No.

NATIONAL ROAD ADMINISTRATION
REPUBLIC OF MOZAMBIQUE

THE PREPARATORY STUDY
ON
ROAD IMPROVEMENT PLAN
IN NACALA DEVELOPMENT CORRIDOR
(N13: CUAMBA-MANDIMBA-LICHINGA)
IN
THE REPUBLIC OF MOZAMBIQUE

FINAL REPORT
2 of 3
MAIN TEXT

Volume 3
Part VI Environmental and Social Considerations

February 2010

JAPAN INTERNATIONAL COOPERATION AGENCY

Eight - Japan Engineering Consultants Inc.

Oriental Consultants Co., Ltd.

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The following foreign exchange rate is applied in the study

1 US dollar = 28.00Mtn = 91.36 JP Yen, or 1 MTn = 3.26 JP Yen (October 2009)

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PREFACE

In response to the request from the Government of the Republic of Mozambique, the Government of Japan decided to conduct the Preparatory Survey on Road Improvement Plan in Nacala Development Corridor (N13: Cuamba-Mandimba-Lichinga) and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA dispatched a Study Team headed by Mr. Hisashi MUTO of Eight-Japan Engineering Consultants Inc. and consist of Eight-Japan Engineering Consultants Inc. and Oriental Consultants Co., Ltd. to Mozambique, between March 2009 and December 2009.

The Study Team held discussions with the officials concerned of the Government of Mozambique and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Mozambique for their close cooperation extended to the study.

February 2010,

Kiyofumi KONISHI
Director General
Economic Infrastructure Department
Japan International Cooperation Agency

Mr. Kiyofumi KONISHI
Director General
Economic Infrastructure Department
Japan International Cooperation Agency

February 2010

Dear Sir,

LETTER OF TRANSMITTAL

We are pleased to submit to you the Final Report of the Preparatory Survey on Road Improvement Plan in Nacala Development Corridor (N13: Cuamba-Mandimba-Lichinga) in the Republic of Mozambique.

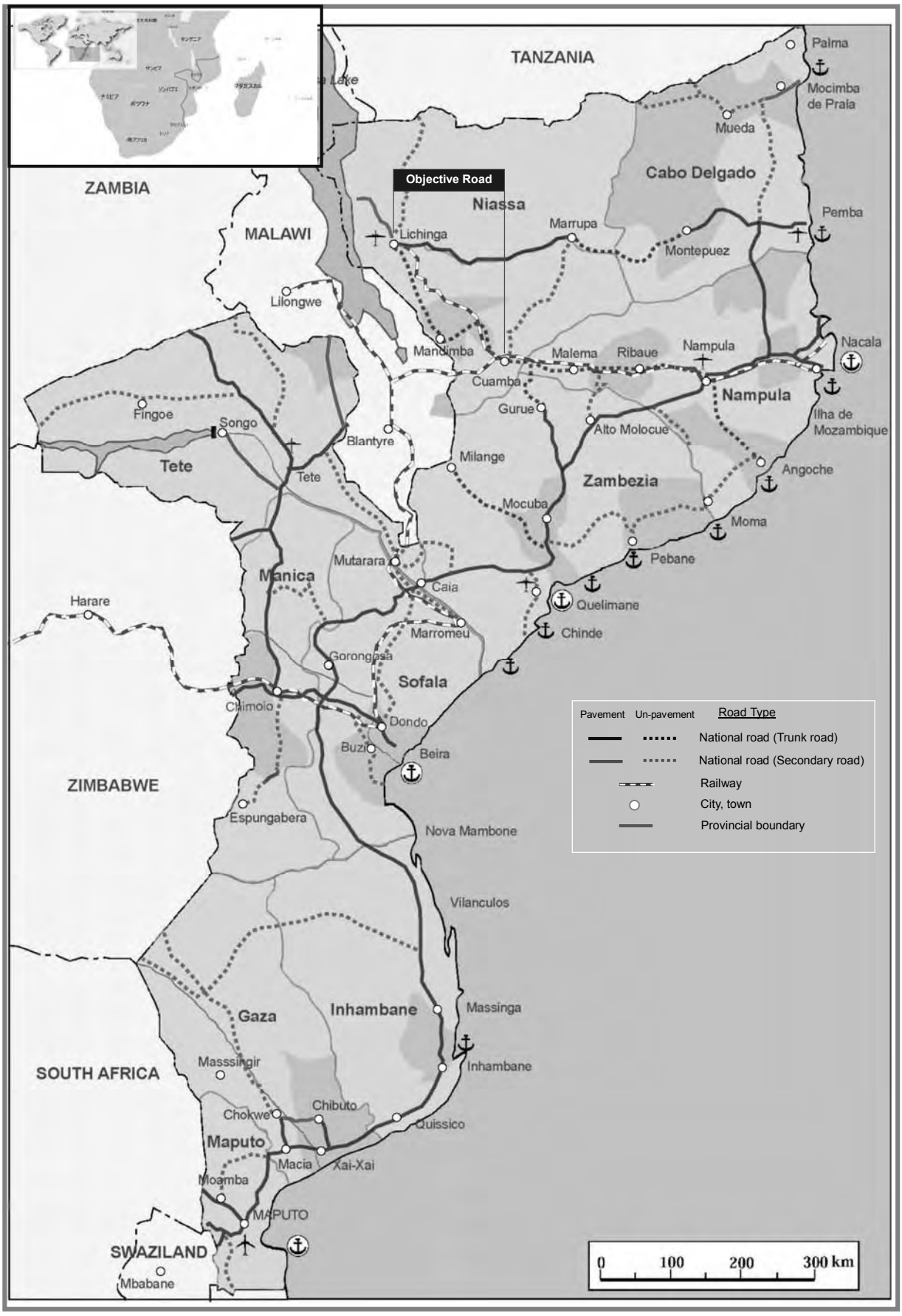
This study was conducted by Eight-Japan Engineering Consultants Inc. and Oriental Consultants Co., Ltd. under a contract to JICA, during the period from March 2009 to February 2010.

We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, Ministry of Foreign Affairs of Japan, National Road Administration, JICA Mozambique Office and Embassy of Japan in Mozambique for their cooperation assistance throughout the Study.

Finally, we hope this report will contribute to further promotion of the project.

Very truly yours,

Hisashi MUTO
Team Leader,
The Preparatory Survey on Road Improvement Plan in Nacala Development Corridor
The Consortium of Eight-Japan Engineering Consultants Inc. and Oriental Consultants Co., Ltd.



Project Location Map

Project Outline

1. Country	Republic of Mozambique
2. Name of Study	The Preparatory Survey on Road Improvement Plan in Nacala Development Corridor (N13: Cuamba-Mandimba-Lichinga) in the Republic of Mozambique
3. Counterpart Agency	National Road Administration (ANE), Ministry of Public Works and Housing(MOPWH)
4. Objectives of the Study	(1) The objectives of the Study are to determine the most technically feasible and economically viable, environmentally acceptable and socially optimal option of upgrading the existing Cuamba – Lichinga road to an all-weather road for easier transit. (2) Formulation and recommendation of the "Regional Development Program" intended for Niassa Province is also the objective of the Study.

1. The Study Area

- The Study Road, with a total length of approximately 302km including the Mandimba-Malawi Border road, traverses four districts having high agricultural potential, namely Cuamba, Mandimba, Ngauma and Lichinga in Niassa Province.
- The Cuamba-Mandimba-Malawi Border road is an important component within the Nacala Development Corridor, since it connects Niassa and Nampula Provinces, and in addition it serves to link landlocked Zambia and Malawi to the Mozambican coast.

2. Scope of the Study

(1) Economic Feasibility Study

1) Economic Analysis, 2) Traffic Analysis, 3) Economic Evaluation, 4) Risk Analysis

(2) Preliminary Engineering Design

1) Site Measurement (Natural Condition Survey), 2) Visual Site Survey, 3) Preliminary Design, 4) Cost Estimate

(3) One Stop Border Post (OSBP)

(4) Assistance for Execution of EIA by GOM (ANE)

(5) Regional Development Program

3. Narrative Description

Feasibility Study

The Study Road passes through many small villages. The road can be broadly divided into three terrains (0 – 148km: Flat terrain, 148 – 240km: Rolling terrain, 240 – 302km: Rolling with some mountainous terrain), and it undulates from a starting altitude of 560MASL reaching up to nearly 1,400MASL at Lichinga. The existing horizontal alignment and vertical alignment generally follow the watershed crest and the natural ground, respectively. The existing road is in fair to poor condition during the dry season and becomes impassable during the rainy season due to interaction between poor drainage and erodible soils. In addition the Study Road width varies between 5m and more than 10m and is generally lower than the surrounding ground.

As a result of the traffic demand analysis, future traffic volumes for both sections (Cuamba-Mandimba and Mandimba-Lichinga) in 2023 were estimated at about 1,481AADT and 1,732AADT, respectively. From the viewpoint of terrain, traffic safety, construction cost, social impacts, traffic management and operation, a design speed of 100km/hr was recommended for the section of Cuamba - Mandimba. Similarly, a design speed of 80km/hr was recommend for the section of Mandimba - Lichinga. And furthermore, the selection of the suitable pavement composition was evaluated based on the initial cost and its financial viability using the EIRR indicator. As a result of the analysis, a DBST surface on a granular base and cemented sub-base was selected as the most economically viable pavement composition. This composition was shown to have the lowest initial cost and the highest EIRR.

Regional Development Program

Niassa Province has the potential for various kinds of development. However, bad access conditions have hindered economic development in the province. Furthermore, huge areas, scattered population and low population density have made it difficult to deliver basic social services to the people. The Study Team formulated a regional development program so that the road improvements of Cuamba-Mandimba and Mandimba-Lichinga could generate synergistic effects on regional development. For the southern part of Niassa Province, such development measures included the support to smallholding farmers' commercialization and agro-processing industries, and infrastructure development for improving logistic functions in the towns of Cuamba and Mandimba. For the middle to northern part of the province, high priority was given to the support of smallholding farmers' commercialization, wood processing industries and tourism, as well as to improvement of social infrastructure and services.

4. Conclusion and Recommendations

(1) To authorize the regional development program proposed by the Study in conjunction with the road implementation plan.
(2) To advance the bilateral discussion for OSBP and to establish a policy relevant to the following issues:
- Types of operational system for OSBP scheme
- Layout and facility size
- Implementation program such as "Two-step upgrading," proposed by the Study

(3) To adopt the COI concept for minimization of social impacts such as resettlement.
(4) To start the detailed design for Cuamba - Mandimba Road (154km) as soon as possible.
(5) To execute a severe site survey (Topographic, Geological and Soil) for Mandimba - Lichinga Road.

5. Report Structure

Name of Report	Number of Volume	Main Contents of the Report		Language		
				Eng.	Por.	Jap.
1. Summary	-	-	-	✓	✓	✓
2. Main Text	Volume-1	Part I	Overall Approach & Work Procedure	✓	✓	
		Part II	General Appreciations			
	Volume-2 **Cuamba-Mandimba Section**	Part III	Preliminary Road Engineering Design			
		Part IV	Economic Feasibility Study			
		Part V	Cross Border Facilities			
	Volume-2 **Mandimba-Lichinga Section**	Part III	Preliminary Road Engineering Design			
		Part IV	Economic Feasibility Study			
	Volume-3	Part VI	Environmental and Social Considerations			
	Volume-4	Part VII	Regional Development Program			
3. Drawings	Cuamba-Mandimba Section	-	-	✓	✓	
	Mandimba-Lichinga Section	-	-			

Executive Summary

Part I Overall Approach & Work Procedure

Mozambique is located on the south-eastern coast of Africa and covers an area of 799,380 sq. km. It is bounded on the north by Tanzania; on the west by Malawi, Zambia, Zimbabwe, Swaziland and the Republic of South Africa (RSA); and on the entire eastern boundary by the Mozambican channel of the Indian Ocean. Mozambique's 17-year civil war, which lasted until 1992, ruined much of the country and destroyed key road infrastructure.

The Government of the Republic of Mozambique (hereafter referred to as the "GOM") assumed that the limited access to roads and other socio-economic services is a cause of the country's poverty and gave priority to improving infrastructures in areas with high potential for agricultural production, etc. in the Action Plan for the Reduction of Absolute Poverty (PARPA II: 2006 – 2009).

A main goal of the Road Sector Strategy 2007-2011 (RSS) is to serve the efficient road network to the prioritized economic areas such as agricultural areas, tourist sites and areas of industrial or natural-resource development that have the greatest potential to contribute to economic growth and PARPA II.

Given the above-mentioned situation, the GOM requested the Government of Japan (hereafter referred to as the "GOJ") to conduct a feasibility study (F/S) for the Upgrading of the Nampula - Cuamba Road. In response to this request from the GOM, the GOJ conducted "The Study on Upgrading of Nampula - Cuamba Road" from 2006 to 2007. In Nampula – Cuamba section, the detail design has been put forward for construction by the counter fund of GOJ.

The Study Road (N13: Cuamba – Mandimba – Lichinga), as part of the two Mozambican corridors (Nacala N13/N1 and Lichinga-Pemba N14/N1 corridors), provides a strategic link to the Malawi Border at Mandimba with the ports of Nacala and Pemba, in Nampula and Cabo Delgado Provinces respectively. Although the Study Road has much potential for stimulating development and reducing poverty throughout the entire northern area of Mozambique by enabling efficient connection, the section concerned is the only unpaved section.

Accordingly, the Japan International Cooperation Agency (hereafter referred to as "JICA"), the official agency responsible for the technical cooperation of the GOJ, undertook the Study including regional development program of Niassa Province along the Study Road in close cooperation with the concerned authorities of Mozambique.

The objectives of the Study are to determine the most technically feasible and economically viable, environmentally acceptable and socially optimal option of upgrading the existing Cuamba – Lichinga road to an all-weather road for easier transit. The Study also determines the impact of providing an all-weather road on poverty reduction and environment.

And establishment of the "Regional Development Program" intended for Niassa Province is also the objective of the Study. This program aims to extend the improvement effect to the wide area in conjunction with the road improvement (Nacala N13/N1 and Lichinga-Pemba N14/N1 corridors).

Part II General Appreciations

1. Government/Sectoral Policy

National policy and planning in Mozambique all have poverty reduction as a key objective. The Mozambique Government has been combating absolute poverty under the Poverty Reduction Strategy Paper (PARPA: 2001-2005) and PARPA II (2006-2009). The target of PARPA II is to reduce the incidence of absolute poverty from 54% in 2003 to 45% in 2009.

And Mozambique's transport sector is governed by the following road sector policies and strategies:

- Road Sector Strategy 2007-2011 (RSS)
- Integrated Road Sector Program 2009-2011 (PRISE)
- Semi Annual Work Plan and Budget (SAWPB)

2. Responsible Institutions for the Sector

Mozambique's road network is currently managed by the National Road Administration (ANE), which reports to the Ministry of Public Works and Housing. The Road Fund is responsible for managing the funds for the sector.

3. Traffic Modal Split

In Mozambique, the roads occupy a large share of both freight (58.2%) and passenger transport (96.1%) among all modes, particularly for passenger transport which is almost totally reliant on the road network. On the other hand, at 27.9%., contribution of the railway mode is relatively high for freight transport. Marine transportation (8.3%) also contributes towards transportation of freight. The air mode only shares a low ratio for both goods and passenger transport due to lower transport capacity.

