other villagers in the village |
| | Transportation | By bicycle | By bicycle |
| Cost of transportation | | | |
| | Route | - | Anaka-Pakwach |
| | Way of transportation | - | As a passenger of a private truck |
| | Cost in UGX | - | 6,000 per person (one way) and 4,000 per bag |
| Education | | | |
| | Popular primary school | Lulyango P/S | St. Kizito P/S |
| Access to the school | | | |
| | On foot | School within the sub-village | School within the sub-village |
| | By bicycle | - | - |
| | By motorcycle | - | - |
| | By car | - | - |
| | Nearest secondary school | Anaka Pope Paul | Anaka Pope Paul |
| | % of secondary school students living outside | 25% | 0% |
| Health | | | |
| | Popular health unit | Anaka Hospital | Anaka Hospital |
| Access to the health unit | | | |
| | On foot | 3 hrs | 1.5 hrs |
| | By bicycle | 1.5 hrs | 30-40 min. |
| | By motorcycle | 30 min. | 15-20 min. |
| | By car | 45 min. | 25 min. |

Source: JICA Study Team

(2) Lot 2 (Otwee- Wii Anaka)

1) Northern Side

On the northern side of Bridge No.2, the survey was conducted in Denga and Abongo Luduka sub-villages in Panockrach Parish, Alero Sub-county since there are not any villages in the area close to the bridge. Unlike villagers in the sub-villages surveyed for Lot 1, villagers in these sub-villages mainly bring agricultural products for sale to Gulu by car. As for a health facility, they mostly use Amuru Health Centre II which is run by Lacor Hospital.

Regarding the expectations towards the bridge construction, people in the sub-villages expect to improve access to Pakwach in Nebbi District, where they can sell their agricultural products as well as receive better social services. Also, they expect to go to Anaka hospital more easily after the bridge construction.

Table 25.3.7 Expected Changes (Lot 2, Northern Side)

| Survey Item | Denga | Abongo Luduka |
|------------------|---|---|
| Expected Changes | <ul style="list-style-type: none"> • Expansion of the market to West Nile • Reduced distance to Anaka hospital • Easy connection to Kampala road • School going children will easily access schools in Pakwach • Motivation to farmers since the market is wider and more available • Improved relationship with people of West Nile • Exposure to different tribes like Alur, introducing new methods/ activities • Development since West Nilers are wealthier people and they have not been disturbed • Thieves will use this road as an exit route to Congo • Land disputes may increase since more wealthy people will be able to access the village • Accidents may increase since the number of vehicles will increase along the road | <ul style="list-style-type: none"> • Transportation to Pakwach will become cheaper • Business may boom within the village since there will be a ready market from Pakwach. • Some of the village children may be able to access education through schools in Pakwach and schools may also crop up here. • Relationships will improve with Pakwach in terms of businesses and intermarriages. • Pakwach possesses very good medical clinics, so villagers will be able to access proper medications. • Since the lifestyle of the village people may improve due to booming business, social evils like diseases (HIV/AIDS) and theft within the village may increase. |

Source: JICA Study Team

Table 25.3.8 Summary of Results (Lot 2, Northern Side)

| Target (Sub-village or Village) | | Denga | Abongo Luduka |
|---|--|---|---------------|
| Sub-county, Parish | Alero, Panockrach | Alero, Panockrach | |
| Population | 700 | | 563 |
| Number of Household | 87 | | 280 |
| Population by type | | | |
| Returned villagers | 450 | | 300 |
| Villagers in transition | 30 | | 200 |
| Villagers outside | - | | 60 |
| Access to Purongo | | | |
| On foot | 9 hrs | 9 hrs | |
| By bicycle | 6 hrs | 3.5 hrs | |
| By motorcycle | 3 hrs | 50 min. | |
| By car | 4 hrs | 2 hrs | |
| Access to Pakwach | | | |
| On foot | 24 hrs | 24 hrs | |
| By bicycle | 12 hrs | 12 hrs | |
| By motorcycle | 6 hrs | 2 hrs | |
| By car | 4 hrs | 4 hrs | |
| Access to Amuru | | | |
| On foot | 5 hrs | 2.5 hrs | |
| By bicycle | 2 hrs | 1 hr | |
| By motorcycle | 24 min. | 30 min. | |
| By car | 1 hr | 40 min. | |
| Marketing Information | | | |
| Cash crop | Rice | Rice | |
| Selling place | <ul style="list-style-type: none"> • Sell to middlemen in Gulu • Sell to middlemen who come to the village from Amuru • Sell to villagers in surrounding villages • Sell to other villagers in the village | <ul style="list-style-type: none"> • Sell to middlemen in Gulu • Sell to middlemen who come to the village from Pakwach and Gulu • Sell to villagers in the surrounding villages • Sell to other villagers in the village | |
| Transportation | By car/ public transportation | By car/ public transportation | |
| Cash crop | Groundnuts | Groundnuts | |
| Selling place | <ul style="list-style-type: none"> • Sell to middlemen in Gulu • Sell to villagers in the surrounding villages • Sell to other villagers in the village • Sell to middlemen who come to the village from Amuru | <ul style="list-style-type: none"> • Sell to middlemen in Gulu • Sell to middlemen in Pakwach • Sell to villagers in surrounding villages • Sell to other villagers in the village | |
| Transportation | By car/ public transportation | By car/ public transportation | |
| Cost of transportation | | | |
| Route | Denga-Gulu | Gulu-Leb Ngec | |
| Way of transportation | Hire a private truck | As a passenger of a private truck | |
| Cost in UGX | 400,000 | 5,000 per person (one way) and 5,000 per bag | |
| Education | | | |
| Popular primary school | Leb Ngec | Leb Ngec | |
| Access to the school | | | |
| On foot | 45 min. | 1 hr | |
| By bicycle | 20 min. | 20 min. | |
| By motorcycle | 10 min. | 10 min. | |
| By car | 15 min. | 14 min. | |
| Nearest secondary school | Keyo SS | Anaka Pope Paul | |
| % of secondary school students living outside | 100% | 100% | |
| Health | | | |
| Popular health unit | Amuru HCII (Branch of Lacor) | Amuru HCII (Branch of Lacor) | |
| Access to the health unit | | | |
| On foot | 5 hrs | 2.5 hrs | |
| By bicycle | 3 hrs | 1 hr | |
| By motorcycle | 2 hrs | 40 min. | |
| By car | 2.5 hrs | 50 min. | |

Source: JICA Study Team

2) Southern Side

Lamin Olango sub-village and Ayero Olwangi sub-village were targeted for the survey for Bridge No.2. People in these sub-villages also bring their agricultural products to major trading centres in other districts such as Gulu and Pakwach rather than wait for middlemen in their sub-villages. From these sub-villages, both schools and health facilities are a little further, compared to the other surveyed sub-villages.

People in the sub-villages expect that they can go to district headquarters more easily and cheaply after the bridge construction. They also expect the improvement of the socioeconomic environment in their sub-villages will occur after the construction.

Table 25.3.9 Expected Changes (Lot 2, Southern Side)

| Survey Item | Lamin Olango | Ayero Olwangi |
|------------------|--|---|
| Expected Changes | <ul style="list-style-type: none"> • Transportation costs to Amuru headquarters will be reduced. • It will connect with the villages especially those from across the river. • It will improve business within the village since there will be access for outsiders. • Vehicles will access people in case of emergencies, saving lives. • Motivation of farmers will result since the market can be accessed. • Development of schools and other social services will take place and peace will prevail. • Villagers will not have to pay to use the bridge. • Sudanese will be able to access villages and buy all food stuffs bringing an end to poverty. | <ul style="list-style-type: none"> • Transportation to district headquarters will be made easier. • Businessmen will be able to frequent the village since there will be a road, hence no extra cost for transport. • Development may arise since roads attract schools and other social services. Our children will not have to go to other villages to access education • Accidents and deaths along the river will be eliminated • We used to pay to use the bridge but we believe when JICA constructs the bridge, we will be able to use it freely. • Animals may die along the roads due to the increased number of vehicles through the village. |

Source: JICA Study Team

Table 25.3.10 Summary of Results (Lot 2, Southern Side)

| Survey Item | Lamin Olango | Ayero Olwangi |
|---|--|---|
| Sub-county, Parish | Purongo, Latoro | Purongo, Latoro |
| Population | 650 | 520 |
| Number of Households | 280 | 84 |
| Population by type | | |
| Returned villagers | 500 | 450 |
| Villagers in transition | 150 | 60 |
| Villagers outside | 30 | 0 |
| Access to Purongo | | |
| On foot | 5 hrs | 3 hrs |
| By bicycle | 3 hrs | 2 hrs |
| By motorcycle | 1 hr | 40 min. |
| By car | 20 min. | 30 min. |
| Access to Pakwach | | |
| On foot | 9 hrs | 12 hrs |
| By bicycle | 5 hrs | 7 hrs |
| By motorcycle | 2 hrs | 3 hrs |
| By car | 1 hrs | 1 hr |
| Access to Amuru | | |
| On foot | 12 hrs | 8 hrs |
| By bicycle | 7 hrs | 6 hrs |
| By motorcycle | 4 hrs | 4 hrs |
| By car | 3 hrs | 3 hrs |
| Marketing Information | | |
| Cash crop | Rice | Rice |
| Selling place | <ul style="list-style-type: none"> • Sell to middlemen in Gulu • Sell to middlemen in Pakwach • Sell to villagers in surrounding villages • Sell to other villagers in the village | <ul style="list-style-type: none"> • Sell to middlemen in Gulu • Sell to middlemen in Pakwach • Sell to middlemen at Purongo |
| Transportation | By car | By car |
| Cash crop | Groundnuts | Maize |
| Selling place | <ul style="list-style-type: none"> • Sell to middlemen in Gulu • Sell to middlemen in Pakwach • Sell to villagers in surrounding villages • Sell to other villagers in the village | <ul style="list-style-type: none"> • Sell to middlemen at Wii Anaka, Purongo, and Wii Anono |
| Transportation | By car | By bicycle |
| Cost of transportation | | |
| Route | Lamin Olango- Pakwach | Wii Anaka-Pakwach |
| Way of transportation | As a passenger of a private truck | As a passenger of a private truck |
| Cost in UGX | 2,000 per person (one way) and 3,000 per bag | 2,000 per person (one way) and 2,000 per bag |
| Education | | |
| Popular primary school | Got Apwoyo P/S | Wii Anaka P/S |
| Access to the school | | |
| On foot | 3 hrs | 1.5 hrs |
| By bicycle | 40 min. | 45 min. |
| By motorcycle | 20 min. | 30 min. |
| By car | 10 min. | 15 min. |
| Nearest secondary school | Anaka Pope Paul | Anaka Pope Paul |
| % of secondary school students living outside | 100% | 100% |
| Health | | |
| Popular health unit | Latoro HCII | Purongo HCIII |
| Access to the health unit | | |
| On foot | 3 hrs | 3 hrs |
| By bicycle | 1 hr | 2 hrs |
| By motorcycle | 40 min. | 40 min. |
| By car | 20 min. | 30 min. |

Source: JICA Study Team

26. PROJECT EVALUATION

26.1 Origin-Destination Survey after Completion

In order to evaluate the outcome and impact of the pilot project, an Origin-Destination (OD) survey and community interview survey were conducted one month after completion of the pilot project (October 2011). The same kind of survey was done before the beginning of the project (March 2010). The changes, such as the amount of traffic including the pedestrian trip purposes and distance are expected to show the outcome effectively.

26.1.1 Objective and Methodology

The OD survey was carried out by the local staff at the locations of Lot 1 and Lot 2 based on the contents of survey shown in Table 26.1.1 and Table 26.1.2. The second survey for after construction was conducted at the beginning of October 2011. The survey form is shown in Figure 26.1.1.

Table 26.1.1 Contents of OD survey

| | Lot 1 (Otwee- Anaka) | Lot 2 (Otwee-Wii Anaka) |
|-----------------|---|---|
| Location | On the constructed bridge on Aswa River for Lot 1 | On the constructed bridge on Aswa River for Lot 2 |
| Date | 2011/10/11 (Tue) | 2011/10/18 (Tue) |
| Time | 6 a.m. – 6 p.m. (12hours) | |
| Interviewee | All passers-by | |
| Method | Interview to passer-by using the interview form | |
| Interview Items | See Table 26.1.2 | |

Source: JICA Study Team

Table 26.1.2 Interview Items

| Interview Items | Choices | |
|---------------------|--|---|
| Direction | (1) From South to North (2) From North to South | |
| Age | (1) Adult (>20yrs) (2) Children (<20yrs) | |
| Transportation Type | (1) Vehicle (2) Motorcycle (3) Bicycle | (4) Walk (5) Others |
| Trip Purpose | (1) To work (including farming) (2) To school (3) Business (sales, meeting, etc) | (4) Private (shopping, Social, etc) (5) To go home (6) To go hospital |
| Trip Frequency | (1) Everyday (2) A few days a week (3) Once a week | (4) A few days a month (5) Once a month (6) A few days a year |
| Commodity Type | (1) Animal & Animal Products (2) Vegetable Products (3) Foodstuffs (4) Petrol and Mineral Products (5) Chemicals & Allied Industries (6) Plastics / Rubbers (7) Animal Skins, Leather & Furs (8) Wood & Wood Products (9) Textiles | (10) Footwear / Headgear (11) Metals incl. hoe (12) Machinery / Electrical (13) Vehicles and Other Transportation (14) Miscellaneous (15) Unknown (16) Grass (17) People (carried) |

Source: JICA Study Team

Survey Month/Day/Year | 2010

Survey Location Bridge on Lot

Surveyor

Source: JICA Study Team

Figure 26.1.1 Interview Form



Source: JICA Study Team

Figure 26.1.2 Photos of OD Survey (Lot 1)



Source: JICA Study Team

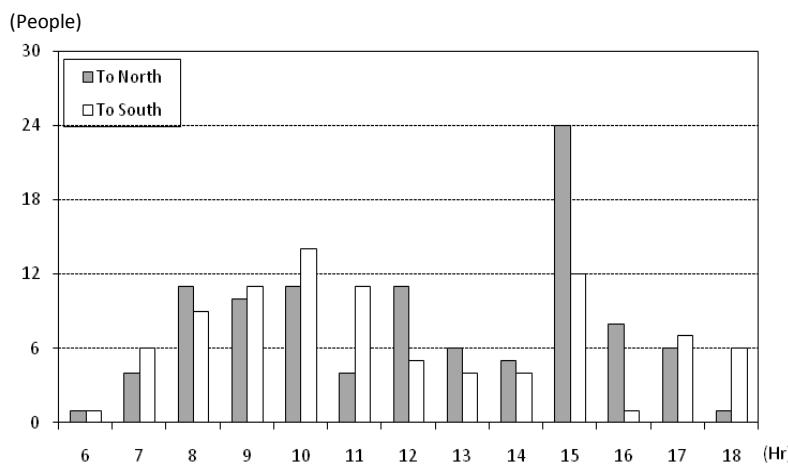
Figure 26.1.3 Photos of OD Survey (Lot 2)

26.1.2 Result of Origin-Destination Survey

(1) Lot 1 (Otwee-Anaka Road)

1) Number of passers-by

- Total number of the passers-by was 193 people in both ways per 12 hours.
- The number of the passers-by on each direction was almost the same.
- There are many people going to the south in the morning and to the north in the evening which means that the bridge is used by the people living on the north side of the river.



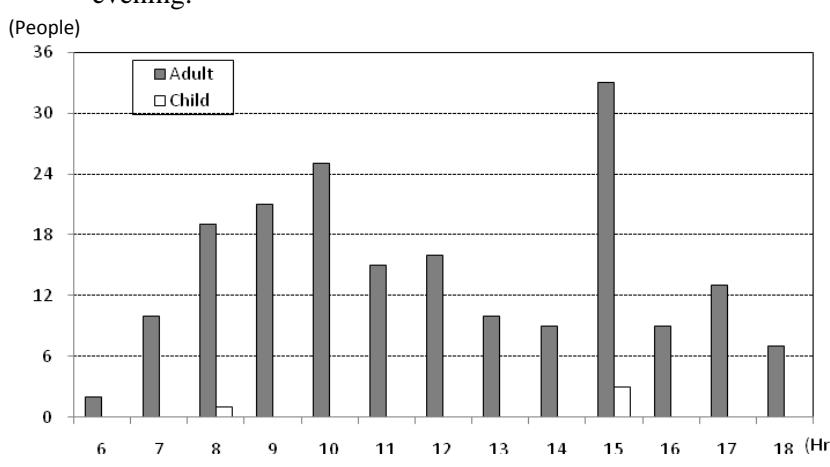
| Hour | To North | To South |
|-------|----------|----------|
| 6 | 1 | 1 |
| 7 | 4 | 6 |
| 8 | 11 | 9 |
| 9 | 10 | 11 |
| 10 | 11 | 14 |
| 11 | 4 | 11 |
| 12 | 11 | 5 |
| 13 | 6 | 4 |
| 14 | 5 | 4 |
| 15 | 24 | 12 |
| 16 | 8 | 1 |
| 17 | 6 | 7 |
| 18 | 1 | 6 |
| Total | 102 | 91 |

Source: JICA Study Team

Figure 26.1.4 Number of Passers-by per Direction

2) Age

- Almost all passers-by are adults.
- After the demolition of the camps most of the children have relocated to their homes and are no longer going to their previous schools in the former camps (Lulyango and Bidati) but attend school within their villages.
- Adults pass over the bridge most frequently in the early morning, around noon and evening.