4. Road Classification System and Conditions

Mozambique has classified roads which consist of national roads (primary and secondary) and regional roads (tertiary and vicinal roads). These roads are administrated by ANE. Urban roads and unclassified roads fall under the jurisdiction of the municipal councils and the district administrations respectively.

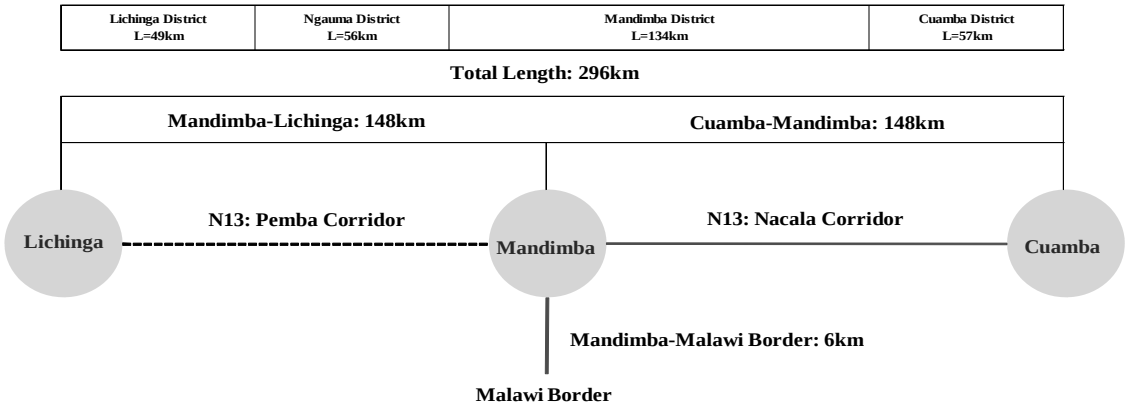
The current Mozambique classified road network is estimated at around 30,000km of which less than 20% is paved. Of the paved roads, the majority are estimated to be in good to fair condition (88%), however only 57% of the unpaved roads are estimated to be fully travelable. A key element of the RSS and of the Strategic Maintenance Plan (SMP) is the introduction of a Paved Road Management Programme (PRMP), which will be managed separately from the rest of the road network. SMP takes care of the 30,000km of classified roads and an additional 3,000km of urban roads.

[Cuamba-Mandimba Section]

Part III Preliminary Engineering Design

1. General Observations

The Study Road can be broadly divided into two sections (Cuamba-Mandimba Section and Mandimba-Malawi Border Section) and the road length of each section is indicated in the following figure.



Outline of the Study Road

2. Natural Condition Survey for the Study Road

The aim of the natural condition survey is to confirm the existing natural conditions for the Study Road with a view to making a road design. Natural condition survey is composed of the following three works.

1) Topographic Survey (Road alignment survey, Aerial survey, Bridge survey, Benchmark setting), 2) Geological Survey, 3) Soil & Material Survey

3. Hydrology and Hydrological Analysis

Following table shows the results of the flood level calculation by the HEC-Ras, which is based on the calculation for non-uniform flow.

Bridge	Return Period	Discharge (m3/s)	Calculated Flood Level (m)	Results of Field Survey (m)
Muambessi	50-Year	312.0	618.50	616.9
	100-Year	390.9	619.28	
Lussangassi	50 Year	589.9	639.42	637.5
	100 Year	731.4	639.92	
Ngolua	50-Year	246.4	704.16	706.2
	100-Year	307.9	704.85	
Ngame II	50 Year	243.7	708.61	709.2
	100 Year	301.7	709.15	

4. Applicable Design Standards

The application of a proper design standard will ensure that the following objectives are achieved:

- Ensure safety, a high standard service level and comfort for road users by the provision of adequate sight distance and roadway space,
- Ensure that the roadway is designed economically
- Ensure uniformity in the design
- Ensure safety of the structures (bridges and culverts).

For the design studies of the Nampula-Nacala Road and Nampla-Cuamba Road which are a part of Nacala Corridor, the Study Team proposed to use the Southern Africa Transport and Communications Commission (SATCC) design standards, as these were commonly used for other projects in the region.

5. Preliminary Engineering Design

Through discussions with ANE and the results of field surveys by the Study Team, the concept of the Project was confirmed as follows:

- To create an efficient primary road connection securing smooth traffic flow throughout the year corresponding to the future traffic demand
- To create a safe primary road connection by reducing the risk of accidents and the rate of injuries to pedestrians by motorized vehicles

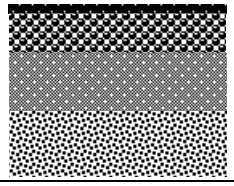
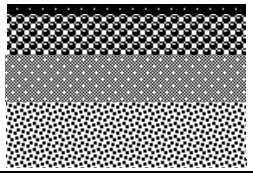
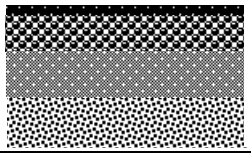
(1) Recommendable Alignment

The following table shows the improvement magnitude and effect of the recommended alignment. In regard to the section between Cuamba and Malawi Border, it was clarified by two indices (horizontal curvature and rise plus fall) that the existing alignments both horizontal and vertical almost meet criteria for a design speed of 100km/h. This means that improvement to the recommended alignment will basically be carried out on the existing road.

			Existing	Plan
Length (km)			153.8km	152.9km
Terrain			Flat	Flat
Design Speed			-	100km/h
Geometry	Horizontal Curvature	deg/km	22.4 (1.00)	21.2 (0.95)
	Rise + Fall	m/km	9.8 (1.00)	9.8 (1.00)
	No. of Rises + Falls	no./km	4.5	3.3
No. of Level Crossings			8	2

(2) Suitable Pavement Compositions

A mechanistic analysis using ELSYM5 was conducted according to the design CBR. The results of the analysis are as shown in following table.

S2 (3-4)	***S3 (5-7)***	***S4 (8-14)***
		

: G4 Crushed or Natural Gravel Base Soaked CBR>80%@98% mod. AASHTO density

: C4 Cemented stabilized Sub-base 0.75-1.5Mpa@100% mod. AASHTO density

: G7 Selected Layer Soaked CBR>15%@93% mod. AASHTO density

Poisson's ratio & Elastic coefficient (Elastic coefficient = (10 x CBR)Mpa)

G4: 0.35, Phase-I: 400Mpa, Phase-II: 400Mpa, Phase-III: 300Mpa

C4: 0.25, Phase-I: 1500Mpa, Phase-II: 600Mpa, Phase-III: 300Mpa

G7: 0.35, Phase-I: 150Mpa, Phase-II: 150Mpa, Phase-III: 150Mpa

(3) Bridge Design

By the discussion with ANE, bridge inner width has been set as 9.2m for two-lane bridges. Those are summarized in following table.

General		Existing bridge			New bridge			
No.	name	width	length	existing	lane	width	length	from existing Br.
(Cuamba)								
1	Muambessi	4.8	14.3	demolish	2-lane	9.2	17	same position
2	Lussangassi	3.2	28.0	demolish	2-lane	9.2	34	down stream 8m
3	Ngolua	4.7	14.0	demolish	2-lane	9.2	17	same position
4	Ngame-II	4.9	28.0	demolish	2-lane	9.2	34	same position
(Mandimba)								

6. Construction Planning

The construction plan was proposed for improvement of Cuamba – Mandimba road on N13 including construction method, procurement of material and equipment, and construction schedule according to site condition, structural scale and work quantities.

7. Project Implementation Plan

Project implementation plan was proposed based on some constraints affecting the schedule as below:

- Selection of consultant for D/D will require four to five months procedure and preparation of D/D with tender documents will require minimum five months.
- Preparation of environmental impact assessment and RAP will require about eight to nine months and will be submitted to AfDB and JICA 120 days prior to the submission of the appraisal report and loan agreement of the Project, respectively.

- Tendering for construction contractor will require minimum nine to ten months procedure including pre-qualification, tender announcement, tender preparation limited to 90 days and tender evaluation and approval by ANE and lending agencies
- Construction work and supervision service will require about three years (33 months)

8. Project Cost Estimate

Basically unit construction cost of "Upgrading of Nampula – Cuamba Road" (hereinafter referred as "NCR") is utilized for the Estimate due to high similarities between the two projects as follows.

- Site location: The Project road is the extension of NCR beyond Cuamba in northern region.
- Time of estimate: Engineering estimate of NCR was finalized at its detailed design stage in April 2009.

The results of the Estimate are summarized in the following table.

Description		Final (USD)
		DBST
1000	General	21,773,229
2000	Drainage	6,205,937
3000	EW & granular layers	47,887,098
4000	AC & seals	13,525,335
5000	Ancillary	2,501,784
6000	Structures	6,051,036
7000	Test & QC	17,250
8000	Others	1,573,090
	Total (Bill A: Road)	**99,534,760**
	Bill B: Day works	855,999
	Bill C: Social issues	935,627
	Bill D: Environmental	248,837
	Total (Bill A to D)	**101,575,223**
	Contingencies (10%)	10,157,522
	IVA (6.8%)	7,597,827
	Total construction cost	**119,330,572**
	Engineering cost (5%)	5,586,637
	IVA (6.8%)	379,891
	Total project cost	**125,297,100**
	Compensation cost	156,103

	Project cost per km	**820,492**

9. Road Maintenance Systems

ANE's ten provincial delegations are responsible for the implementation of all maintenance works on classified roads. The Directorate of Maintenance has a crucial role in ensuring that the delegations in provinces are fully aware of and complying with the technical and operational guidelines for implementation of the annual maintenance plan; and that roads of all types (primary, secondary, tertiary, vicinal, paved, unpaved) are being maintained and provided .

Part IV Economic Feasibility Study

1. Existing Traffic Flow Patterns

The Study Team conducted the following surveys and research to recognize the characteristics of traffic flow patterns for each section.

- Previous traffic volume data in ANE
- Traffic volume and roadside OD survey in May and August, 2009 at three locations in Cuamba, Mandimba and Lichinga on the Study Road
- OD survey at four borders between Mozambique, Malawi and Zambia
- Interview survey of stakeholders both in Mozambique and Malawi

This section is used for passenger movement from Lichinga and other districts in Niassa to connect railway or Nampula province. Regarding goods transportation, some consumer goods are dispatched from Cuamba to Lichinga. On the other hand, most consumer goods for Cuamba city come from the Nampula side mainly by railway.

2. Methodology of Traffic Demand Forecast

The Study Team applied the socio-economic framework based on the development strategy in Niassa (PEP), and the concepts of forecast methodology as three different types of traffic;

Passenger traffic volume is estimated by "Gravity Model" with the variable index of potential population and road section impedance, developed by the actual number of passengers for each O-D trip.

Regional traffic volume is considered by dividing traffic as attraction and generation for each zone. Trip attraction is estimated by the consumption of daily goods, and trip generation is based on the agro-products from Niassa Province.

International traffic volume is thought to be generated after the road network is improved. It is estimated by the Malawi trade and railway capacity, and applies the corridor choice model, named lodgit model.

3. Results of Traffic Demand Forecast

Accumulating the results of each component, future traffic volume for both sections will be summarized. For the section of Cuamba – Mandimba, future traffic volume in AADT is estimated at about 457AADT in 2014, 1,481AADT in 2023 and 5,027AADT in 2033 in the "with" case.

The section of Cuamba - Mandimba is characterized by the numbers of trailers that will be diverted from Beira corridor and railway. It is evidenced that this section will be composed of a part of international corridor.

Compared with the previous feasibility study between Nampula and Cuamba, this estimated traffic volume is almost the same level of volume as for the previous section.

4. Economic Analysis

Economic analysis is conducted on the following assumptions:

Analysis Tool : HDM-4 (RED, Comprehensive for reference)
Project life : 20 years after the opening of the project road (2014)
Pricing date : as of October 2009
Social discount rate : 12%
Conversion Factor : Construction work (0.84), Maintenance work (0.75)
Exchange rate : US$1.00 = 28.00 Meticais (MT)

Results of analysis are tabulated as follows:

Sensitivity Analysis

Case	Assumptions	EIRR
Base	Upgrade to paved road with DBST with Lichinga-Mandinba intervention	19.5%
1	Decrease in traffic volume of -20%	16.6%
2	Increase in investment costs of +20%	16.9%
3	Combination of above as the worst case	14.3%

The Project scores an average level as an upgrade-to-paved intervention and its economic viability is acceptable, with an EIRR of over 12% of the opportunity cost among alternatives. Based on this result, the Project is evaluated as one of the prioritized projects to be implemented in the nation. The particular importance of this primary road and of bringing it to all-weather travelable condition is well established. The Study Team concludes that the road upgrading project is economically feasible in terms of the national economy of Mozambique.

Part V Cross Border Facilities

1. Baseline Study and Fact Findings for Upgrading Border Facilities:

Upgrading of facilities at Mandimba-Chiponde border post was assessed in terms of its needs and requirements in conformity with baseline study and facts found upon the following issues.

- Current Conditions of Borders at Mozambique-Malawi
  - Cross Border Traffic
  - Control System and Facility
- Characteristics of Mandimba-Chiponde Border
  - Geographical and Commercial Features
  - Interactions and Border Communities
  - Strategic Importance on Regional Corridor Development
  - Site Conditions and Facilities
- Strategy for Upgrading Border Control and Facility
  - SADC Regional Strategy
  - Mozambique-Malawi Bilateral Strategy

2. Implementation Approach for Upgrading Border Facilities:

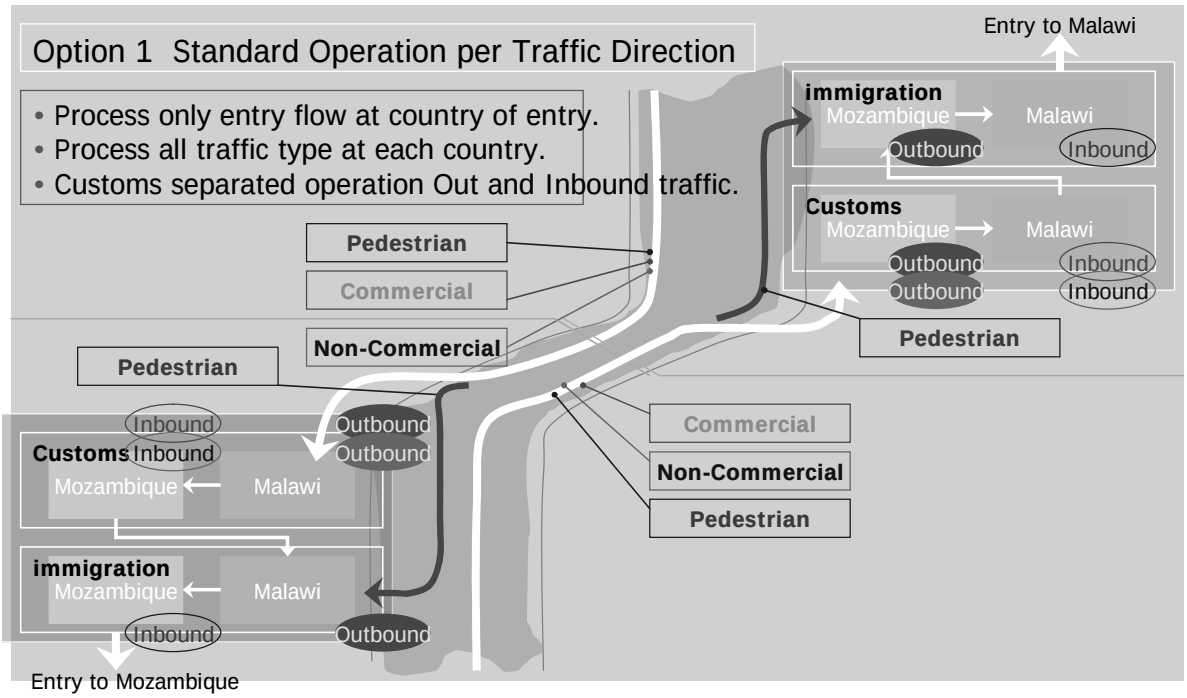
Implementation approach was formulated with the following proposals:

- Phased introduction for OSBP shall be employed,
- Existing facility shall be practically adapted and utilized under the environment of OSBP operation,
- Phased introduction shall be examined in line with: i) magnitude of future demands of cross border traffic and year forecasted, ii) time schedule of the bilateral discussion and the agreement, and iii) time schedule to introduce OSBP environment to other borders.