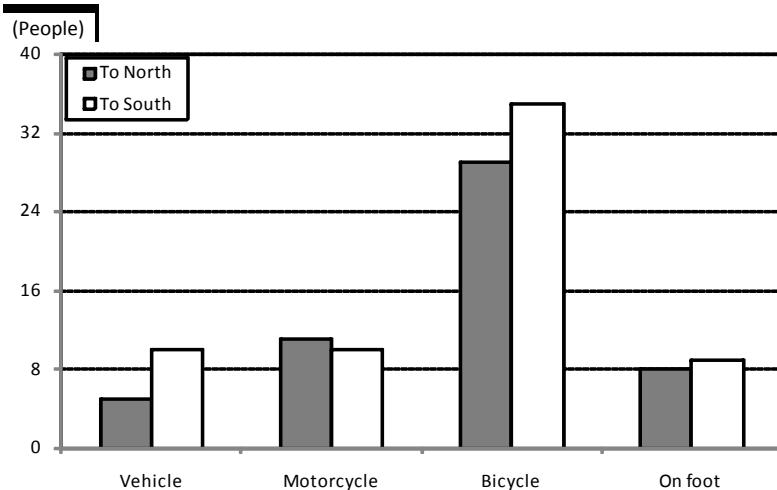
| Hour | Adult | Child |
|-------|-------|-------|
| 6 | 2 | |
| 7 | 10 | |
| 8 | 19 | 1 |
| 9 | 21 | |
| 10 | 25 | |
| 11 | 15 | |
| 12 | 16 | |
| 13 | 10 | |
| 14 | 9 | |
| 15 | 33 | 3 |
| 16 | 9 | |
| 17 | 13 | |
| 18 | 7 | |
| Total | 189 | 4 |

Source: JICA Study Team

Figure 26.1.5 Number of Passers-by per Age

3) Transportation type

- Majority of passers-by crossed over the bridge by bicycle and this was followed by motorcycle riders.
- A total of 17 trips were recorded of people crossing over the bridge on foot.
- Unlike in the first survey, about 15 vehicles were recorded passing over the bridge during the survey.



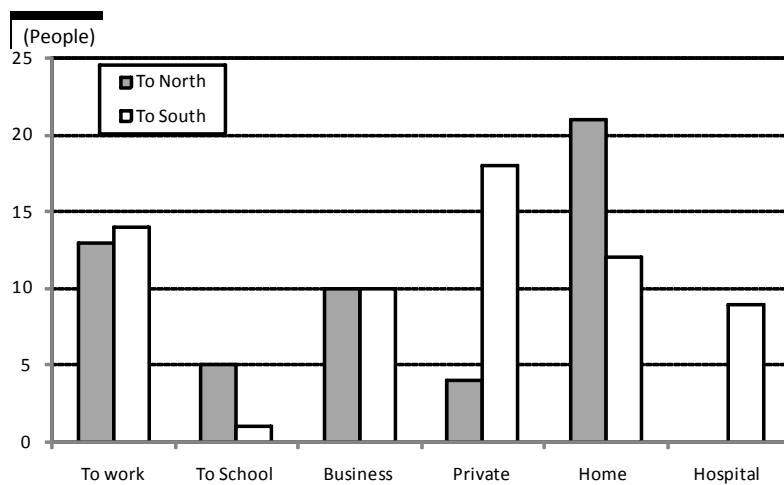
| | To North | To South |
|------------|----------|----------|
| Vehicle | 5 | 10 |
| Motorcycle | 11 | 10 |
| Bicycle | 29 | 35 |
| On foot | 8 | 9 |
| Others | | |
| Total | 53 | 64 |

Source: JICA Study Team

Figure 26.1.6 Number of Passers-by per Transportation Type

4) Trip purpose

- Over 20 people went to the north for the purpose of going back home which means that most of the people passing over the bridge live on the northern side of the bridge.
- There were several trip purposes to the south. Going for private activities has the largest number (18 people in the 12 hours); followed by people going to work, to home and then for business purposes.
- Also in the South is the main hospital with 9 people heading south of the bridge for medical assistance during the survey.



| | To North | To South |
|-----------|----------|----------|
| To work | 13 | 14 |
| To School | 5 | 1 |
| Business | 10 | 10 |
| Private | 4 | 18 |
| Home | 21 | 12 |
| Hospital | | 9 |
| Total | 53 | 64 |

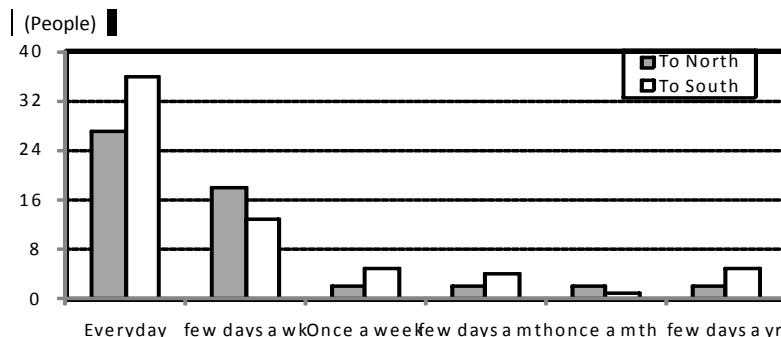
Source: JICA Study Team

Figure 26.1.7 Number of passers-by per Trip Purpose

5) Trip frequency

- A total of 54% of passers-by cross over the bridge on a daily basis.

- A total of 26.5% of passers-by use the bridge a few days a week and others do not use the bridge that frequently.



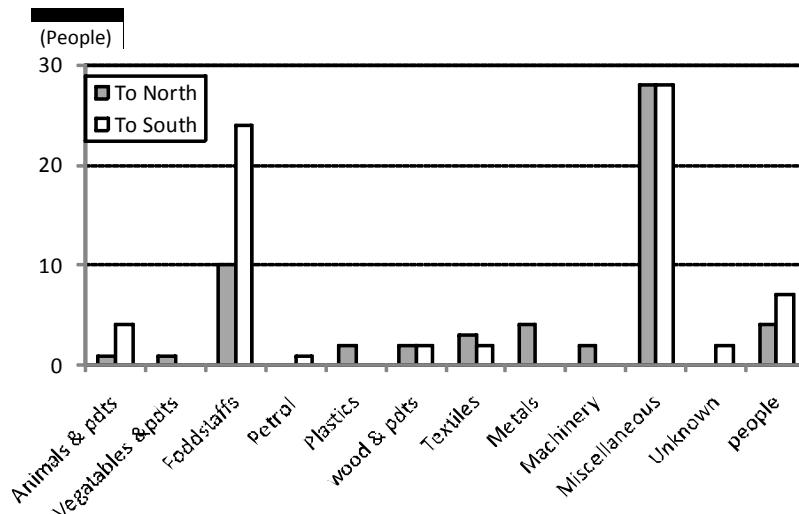
| | To North | To South |
|----------------|----------|----------|
| Everyday | 27 | 36 |
| few days a wk | 18 | 13 |
| Once a week | 2 | 5 |
| few days a mth | 2 | 4 |
| once a mth | 2 | 1 |
| few days a yr | 2 | 5 |
| Total | 53 | 64 |

Source: JICA Study Team

Figure 26.1.8 Number of passers-by per Trip Frequency

6) Commodity type conveyed

- A total of 26.7% of passers-by conveyed food stuffs while crossing over the bridge, especially to the south.
- The majority of passers-by crossed over carrying nothing (miscellaneous)
- Most motorbikes and some vehicles were used as taxis to ferry people along the road.



| | To North | To South |
|-------------------|----------|----------|
| Animals & pdts | 1 | 4 |
| Vegetables & pdts | 1 | 1 |
| Foodstuffs | 10 | 24 |
| Petrol | 2 | 1 |
| Plastics | 2 | 2 |
| wood & pdts | 2 | 2 |
| Textiles | 3 | 2 |
| Metals | 4 | 2 |
| Machinery | 2 | 2 |
| Miscellaneous | 28 | 28 |
| Unknown | 2 | 2 |
| people | 4 | 7 |
| Total | 57 | 70 |

Source: JICA Study Team

Figure 26.1.9 Commodity Type Conveyed by Passers-by

7) Origin-Destination and travel time

- The OD table below shows the number of passers-by based on the sub-village which had over 2 passers-by.
- The OD pair which had the largest number of trips was between Anaka and Lukai at 30 Persons followed by between Anaka and Ongai at 23 trips.
- The pair with the smallest number of trips was between Longulu and Lulyango with 2 trips.