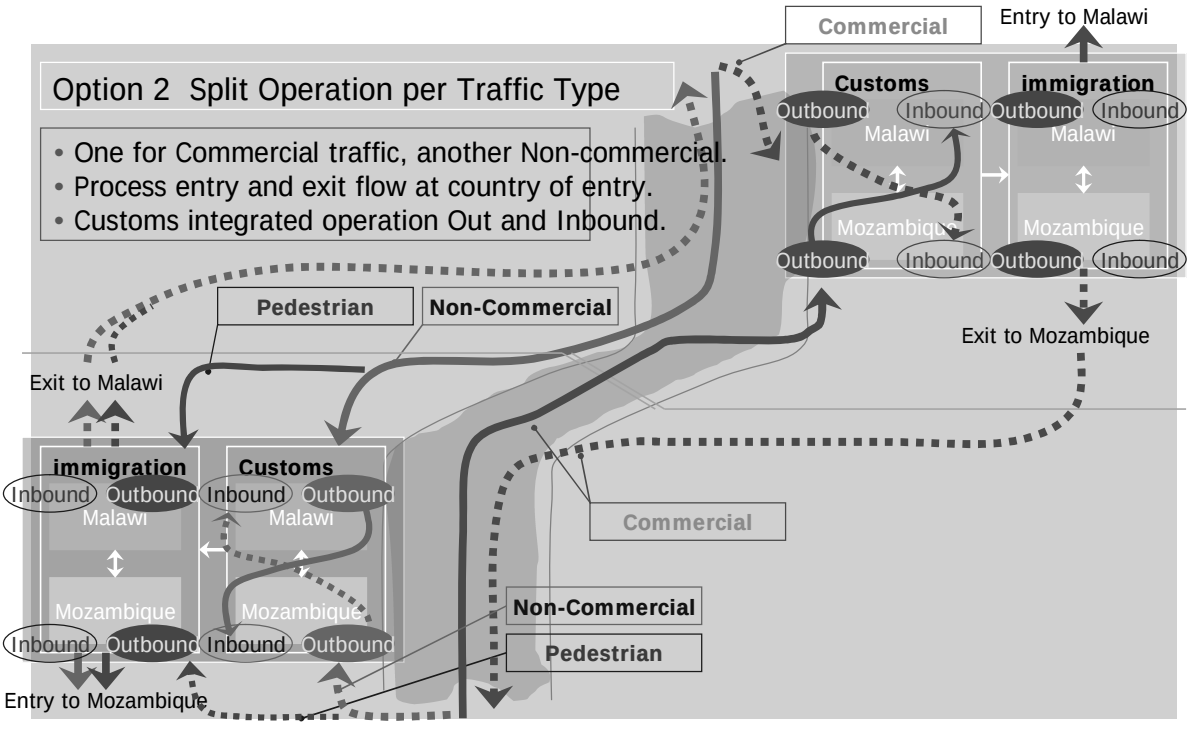
3. Implementation Policy for Upgrading Border Facilities:

"**Two-step upgrading**" as competitive scenario and "**Juxtaposed facility model**" were technically selected for the phased introduction of OSBP. And facility planning was preliminarily formulated estimating provisional conditions such as border control procedures and performance benchmarks (target time release, total processing time, unit workforce etc.) to be applied for OSBP operation.

Two types of operational options for OSBP scheme were proposed and preliminary layout and facility size were proposed for two target years according to "Two-step upgrading," that is, 2014 as the first step and 2024 as the second step introduction:



Option 1: Split Operation per Traffic Direction



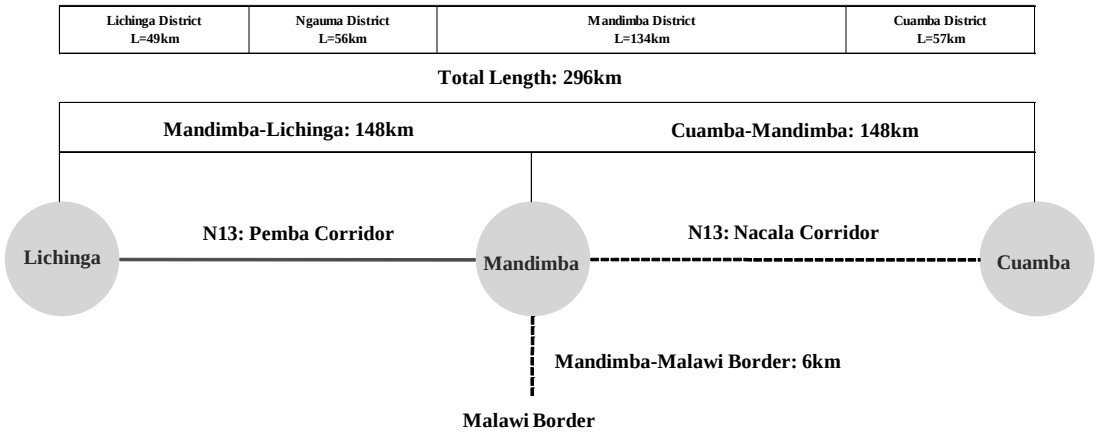
Option2: Split Operation per Traffic Type

[Mandimba-Lichinga Section]

Part III Preliminary Engineering Design

1. General Observations

As shown in Figure 1.1.1, the Study Road, with a total length of approximately 148km, traverses three districts having high agricultural potential, namely Mandimba, Ngauma and Lichinga in Niassa Province. The Mandimba-Lichinga road is part of the Pemba Corridor.



Outline of the Study Road

2. Natural Condition Survey for the Study Road

The aim of the natural condition survey is to confirm the existing natural conditions for the Study Road with a view to making a road design. Natural condition survey is composed of the following three components:

1) Topographic survey (Aerial survey, Bridge survey, Benchmark setting), 2) Geological survey, and 3) Soil & material survey.

3. Hydrology and Hydrological Analysis

Following table shows the results of the flood level calculation by the HEC-Ras, which is based on the calculation for non-uniform flow.

Bridge	Return Period	Discharge (m3/s)	Calculated Flood Level (m)	Results of Field Survey (m)
Ngame I	50-Year	225.6	731.10	732.9
	100-Year	278.9	731.68	
Lilasse	50 Year	277.3	892.76	893.2
	100 Year	342.7	893.01	
Ninde	50-Year	256.6	902.47	902.9
	100-Year	316.9	902.75	
Luculumesi	50 Year	716.2	992.98	990.0
	100 Year	885.0	993.63	
Lutembue	50-Year	310.9	1045.64	1043.9
	100-Year	384.7	1046.01	
Luambala	50 Year	463.2	1107.61	1105.5
	100 Year	576.5	1108.09	

4. Applicable Design Standards

The application of a proper design standard will ensure that the following objectives are achieved:

- Ensure safety, a high standard service level and comfort for road users by the provision of adequate sight distance and roadway space,
- Ensure that the roadway is designed economically
- Ensure uniformity in the design
- Ensure safety of the structures (bridges and culverts).

The Study Team proposed to use the Southern Africa Transport and Communications Commission (SATCC) design standards, as these were commonly used for other projects in the region. The Lichinga- Montepuez Road is also subject to the SATCC design standards.

5. Preliminary Engineering Design

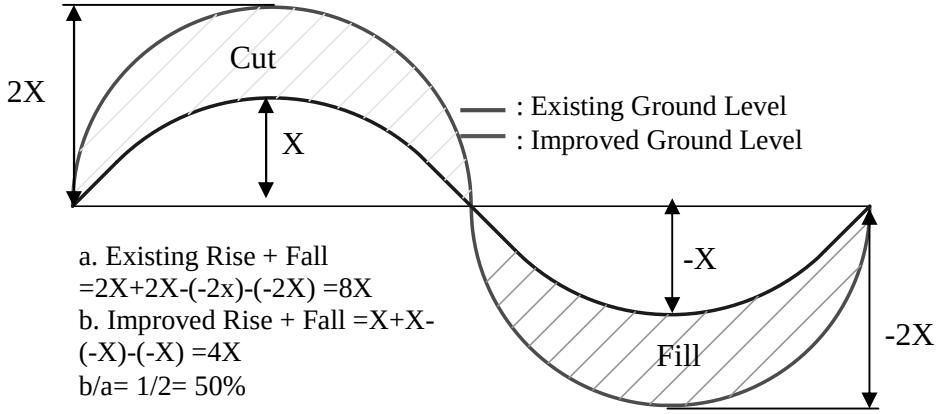
Through discussions with ANE and the results of field surveys by the Study Team, the concept of the Project was confirmed as follows:

- To create an efficient primary road connection securing smooth traffic flow throughout the year corresponding to the future traffic demand
- To create a safe primary road connection by reducing the risk of accidents and the rate of injuries to pedestrians by motorized vehicles

(1) Recommendable Alignment

The following table shows the improvement magnitude and effect of the recommended alignment. In regard to the section between Mandimba and Lichinga, although the horizontal alignment almost meets criteria for a design speed of 80km/h, the vertical alignment should be improved more than 50% for meeting a design speed of 80km/h as shown in following figure. This means that this section should be improved on large scale.

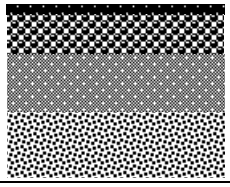
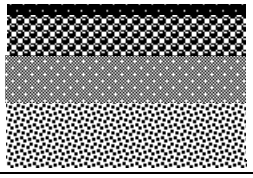
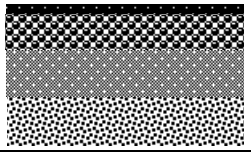
			Existing	Plan
Length (km)			148.1km	148.6km
Terrain			Rolling and mountainous	Rolling and mountainous
Design Speed			-	80km/h
Geometry	Horizontal Curvature	deg/km	164.1 (1.00)	174.8 (1.07)
	Rise + Fall	m/km	55.8 (1.00)	24.2 (***0.43***)
	No. of Rises + Falls	no./km	3.1	2.8



Improvement Image of the Vertical Alignment

(2) Suitable Pavement Compositions

A mechanistic analysis using ELSYM5 was conducted according to the design CBR. The results of the analysis are as shown in following table.

S2 (3-4)	***S3 (5-7)***	***S4 (8-14)***
 200 / 250 / 250	 200 / 200 / 250	 150 / 200 / 200

: G4 Crushed or Natural Gravel Base Soaked CBR>80%@98% mod. AASHTO density

: C4 Cemented stabilized Sub-base 0.75-1.5Mpa@100% mod. AASHTO density

: G7 Selected Layer Soaked CBR>15%@93% mod. AASHTO density

Poisson's ratio & Elastic coefficient (Elastic coefficient = (10 x CBR)Mpa)

G4: 0.35, Phase-I: 400Mpa, Phase-II: 400Mpa, Phase-III: 300Mpa

C4: 0.25, Phase-I: 1500Mpa, Phase-II: 600Mpa, Phase-III: 300Mpa

G7: 0.35, Phase-I: 150Mpa, Phase-II: 150Mpa, Phase-III: 150Mpa

(3) Bridge Design

By the discussion with ANE, bridge inner width has been set as 9.2m for two-lane bridges. Those are summarized in following table.

General		Existing bridge			New bridge			
No.	name	width	length	existing	lane	width	length	from existing Br.
(Mandimba)								
5	Ngame-I	4.2	28.0	demolish	2-lane	9.2	30	same position
6	Lilasse	4.0	10.0	demolish	2-lane	9.2	17	same position
7	Ninde	4.1	31.0	demolish	2-lane	9.2	34	down stream 8m
8	Luculumesi	4.4	22.0	demolish	2-lane	9.2	34	down stream 8m
9	Lutembue	4.1	34.0	demolish	2-lane	9.2	34	down stream 8m
10	Luambala	4.2	22.0	demolish	2-lane	9.2	30	up stream 8m
(Lichinga)								

6. Construction Planning

The construction plan was proposed for improvement of Mandimba - Lichinga road on N13 including construction method, procurement of material and equipment, and construction schedule according to site condition, structural scale and work quantities.

7. Project Implementation Plan

Project implementation plan was proposed based on some constraints affecting the schedule as shown below:

- Selection of consultant for D/D will require four months procedure and preparation of D/D and tender documents will require minimum six months.
- Preparation of environmental impact assessment and RAP will require about eight to nine months and will be submitted to a donor 120 days prior to the submission of the appraisal report and loan agreement of the Project.
- Tendering for construction contractor will require minimum nine to ten months procedure including pre-qualification, tender announcement, tender preparation of 90 days limitation and tender evaluation and approval by ANE and lending agencies
- Construction work and supervision service will require about three years (33 months)

The GOM/ANE is willing to make a request to apply for this Project as NEPAD project or component of the Cuanma-Mandimba Road Project. NEPAD project has to contribute to enhancing regional economic integration as a multinational project. However, the function of the Lichinga-Mandimba Road is not international trunk road linking other countries but rather essential road for regional development of Niassa Province.

For the reasons mentioned above, the possibility of applying this Project as NEPAD project will not be high. In that case, the GOM/ANE should consider a phased improvement in line with the existing road conditions and regional development program.

8. Project Cost Estimate

Basically unit construction cost of “Upgrading of Nampula – Cuamba Road” (hereinafter referred as “NCR”) is utilized for the Estimate due to high similarities between the two projects as follows.

- Site location: The Project Road is the extension of NCR beyond Cuamba in northern region.
- Time of estimate: Engineering estimate of NCR was finalized at its detailed design stage in April 2009.

The results of the Estimate are summarized in following tables.

Description		Final (USD)
		DBST
1000	General	28,083,346
2000	Drainage	11,519,383
3000	EW & granular layers	66,843,578
4000	AC & seals	14,259,205
5000	Ancillary	3,578,272
6000	Structures	5,797,170
7000	Test & QC	17,250
8000	Others	1,997,534
	Total (Bill A: Road)	**132,095,738**
	Bill B: Day works	1,136,023
	Bill C: Social issues	1,241,700
	Bill D: Environmental	330,239
	Total (Bill A to D)	**134,803,700**
	Contingencies (10%)	13,480,370
	IVA (6.8%)	10,083,317
	Total construction cost	**158,367,387**
	Engineering cost (5%)	7,414,204
	IVA (6.8%)	504,166
	Total project cost	**166,285,757**
	Compensation cost	199,391

Project cost per km	**1,121,868**

9. Road Maintenance Systems

ANE's ten provincial delegations are responsible for the implementation of all maintenance works on classified roads. The Directorate of Maintenance has a crucial role in ensuring that the delegations in provinces are fully aware of and complying with the technical and operational guidelines for implementation of the annual maintenance plan; and that roads of all types (primary, secondary, tertiary, vicinal, paved, unpaved) are being maintained and provided .

Part IV Traffic Demand Forecast and Economic Analysis

1. Existing Traffic Flow Patterns

The Study Team conducted the following surveys and research to recognize the characteristics of traffic flow patterns for each section:

- Previous traffic volume data in ANE
- Traffic volume and roadside OD survey in May and August, 2009 at three locations in Cuamba, Mandimba and Lichinga on the Study Road
- OD survey at four borders between Mozambique, Malawi and Zambia
- Interview survey with stakeholders in both Mozambique and Malawi

This section is the only route for delivering consumer goods to Lichinga, which is the provincial capital of Niassa, which is the base for distributing to the northern part. This section can be said to be the lifeline for the northern area. The majority of social and official movement is along the OD-pair between Lichinga and Cuamba.

2. Methodology of Traffic Demand Forecast

The Study Team applied the socio-economic framework based on the development strategy in Niassa (PEP), and the concepts of forecast methodology as three different types of traffic:

Passenger traffic volume is estimated by "Gravity Model" with the variable index of potential population and road section impedance, developed by the actual number of passengers for each O-D trip.

Regional traffic volume is considered by dividing traffic as attraction and generation for each zone. Trip attraction is estimated by the consumption of daily goods, and trip generation is based on the agro-products from Niassa province.

International traffic volume is thought to be generated after the road network is improved. It is estimated by the Malawi trade and railway capacity, and applies the corridor choice model, named lodgit model.

3. Results of Traffic Demand Forecast

Accumulating the results of each component, future traffic volume for both sections will be summarized. For the section of Mandimba – Lichinga, future traffic volume in AADT is estimated at about 467AADT in 2014, 1,732AADT in 2023 and 6,417AADT in 2033 in the "with" case.

The future AADT of section between Lichinga – Mandimba is more than Mandimba – Cuamba. It is because social communication will be more active by minibus and passenger car to the connection of provincial capital in Lichinga.

Compared with the previous feasibility study between Nampula and Cuamba, this estimated traffic volume is almost the same level of volume as for the previous section.

4. Economic Analysis

Economic analysis was conducted on the following assumptions:

Analysis Tool : HDM-4 (RED, Comprehensive for reference)
Project life : 20 years after the opening of the project road (2016)
Pricing date : As of October 2009
Social discount rate : 12%
Conversion Factor : Construction work (0.84), Maintenance work (0.75)
Exchange rate : US$1.00 = 28.00 Meticais (MT)

Results of analysis are tabulated as follows:

Sensitivity Analysis

Case	Assumptions	EIRR
Base	Upgrade to paved road with DBST (revised cost)	18.1%
1	Decrease in traffic volume of -20%	15.4%
2	Increase in investment costs of +20%	15.6%
3	Combination of above as the worst case	13.6%

The Project scores an average level as an upgrade-to-paved intervention and its economic viability is acceptable, with an EIRR of over 12% of the opportunity cost among alternatives. Based on this result, the Project is evaluated as one of the prioritized projects to be implemented in the nation. The particular importance of this primary road and of bringing it to all-weather travelable condition is well established. The Study Team concludes that the road upgrading project is economically feasible in terms of the national economy of Mozambique.

Part VI Environmental and Social Considerations

1. Environmental Law and Relevant Guidelines

The Government of Mozambique has issued laws relevant to the environment. According to the EIA Law, all project proponents must obtain environmental certification from the approval organization which is the Ministry of Environmental Coordination (hereinafter referred to as "MICOA"). This environmental law prescribes that rural road rehabilitation projects are classified as "category A" projects, which require an EIA basically. With regard to Malawi side, the Part V in Environmental Management Act 1996 says, "A4.5 construction new road / widening of existing road of highway / rural road" requires EIA process. On the other hand, construction of immigration facilities is not prescribed in the mandatory list for EIA.

The environmental and social consideration survey based on the JBIC and JICA guidelines indicated that it seems serious environmental impacts are not expected, so far, however some key issues such as resettlement, elephant migration corridor and infectious disease items were picked up, and some mitigation measures were recommended from the Study Team.

2. Environmental Recommendations

The Study Team recommends the following:

[Implementation of Mitigation Measure against Key Issues]

- With regard to African elephant migration routes in the Study Area, signboards should be set up to warn drivers and inhabitants and environmental education should be conducted for construction workers and inhabitants by the proponent.
- In terms of resettlement, adequate law-based process under land law, RPF and other relevant guidelines shall be conducted. Especially, sufficient discussion for negotiation of price determination shall be carried out with stakeholders because the GOM does not have a prescribed compensation price list for structures and assets at the moment.

[Implementation of Adequate EIA]

- ToR for EIA which will be prepared by ANE should consider relevant guidelines such as GOM, JBIC, JICA and AfDB.
- The Study Report shall be referred and incorporated into the EIA report which will be prepared by ANE, especially analysis of elephants and quantitative pollution forecast in air quality and noise pollution

[Implementation of Required Environmental Process during Construction]

- Appropriate law-based processes shall be adopted for development of quarries and borrow pits during construction. Generally, development of new quarry site shall take environmental certificate from Provincial MICOA.

Part VII Regional Development Program

1. Present Situation and Development Potential of Niassa Province

Niassa Province has inherent development potential in agriculture, forestry, mining and tourism. However, poor access conditions have hindered economic development in the province. Furthermore, its territorial size, scattered population and low population density have made it difficult to deliver basic social services to the people.

The majority of provincial population is rural and the majority of rural population is smallholding farmers (smallholders). They grow a variety of food crops including maize, cassava and beans. Poor access conditions increase transport costs. It is difficult for smallholders to transport their agricultural produce by car and sell them at market places. As a result, smallholders have to wait for middlemen to come to their villages or they need to bring produce to nearby buying places by bicycle or on foot. Moreover, in order to satisfy cash needs, they have to sell part of food crops for their own family consumption.

Some smallholders grow cash crops, such as tobacco and cotton. On the other hand, in recent years, in the southern part of Niassa Province, where access conditions are relatively good because of its railway linkage, some smallholders grow sesame for export in the activities of agricultural associations. However, these kinds of cash cropping are still limited in number and to certain areas.

Agriculture is a major and important economic sector, which provides food and cash for the majority of people in the province. In Niassa Province, there is much room for improvement of agriculture in technical production and commercialization. Furthermore, agro-processing industries are expected highly not only to increase the demand for local agricultural produce, but also to increase non-agricultural employment.

In the northern part of Niassa Province, since 2005, industrial tree plantations have been increasingly developed by foreign investments. Harvesting of trees will start at those plantations around 2013. Those harvested wood and/or locally processed wood products would be exported to other regions. In the short term, they rely on road transport from Lichinga to Cuamba to get railway at Cuamba. In the mid and long terms, it is expected that the railway line between Cuamba and Lichinga could be rehabilitated so as to transport unprocessed wood or processed wood products to Cuamba and further to Nampula or to Nacala, sometime to Malawi.

In Niassa Province, Niassa Lake in the north-western area and Niassa Reserve in the north-eastern area have tourism potential. Lichinga, provincial town of Niassa, has beautiful streetscape due to Portuguese colonial legacy. Lichinga has development potential to be a base for tourist accommodation. Such tourism potential including tourist resorts, water sports, ecotourism and game hunting has been hardly exploited yet.

It has been known that the north-western area of the province has mineral resources including coal. However, high transport costs have hindered exploration and development of mineral resources.

2. Regional Development Measures for Promoting Synergy Effect of Trunk Road Improvement and Regional Development

(1) Corridor along Cuamba-Mandimba Trunk Road: Southern Part of Niassa Province

Smallholder Agriculture and Agro-Processing Industries

The upgrading and pavement project of Cuamba-Mandimba Road could reduce transport costs, as well as improve road access along the corridor. As a result, regional potential to commercialize smallholder agriculture and to expand their production would be enhanced. However, such road upgrading alone cannot realize the enhanced regional potential and achieve smallholder commercialization and production expansion. Therefore, it is necessary to assist in strengthening their agriculture associations and securing market channels for their produce.

The upgrading and integration of Cuamba-Mandimba Road with already upgraded Nampula-Cuamba Road would substantially reduce long-distance transport costs by truck so as to reduce goods prices imported from other regions.

It is considered that such smallholder commercialization and agricultural production expansion would increase business potential of agro-processing industries along the corridor. However, such road upgrading alone is not enough to exploit improved opportunities in agro-processing industries. It is essential to assist in not only feasibility studies but also business development services, for providing information and support to private sectors. Such measures would help private sectors to actually invest in the field of agro-processing.

Urban Economy and Logistics Function

The integrated upgrading of trunk roads of Nacala Development Corridor would vitalize regional economy along the corridor. This could promote geographical expansion of commercial catchments Nampula Town and Nacala Town, resulting in upgraded commercial agglomeration.

Similarly the inland towns, such as Cuamba Town and Mandimba Town, would expand their commercial catchments and increase demands for transport and logistics sectors.

In addition to the upgrading of Nampula-Cuamba-Mandimba Road, development of bypass roads, logistics centers and loading-unloading facilities between roads and railways would be necessary for making regional transport more effective and efficient by taking advantage of upgraded trunk roads and rehabilitated railway of Nacala Development Corridor.

(2) Periphery of Nacala Development Corridor: Central and Northern Parts of Niassa Province

Smallholder Commercialization and Production Improvement

Commercialization of smallholders in the periphery of Nacala Development Corridor would be encouraged by the road improvement between Nampula, Cuamba and Mandimba. Due to the reduced long-distance transport costs, the farmers would be able to sell their agricultural products at higher prices. As the economic activities in Nacala Development Corridor are vitalized with the trunk road improvement, populations of Cuamba Town and Mandimba Town would

increase. As a result, the amount of agricultural products to be dealt with by the middlemen would increase. Currently the support to the smallholder commercialization by organizing agricultural associations and by making linkage with marketing companies is provided in a limited number of villages in the southern part of the province. In order to make full use of the enhanced opportunities for smallholder commercialization, such support should be expanded to the central and northern parts. In addition, agricultural technical support should be introduced to improve their production.

Tourism Development

If the road between Nampula, Cuamba and Mandimba is improved, tourists visiting southern part of the Province from Malawi or Nampula by bus or car would increase. It is expected that Lichinga would be developed as a comfortable tourist base to provide accommodation to tourists, traveling along the route via Cuamba and Mandimba. Measures should be taken to improve the quality of tourism services in hotels, restaurants and car rentals, as well as to provide tourist information in Lichinga Town. Furthermore, efforts should be made to attract tourists to make trips from Lichinga to nearby tourist spots such as Niassa Lake and nature conservation areas.

In order to fully develop tourism in Niassa Province to such an extent that more international and domestic tourists would visit Niassa Lake and/or Niassa Reserve as popular tourist destinations, good access conditions should be ensured with improved Mandimba-Lichinga Road. In combination with the road improvement, it is necessary to make Lichinga Town an attractive tourist center, by providing small tourist-oriented facilities, such as tourist information centers, museums and sign boards. It is also necessary to start developing the capacity of local tourist industries by providing training programs. More tourist accommodations and attractions should be developed at Niassa Lake and Niassa Reserve. For facilitating tourism development at the provincial level and for promoting tourism in Niassa Province, it is also recommended to establish a local tourism board involving government and private sectors.

Development of Wood Processing Industry

Improvement of Mandimba-Lichinga Road is essential for promoting industrial development, such as wood-processing industries, in the central and northern part of Niassa Province. The road improvement would largely contribute to cost reduction of long-distance truck transport and furthermore to price reduction of imported goods, such as spare parts and fuels. This could lead to enhancement of basic conditions for attracting industries.

For actual promotion of wood-processing industries, business development services should be provided for foreign investors and companies. Furthermore, it is also necessary to develop small and medium scale enterprises (SMEs) of wood-processing for local employment generation.

Mineral Resources Development

The improvement of Lichinga-Mandimba Road is essential to realize mineral resources development in the north-western area of the province. Together with the road improvement, geological surveys and research is important to provide information on mineral resources availability to promote private investment in mineral exploration and furthermore in mineral exploitation. In the long term, rehabilitation of Lichinga-Cuamba Railway Line is highly expected for

transporting exploited mineral resources through Cuamba, Nampula and Nacala.

Improvement of Social Services

In addition to the above-mentioned economic development measures, the improvement of social services, such as water, education and health, as well as the improvement of local roads are very important for the regional development in the central and northern parts of Niassa Province. In the decentralization policy of Mozambique, budgets for the development are allocated to district governments, and they are supposed to play central roles in planning and implementation for local development. However, their capacity is limited. In order to improve social infrastructure and services, assistance programs for capacity development of district governments are necessary.