Table 26.1.3 OD Table (Lot 1)

Unit: persons

| | | Destination | | | | | |
|--------|----------|-------------|--------|---------|-------|----------|-------|
| | | Anaka | Kinene | Longulu | Lukai | Lulyango | Ongai |
| Origin | Anaka | | | 5 | 18 | | 20 |
| | Kinene | | | | 3 | | |
| | Longulu | 4 | | | | 2 | |
| | Lukai | 12 | 4 | | | 8 | |
| | Lulyango | 5 | | | 3 | | 2 |
| | Ongai | 3 | | | | 2 | |

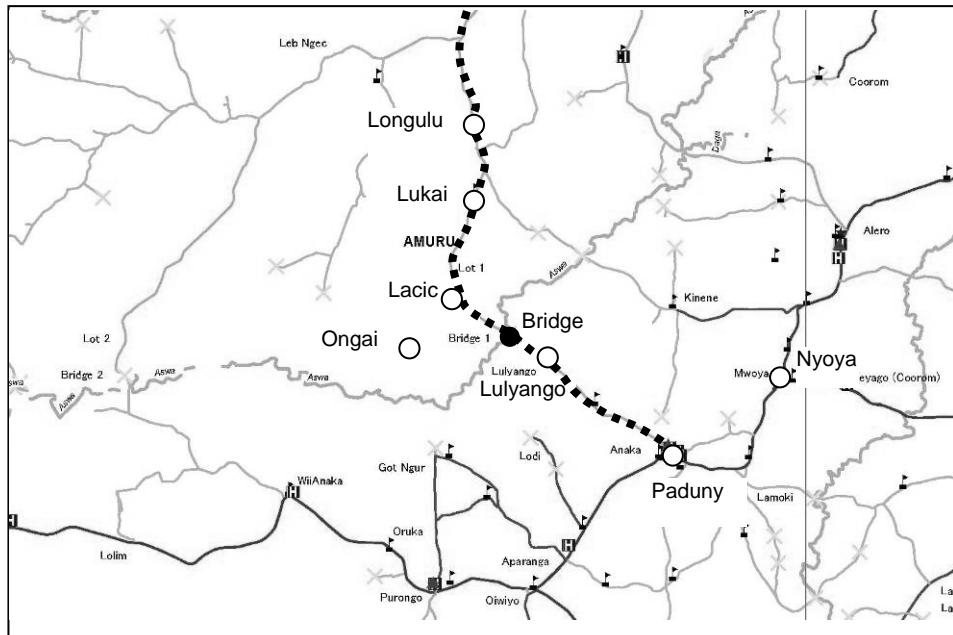
Source: JICA Study Team

Table 26.1.4 Travel Time per OD Pair(Lot 1)

Unit: minutes

| | | Destination | | | | | |
|--------|----------|-------------|--------|---------|-------|----------|-------|
| | | Anaka | Kinene | Longulu | Lukai | Lulyango | Ongai |
| Origin | Anaka | | 60 | 96 | | 90 | |
| | Kinene | | | | 160 | | |
| | Longulu | 150 | | | | 30 | |
| | Lukai | 85 | 60 | | | 87.5 | |
| | Lulyango | 165 | | | 135 | | 30 |
| | Ongai | 300 | | | | 120 | |

Source: JICA Study Team



Source: JICA Study Team

Figure 26.1.10 Map for Origin and Destination (Lot 1)

(2) Lot 2 (Otwee-Wii Anaka Road)

1) Number of passers-by

- Total number of passers-by was 46 people both ways in the 12 hours.
- The number of passers-by to the south was a little more than to the north.
- There are many people using the road at around noon, probably returning from work (farm work).

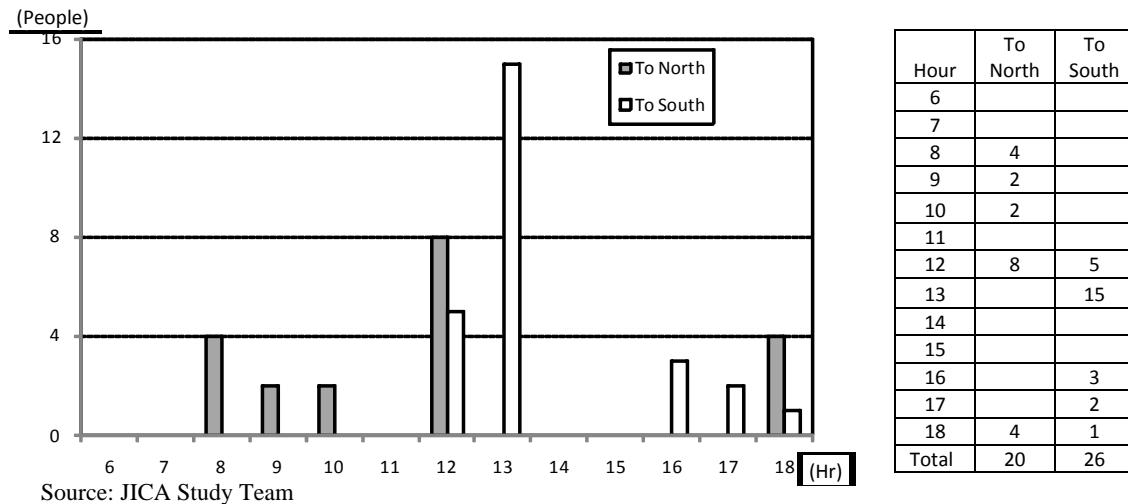


Figure 26.1.11 Number of Passers-by per Direction

2) Age

- During the survey, 100% of passers-by were adults, crossing over the bridge in the morning, noon and evening.
- This could be explained by the fact that on the southern side of the bridge, there are no social facilities apart from farms owned by a few individuals.

3) Transportation type

- During the survey, 4 trips by vehicles were recorded going across the bridge.
- About 6 motorcycles were counted, most ferrying passengers.
- Exactly the same number of motorcycles as those on foot passed over the bridge, but only one bicycle trip was recorded.
- Unlike in Lot 1, this road is not used much.

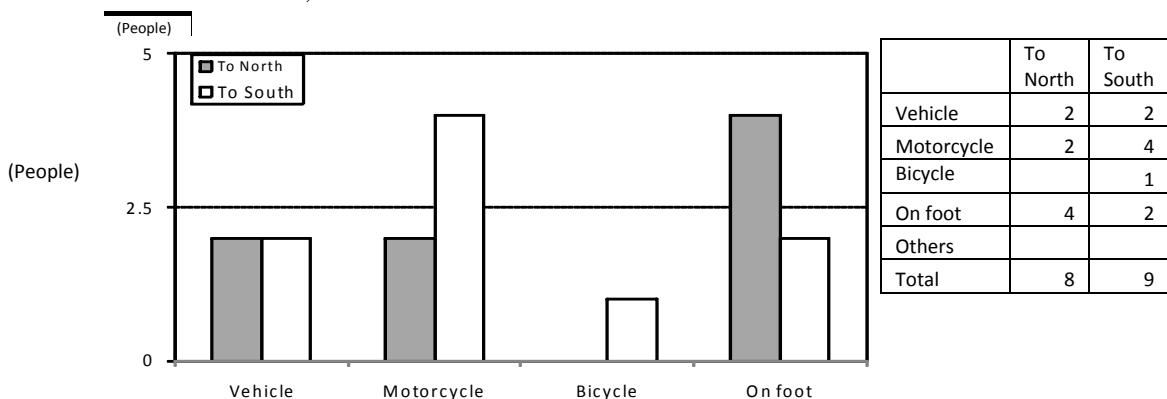
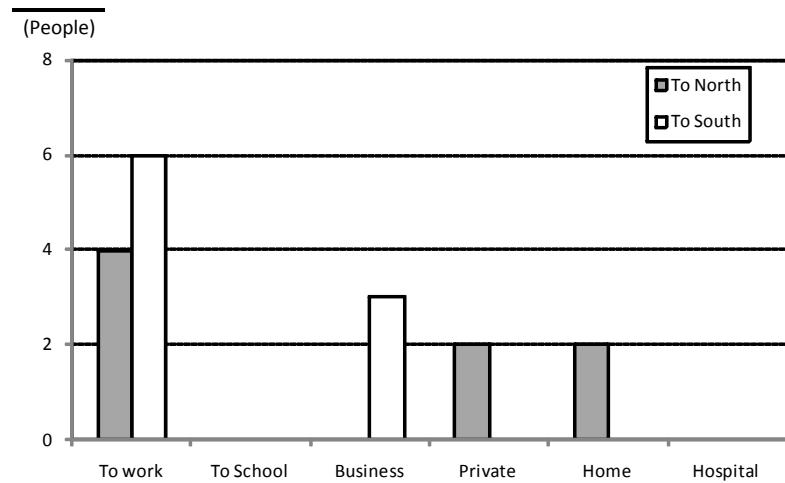


Figure 26.1.12 Number of Passers-by per Transportation Type

4) Trip purpose

- During the survey, 4 purposes were recorded along the route; work, business, private activities and home, meaning there are no schools or hospitals either along the road or within the surrounding villages.

- It is clear that this bridge is normally used for commercial purposes such as farming and carrying the agricultural products, not social use.