The Preparatory Survey on Road Improvement Plan in Nacala Development Corridor (N13: Cuamba-Mandimba-Lichinga) in the Republic of Mozambique

Final Report

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Abbreviation

AADT	Annual Average Daily Traffic
ACE	Competent Authority of Road Sector
ACV	Aggregate Crushed Value
ADT	Average Daily Traffic
AfDB	African Development Bank
ANE	National Road Administration
AU	Africa Union
BOO	Build Own Operate
BOT	Build Operate Transfer
BOOT	Build Own Operate and Transfer
CBR	California Bearing Ration
CDN	Northern Development Corridor
CFM	Mozambique Railway Authority
CLUSA	Cooperative League of the U.S.A.
COI	Corridor of Impact
COMESA	Common Market for Eastern and Southern Africa
DA	Directorate of Administration
DCP	Dynamic Cone Penetration
DIMAN	Directorate of Maintenance of ANE
DIPRO	Directorate of Project of ANE
DNEP	National Directorate of Roads and Bridges
DPANE	Provincial Delegation of ANE
DPOPH	Provincial Directorate of Public Works and Housing
DTI	Department of Trade and Industry
EAC	East African Community
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
ESCS	Environmental and Social Consideration Survey
EU	European Union
FDD	Full Due Diligence
FIP	Preliminary Information File
GAT	Cross Cutting Issues Unit (Environmental Unit in ANE)
GAS	Director of Assessor and Supervision Cabinet
GDP	Gross Domestic Product
GED	Cabinet for Development and Strategic Study
GOJ	Government of Japan
GOM	Government of the Republic of Mozambique
GPS	Global Positioning System
H.W.L	High Water Level
HDM-4	Highway Design and Maintenance Standards Model
HIV/AIDS	Human Immunodeficiency Virus /Acquires Immune Deficiency Syndrome
ICB	International Competitive Bidding
IDA	International Development Association
IND	National De-mining Institute
INE	National Statistics Institute
IRI	International Roughness Index
IRR	Internal Rate of Return
IUCN	International Union for the Conservation of Nature and Natural Resources
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency

MASL	Meter Above Sea Level
MCA	Multi Criteria Analysis
MCC	Millennium Challenge Corporation
MICOA	Ministry for Coordination of Environmental Affairs
MOAF	Ministry of Agriculture & Fisheries
MODP	Ministry of Development & Planning
MOIC	Ministry of Industry & Commerce
MOPWH	Ministry of Public Works and Housing
MOTC	Ministry of Transport & Communication
MTEF	Medium Term Expenditure Framework
NCB	National Competitive Bidding
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organization
NPV	Net Present Value
OSBP	One Stop Border Post
OD	Origin and Destination
PAC	Environmental Accompanying Plans
PAP	Project Affected Person(s)
PARPA	The Action Plan for the Reduction of Absolute Poverty
PEP	Provincial Strategic Plan
PES	Economic and Social Plan
PGA	Environmental Administration Plan
PPP	Public-Private Partnership
PRISE	Road Sector Integrate Program
RAP	Resettlement Action Plan
RECs	Regional Economic Communities
RED	Roads Economic Decision Model
RF	Road Fund
RMF	Regional Maximum Flood
ROW	Right of Way
RPF	Resettlement Policy Framework
RSS	Roads Sector Strategy 2007-2011
SADC	Southern African Development Community
SATCC	the Southern Africa Transport and Communications Commission
SAWPB	Semi Annual Workplan and Budget
SEA	Strategic Environmental Assessment
SDI	Spatial Development Initiatives
SISTAF	Ministries of Finance and Planning and Development in the Government's financial management system
SIDA	Swedish International Development Cooperation Agency
SMEs	Medium-scale National Entrepreneurs
SMP	Strategic Maintenance Plan
SPT	Standard Penetration Test
STD	Sexually Transmitted Disease
SWOT	Strength, Opportunity, Weakness and Threat
TMH	Technical Measures for Highways
TRH	Technical Recommendations for Highways
TOR	Terms of Reference
VEF	Vehicle Equivalent Factor
VOC	Vehicle Operation Cost
WB	The World Bank

Part VI Environmental and Social Consideration

Chapter 1 Environmental Legislation

1.1 Environmental Impact Assessment Law and Relevant Guidelines in Mozambique

1.1.1 Environmental Organization

In Mozambique, the approval of environmental impact assessment procedures is the responsibility of the Ministry of Environmental Coordination (hereinafter referred to as "MICOA"). The Ministry of Public Works and Housing manages the environmental standards and the Ministry of Agriculture oversees the protection of rare and endangered species.

The organization chart concerning environmental issues is as follows.

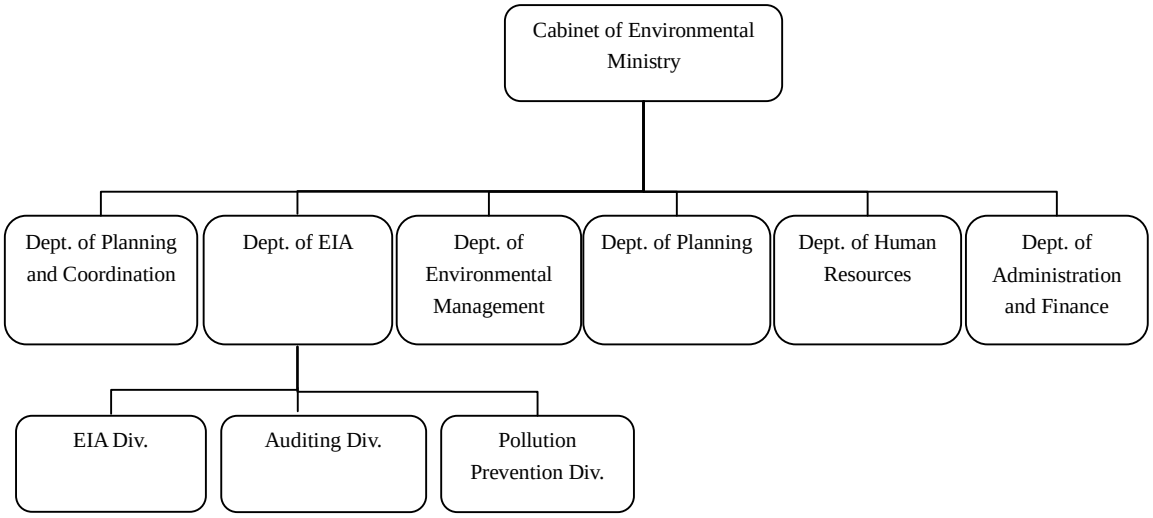


Figure 1.1.1. Organizations Concerned with Environmental Issues

ANE also has an environmental department named "GAT" which acts independently from the other Directorates.

1.1.2 EIA Legislation and Relevant Guidelines

(1) Major Laws and Regulations

There are fourteen laws in Mozambique regarding the environment. Seven regulations are shown in the table below.

Table 1.1.1 Major Laws and Regulations regarding Environment

Name of Law/ Regulation	Outline
Environmental Law, no.20/97 "Regulamento sobre o Processo de Avallacao do Impacto Ambiental", Ministerio para a Coordenação da Accão Ambiental, 2004"	No project can proceed to construction without approval from the Ministry of Environmental Coordination; such approval is based, inter alia, on approval of documents such as an environmental impact report.
Water Law (Lei no. 16/91 de 3 de Agosto de 1991)	Prescribes the management of fishery rights and aquatic resources in the Mozambique coastal area
Land Law (Lei no 19/97)	All land belongs to the government. Government can hand out land-use titles. Right of land-use is applicable to individuals and communities.
Hunting Regulation (Decreto no. 7/87 de 18 de Abril de 1987)	Prescribes measures for hunting
Forestry Regulations (Diploma Legislativo no. 2642 de 20 de Setembro de 1965)	Prescribes management of forestry resources
Cultural Heritage Law (Lei no. 10/88 de 22 de Dezembro de 1988)	Prescribes management and protection of cultural heritage
Regulation of Mines (Despacho de 18 de Maio de 1979)	Prescribes approval for the exploration of mines

Regulations for EIA in 2004 by project types are presented in Table 1.1.2. According to the table, construction of roads in rural areas will be classified as category "A" which requires a full EIA. However, it is considered that construction of immigration facilities does not require EIA in accordance with the following mandatory list.

Table 1.1.2 Project Definitions by Category

Category	Definition	Project Type and Scale
A	a) Sensitive area (International and domestic sensitive area to be protected) b) Area with potential for re-colonization c) High density residential area (Area where there may be significant adverse impacts on residents) d) Developed area where there may be conflicts between persons who are competing for natural resources e) Area which has drinking water resources f) Area which has rare natural resources such as water, mineral and medicated plants	1. Infrastructure Project a) Re-colony b) Construction of residential estates (exceeding 20ha) c) Tourism service and infrastructures (exceeding 150 beds or 10ha) d) Construction of camp site (exceeding than 650 persons or 5ha) e) Establishment of industrial estates and factories (exceeding than 15ha) f) Recreation services and infrastructures (exceeding 5ha) g) Construction of port/harbor (exceeding 50 ships) **h) <u>Construction of new section road except in urban area</u>** i) Construction of bridge (exceeding 100m) j) Construction of railway (exceeding 5km) k) Construction of water pipe (exceeding 0.5m diameter and 10km) l) Pipeline for oil, gasses and mineral resources or mineral resource (exceeding 5km) m) Construction of port and expansion of port (exceeding 4000GT) n) Construction of dam (exceeding 5ha watering area) o) Construction of drainage (exceeding 1m width and 10km) p) Project with pumping of water from underground (exceeding 500m3/hr or 12,000m3/day) q) Construction of canal connected port 2. Project in forest area 3. Agricultural projects 4. Industrial projects
B	Not exceed Category A	No specification
C	Projects which have few adverse impacts	**Construction of small-scale projects, factories** and so on (see detailed criteria in appendix)

With regard to Malawi side, Part V in the Environmental Management Act 1996 says, " A4.5 construction new road / widening of existing road of highway / rural road " requires EIA process. On the other hand, construction of immigration and custom facilities are not included in this mandatory list.

(2) EIA Guidelines

The GOM established "Environmental Guidelines for Road Works in Mozambique" for the road sector in 1997 at the same time as the establishment of environmental laws based on the World Bank's EIA guidelines. Additionally, the Ministry of Environmental Coordination prepared a document containing practical instructions named "Environmental Directive for the Roads Sector" in 2002. According to these guidelines, the following procedures are required for approval of environmental licenses before commencement of construction.

Generally the series of processes for an EIA approval takes 1-2 year(s) at least from the experience of Nampual-Cuamba road. This expected duration includes the procurement of environmental consultants and revision of documents in relevant organizations.

- Preliminary Information File (FIP)

- Contents of FIP

The Preliminary Information File is a standard form (see Annex IV in Environmental Directive for the Roads Sector) to assist in the understanding of the nature and the dimension of a project.

The Preliminary Information File has to be completed for all road rehabilitation projects. Only routine maintenance and periodic maintenance of unpaved roads are exempted. The information containing details for the FIP is to be compiled at the appropriate stage of the project.

The FIP is compiled by the Competent Authority in the Road Sector (hereinafter referred to as "ACE") or by a mandated consultant, and contains information available about the project in question and presents at least the following data:

a) Road identification (number and name)

b) Type of surfacing

c) Road starting and end point (to be shown on map of 1:250,000 scale)

d) Poles of development along the road

e) Social requirements for road

f) Traffic counts

g) Additional data such as "Possibilities of new alignments" and "Proximity to protected areas or sensitive habitats".

- Criteria for analysis of the FIP

The need for the execution of an EIA is described in general terms in Decree 76/98, more specifically in the following:

· Number 2 (reclamation of areas covered by indigenous vegetation, greater than 100ha),

· Number 13 (construction of new road alignments of unit cost greater than US$100,000 per km) and,

· Number 21 (sensitive or vulnerable areas).

➢ Environmental Impact Assessment (EIA)

The EIA establishes a number of recommendations and defines measures whose applications have the potential to expand with the passage of time. From this arises the need for the project to be closely monitored during the implementation phase, and for verification and adaptation, where necessary, of the proposed measures.

➢ Monitoring

Monitoring is intended to verify the impact of the project and the appropriate application of mitigation measures. Monitoring will be carried out by ACE, MICOA, specialized consultants and public institutions responsible for the environmental quality.

As part of the PGA (Environmental Management Plan) and PAC (Environmental Action Plan), a monitoring calendar will be elaborated to deal with each of the impacts. This calendar shall contain the following details:

a) The parameter to be monitored (what);
b) The responsibility for monitoring and the sample information to be collected and the indicated laboratories if testing is to be done (who and how);
c) The duration and periodicity of monitoring (for how long and when)

The correct execution of the PGA and PAC enhances the public image of ACE as an entity concerned with environmental protection.

➢ Audit

An environmental audit of the selected project is carried out to verify if it is being implemented in accordance with plan and if the specified mitigation measures have been effective for the necessary environmental protection.

An environmental audit permits:

a) Evaluation of the actual impact of the project;
b) Verification whether the predictions presented in the EIA have materialized;
c) Sanctions infractions and require coercive accomplishment of previewed measures in the EIA / PGA.

With regard to the Malawi side, “Environmental and Social Management Guidelines in the Road Sector” was published as guided procedures of EIA processes and reporting from the National Road Authority in July 2007. The process is shown in Fig.1.1.3, and generally this process takes 6 – 12 months inclusive of the procurement of environmental consultants.

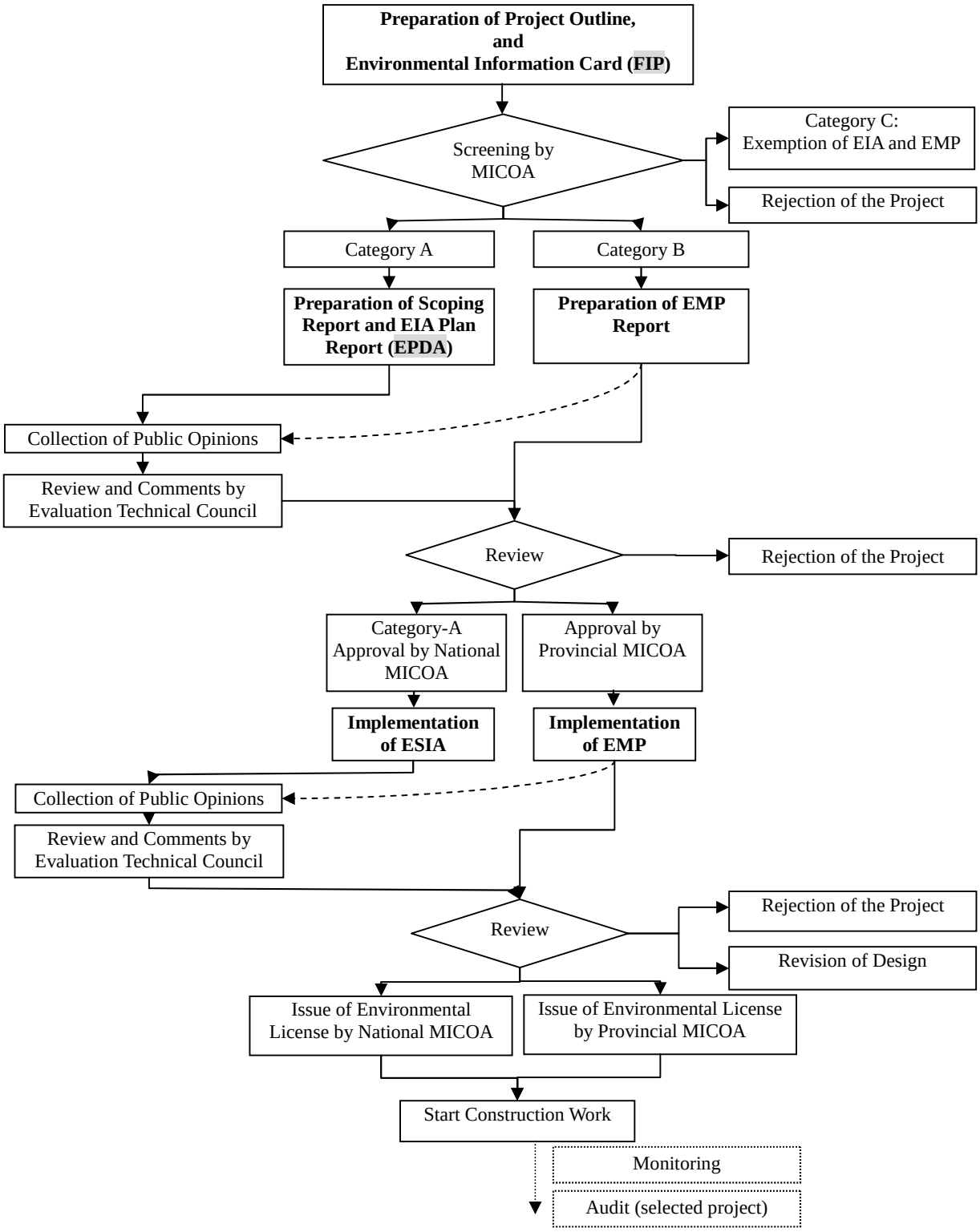
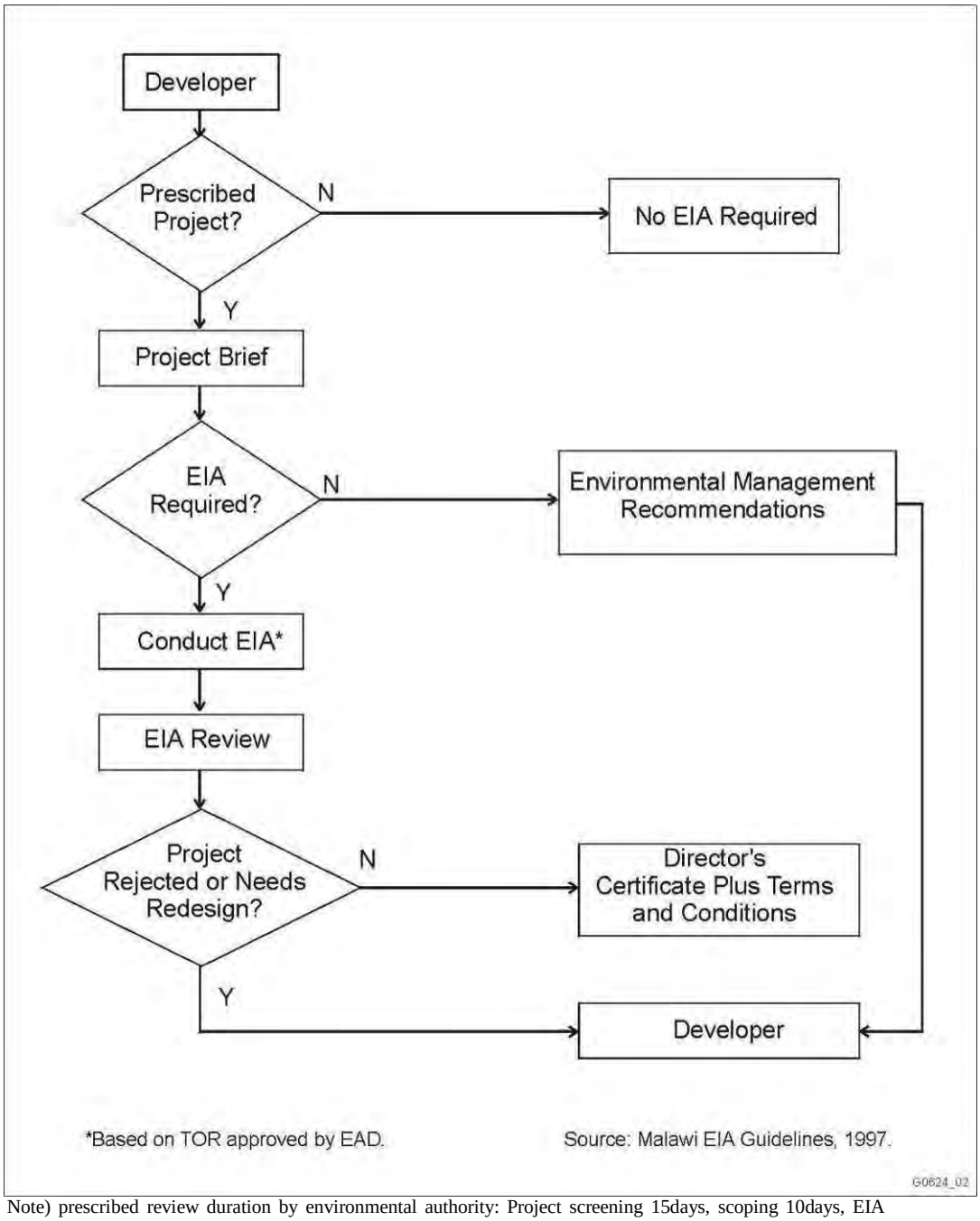


Figure 1.1.2 Law-Based EIA Approval Procedures (Mozambique)
Source: ANE GAT



Note) prescribed review duration by environmental authority: Project screening 15days, scoping 10days, EIA draft 50days, approval process 25 days

Figure 1.1.3 Law Based EIA Approval Procedures (Malawi)

Source: Environmental and Social Management Guidelines in the Road Sector/ National Road Authority 2009

1.2 Land Acquisition Law and Relevant Guidelines in Mozambique

1.2.1 Land Law

The current land law of Mozambique was established in 1997. This legislation covers regulation of the key aspects of land occupation and land use in Mozambique. Also covered in the legislation are the various scenarios of land acquisition, including among others:

a) The acquisition of the right of land use and benefit by customary occupancy,
b) The acquisition of the right of land use and benefit through the official channels;
c) The rules governing protection zones;
d) The relationship between the public and the Cadastral Services; and
e) The rights and duties of the title holders

Some of the Articles of relevance to construction projects are briefly described below:

Article 3 in the land law stipulates that land is the property of the government. This is also prescribed in Article 46 of the Constitution. Hence, land may not be sold, alienated, mortgaged or attached. The law stipulates that although land is owned by the government, all Mozambicans have the right to use land and benefit from it. Specifically, Article 9 provides for the acquisition of the right of land use and benefits by local communities; Article 10 provides for the right of land use and benefit by occupancy, in good faith, by national individuals.

And Article 18 stipulates in case of land acquisition "revocation of the right of land use and benefit for reasons of public interest, should be preceded by payment of fair indemnification and /or compensation"

The Mozambique Land Law Legislation, spelled out in Article 24, recognizes the rights acquired through the system of customary occupancy and the role of communities in the management of land, natural resources and conflict resolution. Article 27 provides for the requirements and modalities regarding consultation on land matters, with the local communities.

Article 30 dictates that the mechanisms for representation of and action by local communities, with regard to the rights of land use and benefit, shall be established by law; while Article 23 empowers District Administrators, to authorize applications for land use and benefit, in cases where there are no Municipal Councils.

The Land Law Legislation captures and observes internationally innovative features that facilitate equitable development, based on relations that are mutually beneficial to local communities and to investors whether these are national or foreign.

The Right of land acquisition (Article 86 of the new constitution of Mozambique) provides for individuals and entities to have the right to equitable compensation for expropriated assets and the right to a new and equal plot of land.

According to this article, the properties in question are assessed by nominated organizations and compensated by government. Generally, real estate (structures

and compounds) is assessed by Ministry of Public Works & Housing, and agricultural land and crops are evaluated by the Ministry of Agriculture.

Lastly the Land Law governs the right of way with the provisions of Chapter II Article 8 about Partial Protection Zones. The following are considered partial protection zones:

The land occupied by motorways and four lane highways, aerial, surface, underground and underwater installations and conduits for electricity, telecommunication, petroleum, gas, and water, including a bordering strip of 50 m on each side, as well as the land occupied by roads including a bordering strip of 30 m for primary roads and 15 m for secondary and tertiary roads. Generally the "bordering strip" is understood to be outside the shoulder of the road.

1.2.2 Resettlement Policy Framework (RPF) for the Road Sector

A resettlement policy framework (hereinafter referred to as "RPF") was established in November 2006 and is being translated into Portuguese by ANE with support from the World Bank. This RPF will be considered in all projects (starting from 2007) for carrying out the social impact assessment and preparing the Resettlement Action Plan (hereinafter referred to as "RAP").

The RPF has two basic objectives:

a) To provide a policy framework that will guide the preparation of any future Resettlement Action Plan for the road sector. The RPF is prepared based on the policies of the GOM and the World Bank.

b) To provide a framework for RAP for the three road sections to be rehabilitated namely Jardim-Benfica, Xai-Xai – Chissibuca and Massingue-Nhachengue . (The Resettlement Action Plan for the above three road sections has been prepared as a separate document)

This RPF establishes the general principles to be considered in preparation of RAPs. The RPF will be required whenever the final section and alignment of roads to be constructed, rehabilitated or maintained under the project are not precisely known. Once a segment of road is selected and designed, a detailed RAP will be prepared in order to guide land acquisition and resettlement activities of that particular section.

The RPF is intended to outline procedures for future road development activities to ensure that where acquisition of land and other assets, or impact on livelihood by the project activities is inevitable, resettlement and compensation activities for lost resources shall be conceived and executed in a sustainable manner. This entails providing for sufficient investment resources to meet the needs of the persons affected and/or displaced from their habitat and resources.

It also requires adequate a process of collaborative consultation and consensus building to achieve an agreement with the project-affected persons (hereinafter referred to as "PAPs") to ensure that they maintain or improve their livelihood and standards of living after the project.

Basically all activities relevant resettlement and compensation on this project will be carried out based on this RPF, accordingly ANE/GAT.

1.2.3 Present Resettlement Procedure

(1) Resettlement Procedure

The present land acquisition and resettlement process is as follows.

After preparation of a draft alignment of the proposed road project, a RAP should be prepared by the project proponent based on a preliminary survey and census. The identification of project boundaries and proposed land / property acquisition is issued in a declaration and based on the final road project. Assessment of the value of land / property affected is done by the Ministry of Agriculture and the Ministry of Public Works & Housing, and the project proponent negotiates with the affected owners and provides for the compensation scheme.

The project proponent can then start the intended project.

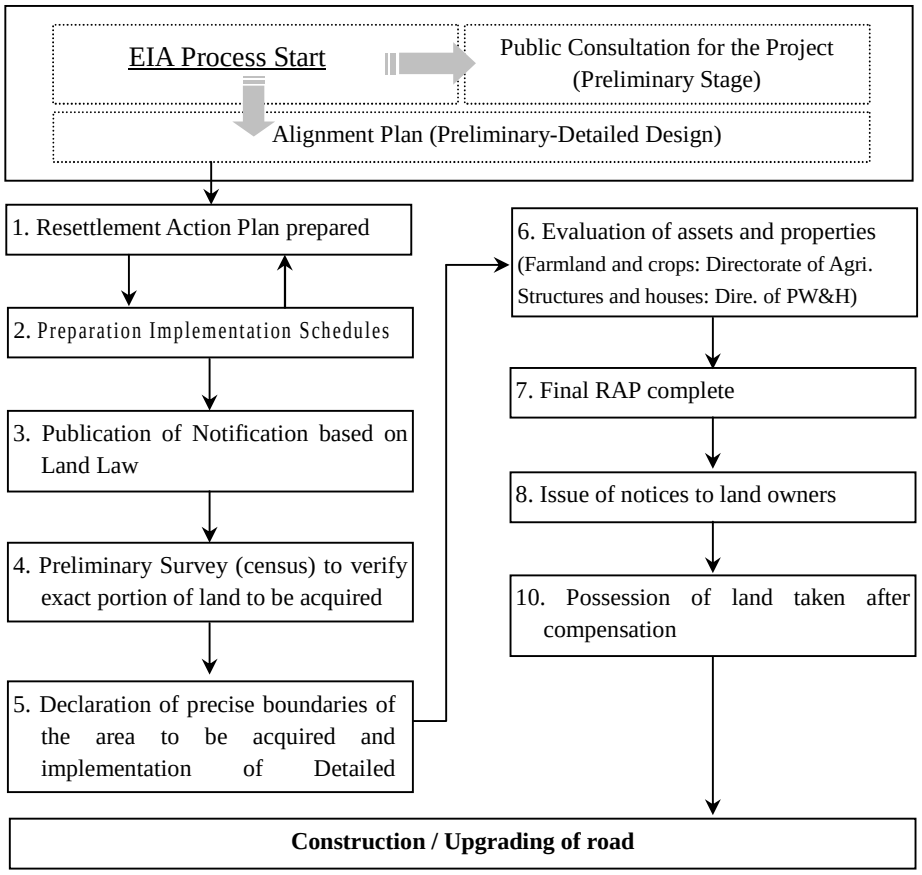


Figure 1.2.1 Land Acquisition / Resettlement Process
Source: Interview with ANE GAT

With regard to Malawi side, Public Roads Ordinance (1962) and Land Acquisition Law (1971) are bases for land acquisition and compensation. According to the National Road Authority, the safeguard policy of the World Bank is adopted as a resettlement guideline. Price of compensation such as buildings and crops is concluded in community's stakeholder meeting because most land in rural areas is

categorized as customary land.

(2) Assets Evaluation for Compensation

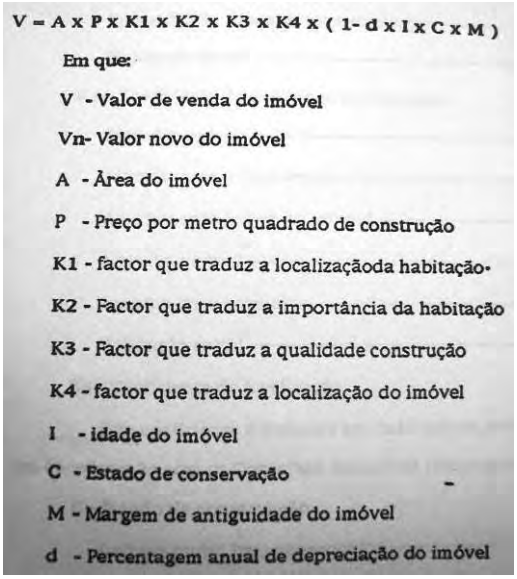
1) Prescribed Compensation Price

As shown in Figure 1.2.2, Directorate of Public Works and Agriculture is responsible for evaluating assets for compensation. According to interviews from them, although they have a common crop list for compensation, an authorized compensation list for structures does not exist at the moment. Additionally, since most structures are built using natural materials such as clay, timber, thatch and paint, cost estimation at market price is too difficult. Indeed, a local building company cannot estimate total cost for a typical house in the Study Area.

Therefore a calculating formula of the government's sale price is substituted for evaluation of structures. However this price is too low for the owners of structures due to sale price from the government to people. Thus some of coefficients in calculating formula are changed through stakeholder meetings between local authority and relevant communities. According to explanation from provincial public works, this calculating formula considers many factors. Therefore, a fixed compensation price is not announced from government at the moment.

However according to the RAP report of Nampula-Cuamba, the cost of a typical house is estimated 12,500Mtn approximately.

Table 1.2.1 Calculating Formula for Structures



V=A x P x K1 x K2 x K3 x K4 x (1-d x I x C x
A: Area of housing
P: Price per square meter of construction
K1: Factor that translate localization of residenc
K2: Factor that translate the importance of resid
K3: Factor that translate the quality of construct
K4: Factor that translate the localization of hous
I: age of housing
C: condition of preservation
M: Margin of antiquity of housing
d: Annual percentage of depreciation of housing

Source: Manual de avaliacao de imoveis do estado/ Miniterio das obras publicas e habitacao, Maputo 1995

Table 1.2.2 Estimated Compensation Price

Table 6-14: Cost of affected houses

Type of House	Total Units	Average Unit cost (MZM)	Total in MZM	Total in USD
Circular huts	1	5,000	5,000	200
Rectangular huts	226	12,500	2,825,000	113,000
Mixed Cement Blocks /Bricks/Corrugated Iron	15	91,000	1,365,000	54,600
Mixed Reed/Corrugated Iron	1	6,000	6,000	240
Conventional/Corrugated Iron Roof	4	38,500	154,000	6,160
Full Conventional Houses	1	2,700,000	2,700,000	108,000
Total	**248**		**7,055,000 MZM**	**USD 282,200**

Source: Resettlement Action Plan for EN13 from Nampula-Cuamba July 2009

With regard to crops, the prescribed price by Ministry of Agriculture and surveyed price in the RAP for Nampua-Cuamba Road is almost same.