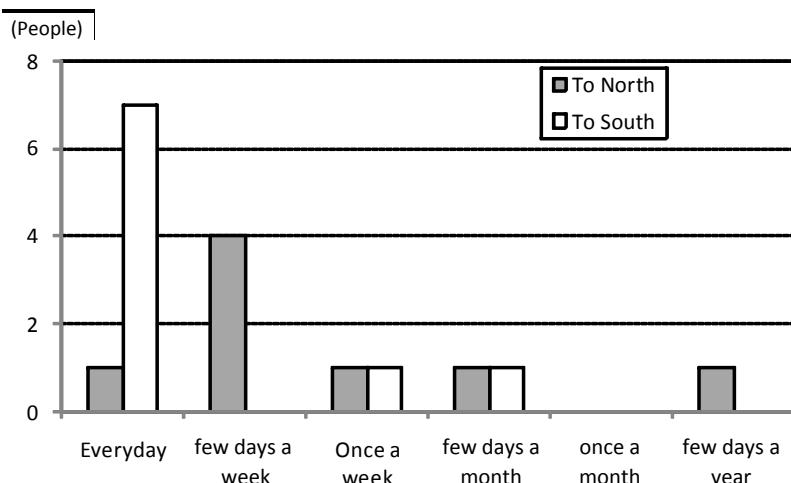


Source: JICA Study Team

Figure 26.1.13 Number of Passers-by per Trip Purpose

5) Trip frequency

- A minority of passers-by responded that they crossed the bridge on a daily basis with 8 trips out of 17.
- About 9 of the passers-by do not use this bridge/road regularly.



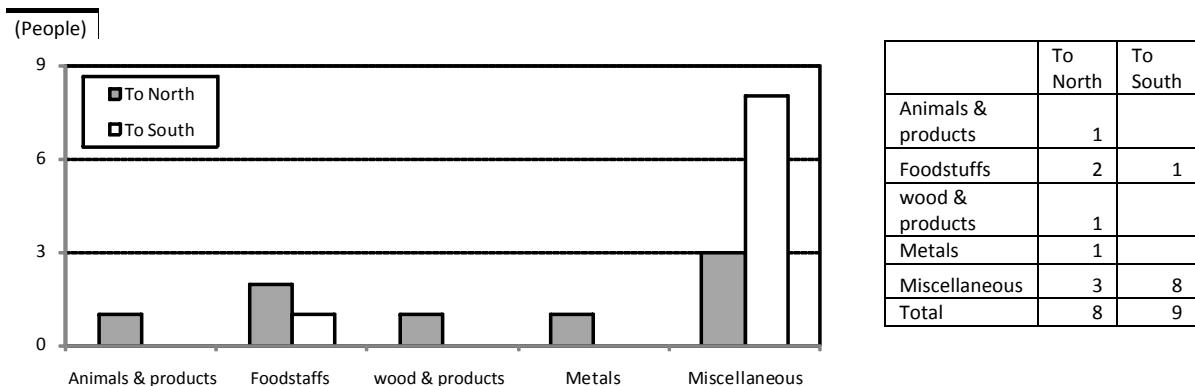
Source: JICA Study Team

Figure 26.1.14 Number of Passers-by per Frequency

| | To North | To South |
|-----------|----------|----------|
| To work | 4 | 6 |
| To School | | |
| Business | | 3 |
| Private | 2 | |
| Home | 2 | |
| Hospital | | |
| Total | 8 | 9 |

6) Commodity type conveyed

- The majority of passers-by crossed carrying nothing (miscellaneous), followed by some 3 trips made while carrying food stuffs.
- This bridge is basically important to people going to work on the large farms along Otwee to Wii-Anaka road and for transporting the farm products.



Source: JICA Study Team

Figure 26.1.15 Commodity type Conveyed by Passers-by

7) Origin-Destination and travel time

- The OD table below shows the number of passers-by on a sub-village basis which had over 2 trips.
- There's no similar number of trips per OD pair.

Table 26.1.5 OD table (Lot 2)

Unit: Person

| | | Destination | | | | |
|--------|------------|-------------|------------|------------|---------|-----------|
| | | Latoro | Panockrach | Pawatomera | Purongo | Wii Anaka |
| Origin | Latoro | | 2 | | | |
| | Panockrach | | 2 | | | |
| | Pawatomera | | 2 | | | 1 |
| | Purongo | 8 | | | | |
| | Wii Anaka | | 5 | | | |

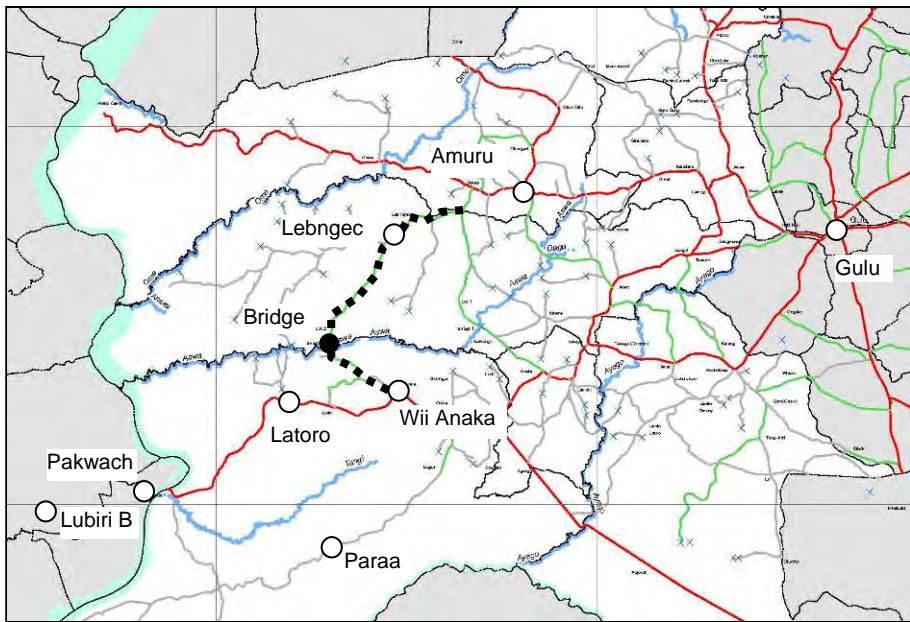
Source: JICA Study Team

Table 26.1.6 Travel time per OD Pair (Lot 2)

Unit: Minutes

| | | Destination | | | | |
|--------|------------|-------------|------------|------------|---------|-----------|
| | | Latoro | Panockrach | Pawatomera | Purongo | Wii Anaka |
| Origin | Latoro | | 75 | | | |
| | Panockrach | | 5 | | | |
| | Pawatomera | | 60 | | | 60 |
| | Purongo | 60 | | | | |
| | Wii Anaka | | 210 | | | |

Source: JICA Study Team



Source: JICA Study Team

Figure 26.1.16 Map for Origin and Destination (Lot 2)

26.2 Community Interview Survey after Completion

26.2.1 Methodology

It is expected that the pilot project brought changes in the lives of the people living near the bridges and along the roads in terms of accessibility in particular. Therefore, in addition to the Origin-Destination survey, interview surveys at several communities along the roads were conducted.

Two sub-villages (Tee Rwot Kweri¹) were selected on the northern side of the bridge. One sub-village was selected on the southern side of the bridge. As a result, three sub-villages were selected for the first bridge. The same number of sub-villages was also selected for the other bridge. So, six sub-villages were selected for the interview survey in total. At the selected sub-villages, sub-village leaders were asked about their current lives there; such as population, accessibility to major trading centres, agriculture, and accessibility to social services.

The outline of the community interview survey is shown in the tables below. The questionnaire is attached to the report as an appendix.

¹ A LCI (village) is composed of several sub-villages called Tee Rwot Kweri. It can be said that Tee Rwot Kweri is the smallest community unit in the region although it is not an administration unit.