These compensation prices are evaluated in consideration of market price and they are updated periodically by the Directorate of Agriculture. Furthermore, if PAPs are not satisfied with these prescribed prices, PAPs can negotiate in the SHMs, RAP phase. Although regional high-value crops are considered in asset evaluation, there are no such special crops in the Study Area according to the Directorate of Public Works and Housing.

According to the Directorate of Public Works and Housing in Niassa Province, most PAPs agree with the Government proposal price based on the prescribed compensation list and generally do not make complaints since there are sufficient alternative crop fields near roads.

Therefore it is considered that compensation prices for crops are reasonable at the moment.

Table 1.2.3 Compensation Price for Agricultural Product

Name of Fruit		Mtn/young tree	Mtn/adult tree
Cajueiros	Cashew	150	300
Mangueriras	Mango	75	175
Bananeiras	Banana	75	150
Citrinos	Citoron	150	300
Litcheria	Lychee	250	775
Pereiras/Abacateiras	Pear/Pineapple	150	250
Papaeriras	Papaya	75	150
Coquerios	Coconut	150	200
Goiaberias	Guava	75	175
Caramoboleira	Starfruit	100	250
Aterira	Sugar Apple	75	200

Name of Crop		Mtn/m2
Arroz	Rice	1.5
Milho	Maize	2
Mapira	Mapira	2
Amendoin	Almond	2
Grgelim	Sesami	3
Feijoes	Beans	2

Name of Crop		Mtn/young tree	Mtn/adult tree
Mandioca	Cassava	3	10
Batata doce	Sweet potato	10	
Batata reno	Irish potato	12	
Inhames	Yam	3	

Name of Crop		Mtn/m2
Algodao	Cotton	1.5
Ricino	Ricinus	1
Tabaco	Tabacco	-
Sisal	Sisal	-
Cana sacarina	Saccharine	

Source: Ministerio da Agricutura, Direcao Provincial Agricultura Tura de Nampula / Tabela de Custos de Curturas Alimentares Para Compensaxao de Colheitas

2) Case Example – Nampula-Cuamba Road in Nacala Development Corridor

RAP for Nampula-Cuamba Road has just been completed and approved by ANE. ANE will compensate people eligible for compensation before the actual construction activities. There are not any complaints at the moment in accordance with ANE.

Following are process and implementation schedule regarding resettlement and compensation which was described in RAP for Nampula-Cuamba Road.

Table 1.2.4 Gaps between JBIC Guidelines and Mozambique's Road Sector RPF

Phase	Description (in RAP for Nampula-Cuamba Road/ Approved in August 2009)
Phase I: RAP Preparation	To a great extent RAP implementation got underway in February/March 2009, when ANE and the topography and socioeconomic team started their work. ANE and the socioeconomic teams in particular started some level of dissemination and discussion of basic information with local people and authorities on road alignment, affected people/households, criteria for valuation of affected assets, general procedures to be followed by the resettlement process. It can be said that these activities covered the first phase of the RAP. Additional preparatory activities will include: ✓ Hiring of a Consultant by ANE to provide TA and overall implementation and management of the RAP. ANE will prepare TORs and carry out related procurement and final commissioning of this TA. This should be done as soon as possible in view of the fact that the Consultant will then be responsible for assisting ANE to get the other tasks downstream the process underway; ✓ Assisted by the Consultant ANE will carry out a preliminary identification of all stakeholders and stakeholder profiling as well as definition of roles and responsibilities and hiring of external

Phase	Description (in RAP for Nampula-Cuamba Road/ Approved in August 2009)
	goods and service providers to provide additional TA and other forms of assistance as required. The commissioning of addition assistance will be an ongoing process in line with the needs that will arise as RAP implementation progresses; ✓ Setting of the RAP Working Groups from the interprovincial level to the village/bairro/household level and establishment of the various subgroups; ✓ Conducting training needs assessment of the various stakeholders, namely: (a) the government entities at the district/municipal level, (b) community/household leaders and subsequent orientation sessions as well as training and capacity building and institutional strengthening to ensure that all role players understand their roles and responsibilities and have the necessary knowledge, skills and attitude to carry out their share of the RAP work. The main issues to be dealt with in this process are: (i) Project design and objectives; (ii) RAP general policy; (iii) Rights and entitlements of DPs; (iv) Institutions responsible for RAP implementation; (v) Confirmation of project schedule;(vi) Specific instructions to DPs to stop cultivation on the road's ROW and other implications of the project schedule on DPs; (vii) Land issues; (viii) Compensation, relocation, substitution; etc. (ix) System to present grievances and appeals ✓ Establishment of an effective management, administrative and reporting system. Development of all relevant working forms/templates such as: • household data sheets; • contracts with the DPs; • payment vouchers, • minutes of meetings and format/periodicity of reports. It is suggested that monthly reports be prepared and submitted by each management body to its immediately higher body (e.g. the district management body to the interprovincial steering committee). Basic issues to be covered should be as presented in subchapter 8.2.2; and • grievance redress system and respective tools, etc. and conducting additional training and capacity building as needed and identified; ✓ Develop and establish a communication strategy to be adopted by RAP Working Groups. As stated in subchapter 8.2.2 all means of communication should be used to foster the interests of the resettlement process, namely radio, TV, newspapers/bulletins, leaflets, letters, word of mouth, meetings (general meetings and focus groups discussions). The use of local languages should be given priority. ✓ Conduct monitoring activities. Activities under this phase should be carried out within 30 days (1 month) after the start.
Phase II: RAP Dissemination	The second phase will be the dissemination of information on RAP as such. Main activities include: ✓ Formal notification of all stakeholders of ANE's intention to acquire land and the need for resettlement and initial dissemination of RAP schedule; ✓ Through meetings, leaflets, word of mouth, etc. dissemination of RAP basic information to all stakeholders organized by main geographical areas (pre-established community/household clusters). The intention is to reach each and every affected household and other relevant stakeholders. The information should contain but not be limited to: • Project design and objectives; • RAP general policy; • Rights and entitlements of DPs • Institutions responsible for RAP implementation • Confirmation of project schedule; specific instructions to DPs to stop cultivation on the road's ROW and other implications of the project schedule on DPs; • Land issues; • Compensation, relocation, substitution; etc. • System to present grievances and appeals The most important meetings will be conducted by the Consultant on behalf of ANE. In those meetings DPs and other stakeholders can raise questions and get feedback. Minutes of each and every meeting will be prepared detailing (i) date and time; (ii) venue; (iii) list of participants (name, village/community, occupation, contact (physical address, phone, e-mail, etc.); (iv) main issues raised and feedback given; (v) matters arising. The Consultant will work on the issues raised in those meetings by bringing them into the RAP mainstream. It is also going to be the Consultant's responsibility to adequately file all the documentation to come out from these meetings. ✓ Conduct training and capacity building activities, in coordination with Labour Departments and NGOs like ADPP and other institutions devoted to vocational training;

Phase	Description (in RAP for Nampula-Cuamba Road/ Approved in August 2009)
	✓ Conduct monitoring activities. Activities under this phase should also be carried out within 30 days (1 month) after the start.
Phase III: Land Acquisition	There are mainly two types of land to be involved in this process, namely land for cultivation and other productive activities (tree plantation, livestock) and land for construction. Estimates made using aerial photographs indicate that around 100 ha of land for cultivation existing along the road will be lost and will need to be substituted by land of the same or better quality within acceptable distance from where the affected families will be living. The land to be lost and restored in this category is mostly concentrated in the districts of Nampula Rapale, Ribaué and Malema. This phase will mainly be characterized by: ✓ Continuous communication and dissemination of relevant information to all stakeholders, including communication of cut-off dates and community consultation/participation; ✓ Screening of potential relocation sites for housing, plant and animal production; ✓ Finalization of maps of the affected areas; ✓ Obtain land authorization and preparation of resettlement areas including different forms of preparation of host communities where applicable; ✓ Demarcation of authorized area to be affected ✓ Completion of household data sheets and final agreements with DPs: • Detailed impact of the project on the specific household; • Compensation rates for each type of impact • Date of delivery of entitlements. ✓ Signing of resettlement/compensation agreements/contracts with affected households/entities; ✓ Conducting/facilitation of traditional ceremonies for DPs to leave their areas and mainly their sacred places; ✓ Land preparation and construction of shared/community social amenities such as irrigation schemes, water supply, health, education, markets, etc. The restoration of markets should be given high priority in order to ensure that that there is no disruption to existing systems of supply and demand of essential goods and services. Consequently, a selected number of kiosks and other vending stalls should be restored at this stage and not necessarily at the fourth stage as will be the case of most other affected assets; ✓ Identification and commissioning of local contractors and artisans to carry out construction and substitution activities in relation to social and individual assets. As indicated in subchapter 6.3, households that have expressed preference to see their affected assets being substituted are distributed as follows: 3 in Cuamba, 5 in Malema, 1 in Nampula City, 10 in Nampula Rapale and 4 in Ribaué. As also stated this distribution may change over time. Construction works should be supervised by competent entities (NGOs/private entities) hired specifically to do so; Also construction of some school and health centre´s buildings that will become too close to the road, markets, new or rehabilitation of water supply systems, shall be included in this activity; ✓ Identification, training and commissioning of local people to prepare seedlings as part of tree restoration. As suggested this could be used as an opportunity to develop new habits in relation to trees, such as deliberate planting as opposed to relying on natural forces, introduction of new and improved varieties, etc. This will require a certain level of resource allocation; ✓ Verification and handling of grievances; ✓ Conduct training and capacity building as well as monitoring activities. ✓ Conduct monitoring activities. Activities under this phase should be carried out within 60 days (2 months) after the start.
Phase IV: Delivery of Entitlements (Resettlement/Compensation)	✓ Continuous communication and dissemination of relevant information to all stakeholders and community consultation/participation as well as training and capacity building as needed and identified; ✓ Delivery of agreed entitlements and obtain signed confirmation of satisfactory delivery from resettled/compensated families and institutions. Entitlements include: • Land for various uses to the affected households after demarcation and initial preparation. As stated it is expected that around 100 ha of land will be affected and subsequently handed over to the affected families. The land is not equally distributed among the 507 families as a significant proportion does not stand to lose any of such land; • Distribution of seeds and seedlings to restore agricultural production; • Cash. In general the project area does not have financial institutions and most of the people are not familiar with bank operations, which explain that most of the cash will be paid

Phase	Description (in RAP for Nampula-Cuamba Road/ Approved in August 2009)
	directly to the DPs as a once off operation. Where bigger amounts are involved the use of financial institutions and cheque and/or bank transfers should be explored. It is to be expected that the wealthier families will have ties with these institutions. The household data sheets should determine which families have bank accounts and which do not have and ascertain their preferred payment option in terms of receiving cash or bank payment; • Transport; • Substituted infrastructures; • Training and capacity building focusing mainly on livelihood restoration (e.g. plant and animal production); • Social infrastructures to be handed over to local public and/or community entities ✓ Verification and handling of grievances; ✓ Conduct monitoring activities. Activities under this phase should be carried out within 60 days (2 months) after the start.
Phase V: Post Resettlement Activities and Monitoring and Evaluation	The fourth phase will be made of post resettlement activities including monitoring and evaluation and the final evaluation. As it is well known restoration of household and community life cannot be accomplished in 4-6 months of the duration of the RAP core activities. It is a long term process that may take years to reach certain level of stability. This is the main reason for embracing a process that should be, as much as possible, well aligned with local development plans at the same time that can be managed by local entities in a sustainable way. Some of the post resettlement activities include: ✓ Assisting resettled households to normalize and where possible to improve their productive systems in areas such as tree plantation, plant and animal production; ✓ Food assistance to families that for some reason might not have re-established their production base. The reestablishment of the productive base should be monitored closely in the first weeks after resettlement in order to identify possible pockets of food insufficiency and introduce emergency assistance. In order to avoid food dependence this component should be handled carefully and only be brought in after confirming that other self sustaining survival schemes have temporarily failed; ✓ Reestablishment of local markets; ✓ Reestablishment of social services and access to those services in areas such as education, health, water supply and sanitation. ✓ Verification and handling of grievances; Government departments at district and local levels should be given specific tasks and action programs to assist in these important areas of life restoration and be equipped with the necessary systems and tools to monitor and evaluate progress. Capacity building and institutional strengthening of the government departments, to be carried out by the Consultant and contracted NGOs, should also prepare them to carry out these tasks. Due to the importance of RAP monitoring and evaluation, the proposed process is described in the following chapter (Chapter 11 in RAP / Nampula-Cuamba Road). Activities under this phase should be carried out on a medium to long term basis. The first period of medium term duration starts soon after completing “delivery of entitlements” and lasts for six months and the second phase thereafter for a period of 2 to 5 years.

Source: Resettlement Action Plan for the EN 13 Road from Nampula to Cuamba, July 2009

Additionally following items shall be compensated though stakeholder meetings based on evaluated price by the Directorate of Agriculture and Public Works.

Table 1.2.5 Compensated Items in Entitle Matrix

Type of Los	Compensation Type
Loss of physical assets (domestic and business infrastructures)	✓ Cash compensation to rebuild lost assets ✓ Substitution of lost assets for ✓ Relocation of the lost assets * The prices of houses and other infrastructure provided in this report are average direct costs and were directly negotiated with the affected people/entities during the socioeconomic survey
Loss of trees, mainly fruit trees	Cash compensation for loss of fruit trees * The trees were valued using the price list provided by the Provincial Directorate of Agriculture (DPA) in Nampula

Type of Los	Compensation Type
Loss of standing crops and use of land for agriculture	Families will be timely advised to not cultivate in that area in order to not incur in losses. Lost land will be substituted by land of the same or better value.
Loss of sacred places	Cash compensation and to relocate remains of buried people to new sites and to rebuild lost assets

Source: Resettlement Action Plan for the EN 13 Road from Nampula to Cuamba, July 2009

(3) Comprehensive Comparative Table between RPF and JBIC Guidelines

This is comprehensive comparative table between RPF and JBIC Guidelines.

According to following comparative table, it is confirmed that these guidelines do not have significant gaps.