Table 26.2.1 Outline of the Survey

| | Lot 1 (Otwee- Anaka) | | Lot 2 (Otwee- Wii Anaka) | |
|------------------------------|--|------------------|-----------------------------|--|
| | Northern | Southern | Northern | Southern |
| Target Sub-village (Village) | Lungulu (Bwobonam B), Lacic (Lulyango) | (Bidati (Badati) | Abongo Luduka (Latek Odong) | Lamin Olango (Pajengo), Ayero Olwangi (Pamin Olango) |
| Survey Date | 10 Oct 2011 | 12 Oct 2011 | 19 Oct 2011 | 17 Oct 2011 |
| Methodology | Interview survey by prepared questionnaire | | | |
| Interviewee | Sub-village Leader | | | |
| Interview Items | See Table 26.2.2 | | | |

Source: JICA Study Team



Source: JICA Study Team

Figure 26.2.1 Photos of Community Interview Survey

Table 26.2.2 Interview Items

| | Lot 1 (Otwee- Anaka) | Lot 2 (Otwee- Wii Anaka) |
|---|---|---|
| Interview Information | 1. Date 2. Interviewee 3. Occupation | |
| Location of the Site | 1. Sub-county 2. Parish 3. Village 4. Sub-village (Tee Rwot Kweri) | |
| Outline of the Site | 1. Population 2. Number of households 3. Population by type (Returned villagers, villagers in transition, villagers outside the village) | |
| Transportation | 1. Access from the village to Anaka (on foot, by bicycle, by motorcycle, by car) 2. Access from the village to Amuru (on foot, by bicycle, by motorcycle, by car) | 1. Access from the village to Purongo (on foot, by bicycle, by motorcycle, by car) 2. Access from the village to Packwach (on foot, by bicycle, by motorcycle, by car) 3. Access from the village to Amuru (on foot, by bicycle, by motorcycle, by car) |
| Agriculture | 1. Information regarding agriculture (major crops, major cash crops) 2. Amount and selling prices of major cash crops (planted area, amount produced per acre, selling amount per acre, selling prices per bag, number of bags sold) 3. Information regarding agricultural marketing (where to sell, how to sell, how to transport) 4. Cost of goods transportation (destination, origin, method of transportation, cost of transporting goods per amount) | |
| Education | <u>Access to Primary School</u> 1. % of children going to primary school 2. Name of primary schools children go to 3. Access to the first school (on foot, by bicycle, by motorcycle, by car) 4. Access to the second school (on foot, by bicycle, by motorcycle, by car) <u>Access to Secondary School</u> 5. % of children going to secondary school 6. % of children residing outside the village 7. Name of secondary schools children go to 8. Access to the first school (on foot, by bicycle, by motorcycle, by car) 9. Access to the second school (on foot, by bicycle, by motorcycle, by car) | |
| Health | 1. Name of health centres people go to 2. Access to the first health centre (on foot, by bicycle, by motorcycle, by car) 3. Access to the second health centre (on foot, by bicycle, by motorcycle, by car) | |
| Water | 1. Number of water sources people use 2. Access to the nearest water source (on foot, by bicycle, by motorcycle, by car) 3. Type of the nearest water source 4. Condition of the nearest water source 5. Access to the second nearest water source (on foot, by bicycle, by motorcycle, by car) 6. Type of the second nearest water source 7. Condition of the second nearest water source 8. Access to the third nearest water source (on foot, by bicycle, by motorcycle, by car) 9. Type of the third nearest water source 10. Condition of the third nearest water source | |
| Expected changes the bridge construction brings | Open end | |

Source: JICA Study Team

26.2.2 Result of Community Interview Survey

Results of selected items are described below by Lot. The entire results are attached to the report as an appendix.

(1) Lot 1 (Otwee-Anaka)

1) Northern Side

Lungulu and Lacic sub-villages were selected as survey sites for the northern side of Lot 1 bridge. A summary of the interview survey is shown in Table 26.2.4. At these sub-villages, people sell their agricultural products to middlemen who come from Gulu. Others sell their agricultural products to middlemen in Anaka. The most popular secondary school is Anaka Pope Paul secondary school, and the most popular health unit among people in these sub-villages is Anaka Hospital although it takes several hours on foot to reach it. Looking at these results, the connection between these sub-villages to Anaka is stronger than the connection

between the sub-villages to Amuru although there is Aswa River between the sub-villages to Anaka.

The survey also asked what kinds of changes people on the target road expect by the bridge construction. Table 26.2.3 shows the answers from the sub-villages. They answer that the bridge construction will make access to Anaka hospital much easier. In addition, transportation of agricultural products to major trading centres would be much easier and cheaper.

Table 26.2.3 Expected Changes (Lot 1, Northern Side)

| Survey Item | Lungulu | Lacic |
|------------------|---|---|
| Expected Changes | <ul style="list-style-type: none"> • Reduced Accidents rates, no more deaths while crossing the river over the bridge, no more psychological torture • Easier access to Hospital • Easier linkage and cheaper transport means/Public Transport since many vehicles have started using the route • Linkage to the Markets for produce • Easier access and linkage to district headquarters • Access to School (Secondary) • Improved Social Relationship Among Villages • Increase in Commercial Agricultural Activities | <ul style="list-style-type: none"> • Safety, No more deaths • Emergency purposes to hospital • Easy transportation of goods • Reduced cost of transportation • Development (Income) due to increase in small scale business ventures along the roads, improved the standard of living • Easier access to School • Stability of produce prices due to strong bargaining power for goods that farmers can now afford since they can now transport their produce. • Increased Productivity • Flexibility in movement |

Source: JICA Study Team

Table 26.2.4 Summary of Results (Lot 1, Northern Side)

| Target (Sub-village or Village) | | Lungulu | Lacic |
|---|---|--|-------|
| Sub-county, Parish | Alero, Bwobonam | Alero, Paibwor | |
| Population | 175 | | 510 |
| Number of Households | 35HH | | 34HH |
| Population by type | | | |
| Returned villagers | All | | All |
| Villagers in transition | Nil | | Nil |
| Villagers outside | 35HH | | 3HH |
| Access to Anaka | | | |
| On foot | 5 hrs | 4 hrs | |
| By bicycle | 3 hrs | 2 hrs | |
| By motorcycle | 45mins | 45 mins | |
| By car | 20mins | 30 mins | |
| Access to Amuru | | | |
| On foot | 3 hrs | 5hrs | |
| By bicycle | 1 hr | 2 hrs | |
| By motorcycle | 20 mins | 40 mins | |
| By car | 15 mins | 1 hr | |
| Marketing Information | | | |
| Cash crop | Rice | Rice | |
| Selling place | <ul style="list-style-type: none"> • Sell to middlemen in Gulu • Sell to villagers in surrounding villages • Sell to other villagers in the village | <ul style="list-style-type: none"> • Sell to middlemen at the nearby trading centre(Anaka) • Sell to middlemen in Gulu • Sell to middlemen who come to the village from Gulu • Sell to villagers in surrounding villages • Sell to other villagers in the village | |
| Transportation | By car/public transport | By car/public transport, bicycle and on foot | |
| Cash crop | Groundnuts | Groundnuts | |
| Selling place | <ul style="list-style-type: none"> • Sell to middlemen in Gulu • Sell to middlemen at a major trading centre (Amuru) • Sell to villagers in surrounding villages • Sell to other villagers in the village | <ul style="list-style-type: none"> • Sell to middlemen at the nearby trading centre(Panyimur) • Sell to middlemen in Gulu | |
| Transportation | By car/public transport | By car/public transport, | |
| Cost of transportation | | | |
| Route | -Lungulu - Gulu | Lacic -Gulu | |
| Method of transportation | -As a passenger of a private truck | As a passenger of a private truck | |
| Cost in UGX | -5000 per bag and 5000 per person (one way) | 8,000 per person (one way) and 5,500 per bag | |
| Education | | | |
| Popular primary school | Lungulu P/S | Lukai P/S | |
| Access to the school | | | |
| On foot | 30mins | 30 mins | |
| By bicycle | 10mins | 10mins | |
| By motorcycle | 5mins | - | |
| By car | 7mins | - | |
| Nearest secondary school | Anaka Pope Paul | Anaka Pope Paul | |
| % of secondary school students living outside | 100% | 100% | |
| Health | | | |
| Popular health unit | Anaka Hospital | Anaka Hospital | |
| Access to the health unit | | | |
| On foot | 5 hrs | 4 hrs | |
| By bicycle | 2.5 hrs | 2 hrs | |
| By motorcycle | 1.5 hrs | 45 mins | |
| By car | 2 hrs | 30mins | |

Source: JICA Study Team

2) Southern Side

On the southern side of Lot 1 bridge, Bidati sub-village was the survey site. Since it is close to Anaka, one of major trading centres, it seems that their connection with Anaka is very strong. They sell their agricultural products to middlemen who come from Anaka as well as taking them to Anaka for selling, and to Gulu and Pakwach as well. Besides, they mostly use Anaka hospital as their main health facility. It should be noted that all secondary school-going students live outside the sub-villages.

As shown in Table 26.2.5, they consider the bridge construction will improve accessibility to district headquarters (Otwee). They also consider that the bridge construction will change the lives of the people who live on the northern side of the Aswa River. Furthermore, they expect economic expansion in their own sub-villages.

Table 26.2.5 Expected Changes (Lot 1, Southern Side)

| Survey Item | Bidati |
|------------------|---|
| Expected Changes | <ul style="list-style-type: none">• Safety among the villagers has improved since there are no more cases of river crossing accidents,• Easier transportation to social services especially to the hospital.(the road)• Boosted business along the road as a result of increased road usage since the bridge construction.• Social network among villagers on the northern and southern sides of the bridge has improved.• Easier access to school by school- going children• Income generating activities have sprouted up among villagers especially those along the road, leading to development• Improved Relationship with neighboring Villages• Improvement of Agricultural Activities & productivity• |

Source: JICA Study Team

Table 26.2.6 Summary of Results (Lot 1, Southern Side)

| Target (Sub-village or Village) | | Bidati |
|---------------------------------|---|--|
| Sub-county, Parish | | Anaka, Pangora |
| Population | | 658 |
| Number of Households | | 94HH |
| Population by type | | |
| Returned villagers | | 85HH |
| Villagers in transition | | 5HH |
| Villagers outside | | 6HH |
| Access to Anaka | | |
| | On foot | 1.5 hrs |
| | By bicycle | 40 mins |
| | By motorcycle | 20 mins |
| | By car | 15 mins |
| Access to Amuru | | |
| | On foot | 6 hrs |
| | By bicycle | 3 hrs |
| | By motorcycle | 1.5hrs |
| | By car | 1 hr |
| Marketing Information | | |
| | Cash crop | Rice |
| | Selling place | <ul style="list-style-type: none"> • Sell to middle men who come to the village from Anaka • Sell to middlemen at a major trading centre (Pakwach) • Sell to middlemen in Gulu • Sell to villagers in surrounding villages • Sell to other villagers in the village |
| | Transportation | - By car/public transport |
| | Cash crop | Groundnuts |
| | Selling place | <ul style="list-style-type: none"> • Sell to middle men who come to the village from Anaka • Sell to middlemen at a major trading centre (Pakwach) • Sell to middlemen in Gulu • Sell to villagers in surrounding villages • Sell to other villagers in the village |
| | Transportation | By car/ public transport |
| Cost of transportation | | |
| | Route | Bidati- Panyimur |
| | Method of transportation | As a passenger of a private truck |
| | Cost in UGX | 4,000 per person (one way) and 4,000 per bag |
| Education | | |
| | Popular primary school | St. Kizito P/S |
| Access to the school | | |
| | On foot | School within the sub-village |
| | By bicycle | - |
| | By motorcycle | - |
| | By car | - |
| | Nearest secondary school | Anaka Pope Paul |
| | % of secondary school students living outside | 100% |
| Health | | |
| | Popular health unit | Anaka Hospital |
| Access to the health unit | | |
| | On foot | 1.5 hrs |
| | By bicycle | 30 mins |
| | By motorcycle | 20 mins |
| | By car | 15 mins |

Source: JICA Study Team

(2) Lot 2 (Otwee- Wii Anaka)

1) Northern Side

On the northern side of Lot 2 bridge, the survey was conducted in Abongo Luduka sub-village in Panockrach Parish, Alero Sub-county since there are no villages but only farms in the areas close to the bridge. Unlike villagers in the sub-villages surveyed for Lot 1, villagers in this sub-village mainly take their agricultural products to Gulu by car. As for a health facility, they mostly use Amuru Health Centre II which is run by Lacor Hospital.

Regarding the expectations towards the bridge construction, people in the sub-villages expect improved access to Pakwach and Nebbi Districts, where they can sell their agricultural products as well as receive better social services. Also, they expect to go to Anaka hospital more easily after the bridge construction.

Table 26.2.7 Expected Changes (Lot 2, Northern Side)

| Survey Item | Abongo Luduka |
|------------------|--|
| Expected Changes | <ul style="list-style-type: none">• Easier transport due to the improvement of the road• Easier movement of goods and Services to the markets• Distance to Anaka Town Council has become short• Easier linkages to other Villages• Reduced risk while crossing over the river• No more deaths or fear of crossing the bridge• Bridging relationship between Acholi & Alur• Income generating activities improved among farmers• No more paying for the bridge. |

Source: JICA Study Team

Table 26.2.8 Summary of Results (Lot 2, Northern Side)

| Target (Sub-village or Village) | | Abongo Luduka |
|---------------------------------|---|--|
| Sub-county, Parish | | Alero, Panockrach |
| Population | | 672 |
| Number of Households | | 112HH |
| Population by type | | |
| Returned villagers | | - |
| Villagers in transition | | - |
| Villagers outside | | - |
| Access to Purongo | | |
| | On foot | 6 hrs |
| | By bicycle | 3 hrs |
| | By motorcycle | 1 hr |
| | By car | 40 mins |
| Access to Pakwach | | |
| | On foot | 24 hrs |
| | By bicycle | 12 hrs |
| | By motorcycle | 6 hrs |
| | By car | 4 hrs |
| Access to Amuru | | |
| | On foot | 3 hrs |
| | By bicycle | 2.5 hrs |
| | By motorcycle | 1.5 hrs |
| | By car | 1 hr |
| Marketing Information | | |
| | Cash crop | Rice |
| | Selling place | <ul style="list-style-type: none"> • Sell to middlemen in Gulu • Sell to middlemen who come to the village from Gulu |
| | Transportation | By car/ public transportation |
| | Cash crop | Groundnuts |
| | Selling place | <ul style="list-style-type: none"> • Sell to middlemen in Gulu • Sell to middlemen who come to the village from Gulu |
| | Transportation | By car/ public transportation |
| Cost of transportation | | |
| | Route | Abongo luduka-Gulu |
| | Method of transportation | As a passenger of a private truck |
| | Cost in UGX | 7,000 per person (one way) and 7,000 per bag |
| Education | | |
| | Popular primary school | Leb Ngec P/S |
| | Access to the school | |
| | On foot | 2.5 hrs |
| | By bicycle | 1 hr |
| | By motorcycle | 20 mins |
| | By car | 20 mins |
| | Nearest secondary school | Anaka Pope Paul |
| | % of secondary school students living outside | 100% |
| Health | | |
| | Popular health unit | Amuru HCII (Branch of Lacor) |
| | Access to the health unit | |
| | On foot | 4 hrs |
| | By bicycle | 2 hrs |
| | By motorcycle | 40 mins |
| | By car | 50 mins |

Source: JICA Study Team

2) Southern Side

Lamin Olango sub-village and Ayero Olwangi sub-village were targeted for the survey for Lot 2 bridge. People in these sub-villages also take their agricultural products to major trading centres in other districts such as Gulu and Pakwach rather than waiting for middlemen to come to their sub-villages. From these sub-villages, both schools and health facilities are a little further, compared to other surveyed sub-villages.

People in the sub-villages expect the bridge construction to enable them to access district headquarters more easily and cheaply. They also expect the improvement of socio-economic development in their sub-villages as a result of the construction.

Table 26.2.9 Expected Changes (Lot 2, Southern Side)

| Survey Item | Lamin Olango | Ayero Olwangi |
|------------------|--|---|
| Expected Changes | <ul style="list-style-type: none"> • Emergency visits to the hospital have been made easier leading to reduction in deaths in the villages. • Easier linkage to the town Council • Easier Transportation of farm products • Increase in agricultural production • Improved social Relationship among villagers • Reduction in death rate while crossing over the bridge. • Market has increased for the products since outsiders can now easily access the villages • Improved development due to increase in income generating activities | <ul style="list-style-type: none"> • Transportation has become cheaper for their produce • Easier access to transportation • Reduction in road accidents • reduction in deaths • we no longer pay for the use of the bridge as it was before the construction of the new bridge • Marketing of their agricultural produce has become easier because of the construction of the new bridge |

Source: JICA Study Team

Table 26.2.10 Summary of Results (Lot 2, Southern Side)

| Target (Sub-village or Village) | | Lamin Olango | Ayero Olwangi |
|---|---|---|---------------|
| Sub-county, Parish | Purongo, Latoro | Purongo, Latoro | |
| Population | 550 | 510 | |
| Number of Households | 34HH | 34HH | |
| Population by type | | | |
| Returned villagers | 550 | All | |
| Villagers in transition | - | Nil | |
| Villagers outside | 20HH | 3HH | |
| Access to Purongo | | | |
| On foot | 5 hrs | 5 hrs | |
| By bicycle | 2.5 hrs | 1.5 hrs | |
| By motorcycle | 40 mins | 45 mins | |
| By car | 30 mins | 40 mins | |
| Access to Pakwach | | | |
| On foot | 7 hrs | 12 hrs | |
| By bicycle | 3 hrs | 6hrs | |
| By motorcycle | 1.5hrs | 1.40mins | |
| By car | 1 hr | 3 hrs | |
| Access to Amuru | | | |
| On foot | 10 hrs | 14 hrs | |
| By bicycle | 4 hrs | 7 hrs | |
| By motorcycle | 2 hrs | 3.5 hrs | |
| By car | 1 hr | 2.5 hrs | |
| Marketing Information | | | |
| Cash crop | Rice | Rice | |
| Selling place | <ul style="list-style-type: none"> • Sell to middlemen who come to the village from Gulu and Arua • Sell to middlemen in Gulu • Sell to other villagers in the village | <ul style="list-style-type: none"> • Sell to middlemen who come to the village from Gulu, Purongo and Pakwach) | |
| Transportation | By car/ Public transport | - | |
| Cash crop | Groundnuts | Groundnuts | |
| Selling place | <ul style="list-style-type: none"> • Sell to middlemen at a major trading centre (Panyimur) • Sell to middlemen in Gulu | <ul style="list-style-type: none"> • Sell to middlemen who come to the village from Gulu, Purongo and Pakwach) • Sell to a major trading centre in Panyimur | |
| Transportation | By car/ public transport | By car/ public transport | |
| Cost of transportation | | | |
| Route | Lamin Olango- Pakwach | Purongo- Panyimur | |
| Method of transportation | As a passenger of a private truck | As a passenger of a private truck | |
| Cost in UGX | 3,000 per person (one way) and 3,000 per bag | 7,000 per person (one way) and 4,000 per bag | |
| Education | | | |
| Popular primary school | Latoro P/S | Wii Anaka P/S | |
| Access to the school | | | |
| On foot | 4 hrs | 2 hrs | |
| By bicycle | 1.5hrs mins | 45 mins | |
| By motorcycle | 30 mins | 15 mins | |
| By car | 10 mins | 10 mins | |
| Nearest secondary school | Anaka Pope Paul | Anaka Pope Paul | |
| % of secondary school students living outside | 100% | 100% | |
| Health | | | |
| Popular health unit | Latoro HCII | Wii Anaka HC II | |
| Access to the health unit | | | |
| On foot | 3 hrs | 2 hrs | |
| By bicycle | 1. 5hrs | 45 mins | |
| By motorcycle | 30 mins | 15 mins | |
| By car | 10 mins | 10 mins | |

Source: JICA Study Team

26.3 Evaluation of Pilot Project after Completion of the Bridges

26.3.1 Comparison of the Survey Results with the Baseline Survey

The summary of survey results are follows. The numbers in () show the results of the previous survey (baseline survey in March 2010).

(1) Lot 1 (Otwee-Anaka)

Origin-Destination (OD) survey

Number of the by-passers: 193 (128) people for both directions

Transportation type: 15 (0) vehicles, 21 (4) motorbikes, 64 (44) bicycles, 17 (75) pedestrians for both directions

Main trip purpose: Work 27 (13), Private 22 (18), Business 20 (10), Hospital 9 (17), School 6 (13) for both directions

Commodity type: Convey nothing 56 (63), Food 34 (2), Fuel 1(17), Vegetation 4 (16)

Origin-Destination: The largest number of trips was between Lukai and Anaka at 30 trips (Lacic and Lulyango at 33 trips)

Community Interview survey

Population of Original Village (on the northern side of the bridge): Lacic Sub-village ; Returnees 510, Transit site 0 (Returnees 400, Transit site 200)

Access to Anaka by car: Lungulu Sub-village; 20 min (1.5 hrs), Lacic Sub-village; 30 min (2.0 hrs)

Name of cash crop: Rice, Groundnuts (Rice, Groundnuts)

Marketing: Sell to middlemen at trading centre (Gulu, Anaka, Panyimur, Amuru), Sell to middlemen from Gulu or Anaka

(2) Lot 2 (Otwee- Wii Anaka)

Origin-Destination (OD) survey

Number of the by-passers: 46 (91) people for both directions

Transportation type: 4 (19) vehicles, 6 (14) motorbikes, 1 (20) bicycles, 6 (11) pedestrians for both directions

Main trip purpose: Work 10 (38), Private 2 (6), Business 3 (0) for both directions

Commodity type: Food 3 (63), Vegetation 1 (12)

Origin-Destination: The largest number of trips was between Prongo and Latoro at 8 trips (Lbengec and Latoro at 35 trips)

Community Interview survey

Population of Original Village (on the northern side of the bridge): Abongo Luduku Sub-village; Returnees 672, Transit site 0 (Returnees 300, Transit site 200)

Access to Purongo by car: Abongo Luduku Sub-village 40 min (2.0 hrs)

Name of cash crop: Rice, Groundnuts (Rice, Groundnuts)

Marketing: Sell to middlemen at trading centre (Gulu), Sell to middlemen from Gulu, Amuru or Pakwach

26.3.2 Impact of the Pilot Project

Comparing the survey results implemented before and after construction of the bridges, the following impacts are observed.

(1) Lot 1 (Otwee-Anaka)

This bridge is used for social purposes such as to commute to the hospital, school and their work place.

Before construction, no vehicle was able to cross the river. All vehicles were forced to use another route which is more than 1 hour drive further. Hence, there was a limit on the distance that they could convey products produced in the northern part of Nwoya to the consumption areas since the river was a bottleneck for transport and therefore, most of the products ended up going to Anaka.

After the bridge was constructed, vehicles could pass in all season. It seems that the working and business opportunities for the people in the surrounding area were increased by improvement of the access road. For example, the village people can choose to sell their products in trading centres such as Gulu and Anaka by themselves using private trucks (a kind of shared-taxi), which now comes in on this road after completion of the bridge, instead of waiting for a middle man in their home villages. These impacts will contribute to resettlement for the returnees in their original villages from an IDP camp.

Before construction of Bridge No.1, the number of IDP returnees of Lucic Sub-Village, located in the northern Area of the bridge, was around 400, and the number of IDP that lived in transit sites were around 200 (the rate of returnees was 67%). After completion of Bridge No.1, the number of IDP returnees of Lucic Sub-Village was around 510, and the number of IDP that lived in transit sites were zero (the rate of returnees was 100%). The main reason that all the IDP had already returned at the time of bridge completion can be that the Government had issued a closure policy for IDP camps by July 2010. In addition to this, the reopening of a school in this area and improved access to Anaka town with a detour during the bridge construction stage might accelerate IDP return and resettlement to their original villages.

The amount of traffic passing Bridge No.1 is still small at this moment and there are only 15 vehicles and 21 motorbikes per day according to the survey. However, it is expected that this number will increase soon as investment starts in this area. Thus, an additional survey after a year to monitor shall be necessary to find the true impact of the construction.

Another impact that can be observed is the travel distance between the two district capitals. From Otwee - the capital of Amuru district to Anaka – the capital of Nwoya district, vehicles had to travel through Lamogi or Alelo before construction, which took approx. 90 minutes to drive. After construction this became 30 minutes, so an hour of travel was eliminated.

(2) Lot 2 (Otwee- Wii Anaka)

Before construction of Bridge No.2, the number of IDP returnees of Abong Luduka Sub-Village, located in the northern Area of the bridge, was around 300, and the number of IDP that lived in transit sites were around 200 (the rate of returnees was 60%). After completion of Bridge No.2, the number of IDP returnees of Abong Luduka Sub-Village was 672, and the number of IDP that lived in transit sites was zero (the rate of returnees was 100%). The main reason that all the IDP had already returned at the time of bridge completion can be that the Government issued a closure policy for IDP camps by July 2010, as stated before.

This bridge is used for business purposes, especially for transporting agricultural products and the farm workers. The number of by-passers after completion of the bridge was only 46 per 12 hours. This number is 45 people less compare with before the construction. It seems that these traffic demands vary depending on planting and harvesting season of the products. In northern Uganda, the usual planting season is in the beginning of the rainy season (March to July) and crops are harvested at the end of the rainy season and then transported to markets during the dry season.

A total of 19 vehicles crossed No.2 Bridge at the time of the baseline survey before the bridge construction, which was conducted in March, 2010 (end of the dry season). On the other hand, only 4 vehicles crossed No.2 Bridge at the time of the survey after completion of the bridge conducted in October, 2011 (end of the rainy season). The reason for the decrease in traffic after completion of the bridge will be attributed to this seasonal variation.

In Lot-2, the impact of the bridge was not found clearly. However, considering the potential it has for the land, it is expected that the bridge shall contribute to the growth of the economy in the long term. It is recommended to monitor the traffic of this bridge for each season to comprehend the exact impacts of the bridge.

26.3.3 Evaluation of the Contractor

The following finding was observed from the activities of the Contractor during the execution.

- 1) The capability of the contractor depends on the capability of the project manager and support from headquarters was very limited. The first dispatched project manager from the contractor was a new person from India. Although his performance was limited and unsatisfactory, unfortunately, there was no response from the contractor's headquarters to the Resident Engineers claim.
- 2) Although it is the responsibility of the contractor, the Resident Engineer has to support and sometimes do work for him in the following tasks.
 - Concrete mixing design
 - Preparation of reinforcement bar bending schedule
 - Revision of schedule
 - Procurement of Materials (Introduce supplier who can satisfy the specifications)
 - Correction of payment certificates

The following was also found from the construction.

- 3) Most of the materials and machinery found in Uganda had almost the same quality as that found in Kenya or Tanzania. However, special machinery, such as a 100 ton crane, had to be procured from Kenya.
- 4) The labour in Amuru was not accustomed to working long hours. They decided to leave the site when they were asked by the contractor to work for 8 hours a day. Hence, the contractor hired labourers from other areas that were familiar with civil works. These labourers were skilful enough to execute the work.