Table 1.2.6 Gaps between JBIC Guidelines and Mozambique's Road Sector RPF

	JBIC Guidelines (April, 2002)	Road Sector RPF (2006)
Provision of support for illegal occupants	People to be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported by the project proponents, etc. in timely manner. (Compensation shall be done for illegal occupants)	**RPF's description satisfies the conditions of JBIC's Guidelines.** See "5.3 BENEFICIARIES ELIGIBILITY CRITERIA" (a) Persons with homes, farmland, structures or other assets within the proposed road reserve or way leave of any infrastructure proposed for construction or rehabilitation These criteria do not describe illegal or legal occupants. Thus all persons with assets are compensated.
Compensation by reacquisition price	JBIC also uses, as reference points or benchmarks, examples of standards and/or good practices regarding environmental and social considerations established by international and regional organizations and developed countries such as Japan. (The government / proponent shall compensate at full replacement cost, not current appraisal price)	**RPF's description satisfies the conditions of JBIC's Guidelines.** See "7.3.6 Compensation for Buildings and Structures" and "APPENDIX 5.1 Entitlement Matrix for Various Categories of PAPs "in RPF. And "APPENDIX 5.1 Entitlement Matrix for Various Categories of PAPs" mentions as follows; Category of PAP: Property Owners Type of Loss: Loss of Structures Residential or Business Compensation for Loss of Structures: Compensation at full replacement value (not depreciated) Compensation for Loss of Land and other Assets: (Fences block work, wire and wood) , Walls, Stores, Wastewater facilities, Connections to utilities and Access roads Compensation for Loss of Income/Livelihood: For lost income from rented property, make a lump sum cash payment of agreed number of months of rental per tenant
Consideration for vulnerable groups	Appropriate consideration must be given to vulnerable social groups, such as women, children, the elderly, the poor, and ethnic minorities, all of whom are susceptible to environmental and social impact and who may have little access to the decision-making process within society.	**RPF's description satisfies the conditions of JBIC's Guidelines.** See "4.0 ESTIMATED POPULATION DISPLACEMENT AND CATEGORIES OF AFFECTED PEOPLE" and "5.3 BENEFICIARIES ELIGIBILITY CRITERIA" in RPF.
Restoration Planning	The project proponents, etc. must make efforts to enable the people affected by the project, to improve their standard of living, income opportunities and production levels, or at least to restore them to pre-project levels.	**RPF's description does not satisfy the conditions of JBIC's Guidelines.** Definition of " Rehabilitation Assistance " is explained in "12 Rehabilitation of Assistance / page xii" in RPF See other related articles "9.1 RESETTLEMENT ACTION PLANS", "13.0 ESTIMATED BUDGET" in RPF. Although a definition of rehabilitation assistance is

	JBIC Guidelines (April, 2002)	Road Sector RPF (2006)
		explained in RPF, there are not any detailed descriptions. Thus all items which are required shall be filled in the RAP survey as required. * Definition of Rehabilitation Assistance Rehabilitation Assistance" means the provision of development assistance in addition to compensation such as land preparation, credit facilities, training, or job opportunities, needed to enable project affected persons to improve their living standards, income earning capacity and production levels; or at least maintain them at pre-project levels.

1.3 Comparison with other EIA Guidelines

When comparing the content of JICA's guidelines and the requirements of MICOA, no significant differences have been identified, except for social aspects. In addition, JICA makes reference to a Strategic Environmental Assessment (SEA), which MICOA does not mention. A full comparison is provided below in the next table:

Table 1.3.1 JBIC and Mozambique's EIA Guidelines -A Comparison of Requirements

Item	JBIC Guidelines	Mozambique
Potential	Direct and indirect	Direct/indirect, magnitude and timeframe
Affected Area	Environmental impacts on a trans-boundary or global scale, e.g. global warming	Project-related impacts
Target Items	[Social Environment] Involuntary resettlement, Local economy, employment and livelihood, Land use and local resources utilization, Existing social infrastructures and services, Local communities, Benefit and damage misdistribution, Gender, Children's rights, Cultural heritage, Local conflicts of interests, Public sanitation, Infectious diseases such as HIV/AIDS, Water usage and rights, Traffic accidents	Human Environment Socio economic activity, land acquisition and resettlement, cultural heritage, vehicle and traffic noise, aesthetic and landscape, road safety
	[Natural Environment] Global warming, Biota and ecosystems, Geographical features, Soil erosion, Underground water, Hydrological situation, Coastal zone (mangroves, coral reefs, tidal flats, etc.), Climate, Landscape	Natural Environment Fauna, Flora and ecosystem
	[Pollution] Air pollution, Water pollution, Soil contamination, Waste, Noise and vibration, Ground subsidence, Offensive odors, Bottom sediment in sea and rivers	Physical Environment Soil and erosion (erosion, stability of slopes, excessive water flow, soil contamination), water (surface water, groundwater, water quality), air (health, smoke, smell, dust)

Source: JBIC EIA Guidelines, Mozambique's Environmental Impact Assessment Guidelines for Road Sector

Chapter 2 Screening and Scoping for Environmental and Social Consideration

2.1 Project Outline

The project road alignment will follow an existing road basically. Additionally, other structures and facilities such as drainage, bridges and culverts will be constructed on the same alignment. It is further expected that all of the existing gravel road will be paved.

The major concepts of design are as follows:

The upgrading of the Study road will essentially satisfy the geometric standards of SATCC for road safety; however, it is clearly important that the negative impacts on the social and natural environmental aspects be minimized. Accordingly, the following concepts of re-alignment were accepted through discussions between ANE and the Study Team.

- The existing centerline shall be followed in the towns and major villages to minimize of the necessity of resettlement
- Other sections shall satisfy the SATCC Standards but should as much as possible take into account the existing centerline
- Bridges considered to be in good condition shall be used with a view to minimize the initial capital costs
- Basically two design speeds, 100km/hr for Cuamba-Mandimba in flat areas and 80km/hr for Mandimba-Lichinga in mountainous areas were adopted to reduce the cost and for environmental reasons.

Major project's activities are shown in following table.

Table 2.1.1 Project Outline

Project Name	Road Improvement Plan in Nacala Development Corridor (N13: Cuamaba-Mandimba-Lichinga)
Major Activities	Type of Project: Road improvement (re-alignment, widening 10m with tow carriage way and pavement, app. 2m embankment and 5m for construction area) Road Distance : 302km (Cuamba-Mandimba 296km, Mandimba- Malawi border 6km) Design Speed : 100km (Cuamab-Mandimba), 80km (Mandimba – Lichinga), 60km (Mandimba, Masangulo and Lione Town) Planned Traffic Volume: 7,000 – 8,000 vehicles a day
Other Activities	Construction of border facilities in Mandimba (One Stop Border Post)

2.2 Screening based on the relevant EIA Laws and Guidelines

This road improvement project requires full-scale EIA in accordance with following EIA laws and guidelines.

Full-scale EIA is required in many laws and guidelines as shown in the following table.

Table 2.2.1 Requirements for Full-Scale EIA

Title of Laws or Guidelines	Requirement of full scale EIA
Mozambique EIA Guidelines	Construction of new section road except in urban area, and upgrading
JBIC Guidelines	Upgrading more than 5km road and 50 households resettlement
JICA EIA Guidelines	The project gives serious impact to social and natural environment
AfDB EIA Guidelines	Large-scale roads and railways construction, upgrading and major rehabilitation
Malawi EIA Guidelines	Construction new road / widening of existing road of highway / rural road

Other relevant EIA guidelines are shown in the next table.

According to JBIC, JICA and AfDB guidelines, detailed EIA is required for this project.

Table 2.2.2 Criteria for Identification of EIA Category

Law or Guidelines	Category Criteria	Tentative Result of Screening
1. Mozambique's EIA Law	Category A: Req. EIA New road construction in rural area Sensitive area (more than 50ha felling), infrastructure, agricultural, industrial development projects Category B: Req. ESCS (EAS): Minor impacts expected than Category A) Category C: no ESCS/EIA required: (Few to no impacts expected)	According to MICOA, ANE (GAT), the project will be classified as typeA
2. Japan Bank for International Cooperation's Environmental Guidelines	Category A: Req. EIA Major impacts projects (road projects; 4 carriage ways or exceeding 10km distance), significant impacts for social and natural environment (the number of resettlements, sensitive habitats) Category B: Req. ESCS (EAS): Minor impacts project than Category A Category C: no ESCS/EIA required: Few to no impacts expected	Category A (The projects likely to have significant adverse impact on the environment)
3. JICA's Environmental and Social Consideration Guidelines	Category A: Req. EIA Major impacts projects Category B: Req. ESCS: (Minor impacts expected than Category A) Category C: no ESCS/EIA required: (Few to no impacts expected)	Category A (according to the past project, Nampula-Cuamba Road screening)
4. African Development Bank's Integrated Environmental and Social Impact Assessment Guidelines	Category 1: projects require a full ESIA, including the ESMP These projects are likely to induce important adverse environmental and/or social impacts that are irreversible, or to significantly affect environmental or social components considered sensitive by the Bank or the borrowing country. The ESIA examines the project's potential beneficial and adverse impacts, compares them with those of feasible alternatives (including the "without project" scenario), and recommends any measures needed to prevent, minimize, mitigate or compensate for adverse impacts and to enhance environmental and social project benefits. Category 2: projects require the ESMP These projects are likely to have detrimental and site-specific environmental and/or social impacts that are less adverse than those of Category 1 projects and that can be minimized by the application of mitigation measures or the incorporation of internationally recognized design criteria and standards. Category 3: projects require no impact assessment These projects shall involve no adverse physical intervention in the environment and induce no adverse environmental or social impact. Beyond categorization, no further ESA action is required for this category of project.3 Category 4: projects involve investment of Bank's funds through Financial Intermediaries (FIs) in subprojects that may result in adverse environmental and/or social impacts. FIs include among others banks, insurance and leasing companies, and investment funds that on-lend Bank's funds to small and medium size enterprises (refer to the Glossary). FI	According to AfDB in Maputo, the project will be classified as a Type 1 project (requiring detailed EIA)

Law or Guidelines	Category Criteria	Tentative Result of Screening
	responsibilities under the ESAP are outlined in Annex 6	
5. Malawi EIA Law	The Part V in Environmental Management Act 1996 describes, "A4.5 construction new road / widening of existing road of highway / rural road" is required EIA process. On the other hand, construction of immigration and custom facilities are not included in this mandatory list.	Required EIA (Bypass and winding section)

2.3 Analysis of Alternatives

2.3.1 With Project

Alternatives for new alignments are generally considered from the view of required geometric structure, economy and environment. With regard to alignment, all important social facilities such as cemeteries, religious facilities, schools, health centers and wells are identified in the site survey and basically avoided in the new alignment. Additionally, bypass routes are analyzed in some sections which have traffic accidents at cross points with railway from the view of social environment. In Cuamba Town – Malawi Border section, adoption of bypass route will reduce number of resettlements. Furthermore, sidewalk space is considered in cross section design for traffic safety.

Concrete analysis is given in "Volume-2 Part III Preliminary Engineering Design".

2.3.2 Without Project (Zero-Option)

The 'without project scenario (Zero-option)' will not cause any adverse environmental impact since there is no congestion now. However, economic growth may be stagnant and levels of absolute poverty may grow as a result of this.

2.4 Scoping for Full-scale EIA based on JBIC Guidelines

Item for scoping were picked up from the JBIC guidelines.

Affected activities, items and degree of adverse impacts are shown in the scoping matrix. Categorized items rating "A" and "B" are analyzed in this environmental and social consideration survey in the feasibility study due to considerable impacts.

However, all items shall be surveyed and analyzed in the EIA which will be carried out by ANE because this preliminary design and alignment may be revised in detailed design stage in the future.

Table 2.4.1 Scoping for Full-scale EIA

	No.	Affected Activities / Impact Item	Overall Rating	Planning Phase		Construction Phase							After Construction		
				Land acquisition and loss of properties	Change of land use plan, Control of various activities by regulations for the construction	Reclamation of wetland, etc.	Deforestation	Alteration to ground by cut land, filling, drilling, tunnel, etc.	Operation of Construction Equipment and Vehicles	Construction of Roads, tollgates, parking lots, Access roads for bridges and other related facilities	Traffic restriction in construction area	Influx of construction workers, construction of base camp	Increase of Through Traffic	Appearance/ Occupancy of roads and related building structures	Increasing influx of settlers
Social Environment	1	Resettlement	A	A											
	2	Local economy such as employment and livelihood, etc.	C												
	3	Land use and utilization of local resources	B	B		B	B								B
	4	Social institutions and local decision-making institutions	C												
	5	Existing social infrastructures and services	B	B											
	6	The poor, indigenous and ethnic people, gender and children rights	C	C											
	7	Misdistribution of benefit and damage	C												
	8	Cultural heritage	B	B											
	9	Local conflict of interests	B									B			
	10	Water usage or water rights and rights of common	B					B							
	11	Sanitation	C												B
	12	Hazards (risk) Infectious diseases such as HIV/AIDS	B									B			B
Natural Environment	13	Topography and geographical features	C												
	14	Soil erosion	B					B							
	15	Underground water	B					B							
	16	Hydrological situation	B					B		B					
	17	Coastal zone	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	Flora, fauna and biodiversity	B					B	B				B	B	B
	19	Meteorology	C												
	20	Landscape	C												
	21	Global warming	B				B						B		
Pollution	22	Air pollution	B						B				B		
	23	Water pollution	B			B		B		B		B			B
	24	Soil Contamination	C												
	25	Waste	B				B	B				B			B
	26	Noise and vibration	B						B	B			B		
	27	Ground subsidence	C												
	28	Offensive odor	C												
	29	Bottom sediment	C												
	30	Accidents	B						B		B		B		B

Rating:

A: Serious impact is expected, B: Some impact is expected, C: Extent of impact is unknown (**serious impacts are not expected, but detailed survey and analysis shall be done in ANE's EIA**)

No Mark: Few impacts are expected. Detailed quantitative survey is not necessary.

Analyzed items in this environmental and social consideration survey

Some key issues are indentified from the view of environment and social considerations in above table.

Main reasons for rating in each item, and recommended methodology of survey in this environmental and social consideration survey in the feasibility study are shown in the following table.

Table 2.4.2 Main Reason of Rating and Survey Methodology

	No	Target Item	Main Reasons of Rating for A and B	Methodology of Survey
Social	1	Resettlement	Realignment and securing of construction area may cause loss of buildings and properties such as crops. More than 50 households may be relocated.	Preliminary RAP based on the preliminary alignment in the feasibility study and detailed RAP in the detailed design shall be prepared by ANE. Quantitative survey based on aerial photograph should be carried out.
	3	Land use and utilization of local resources	Realignment and securing of construction area may cause loss of properties such as crops and forest.	
	5	Existing social infrastructures and services	Realignment and securing of construction area may affect to schools, health centers, power line and water supply facilities.	
	8	Cultural heritage	Realignment and securing of construction area may affect historical heritage, graveyard, sanctuary and religious facilities along the road.	
	9	Local conflict of interests	Candidates of construction workers may have conflict with each other.	
	10	Water usage or water rights and rights of common	Realignment and securing of construction area may affect wells along the road. Additionally, construction earthwork may cut underground water veins during construction.	
	12	Hazards (Risk) Infectious diseases such as HIV/AIDS	Influx of construction workers may affect inhabitants during construction. Human migration may also raise risks of infectious disease such as STDs during and after construction.	Literature review
	14	Soil erosion	Road embankment may cause soil erosion during and after construction.	Literature review and site visual survey
Natural	16	Hydrological situation	Reconstruction of bridges may affect hydrological situation	Site survey and literature survey for hydrological situation and basin
	18	Flora, fauna and biodiversity	According to some specialists, some elephant migration routes may be crossing the road in Mandimba district. Construction of road and bridges with high embankment and increase of traffic volume may affect the corridor during and after construction.	Literature and interview survey from Niassa Province, WWF, IUCN and relevant specialists. Interview from inhabitants regarding elephant corridor every 10-20km on the road.
	21	Global warming	Greenhouse gases will increase in conjunction with traffic volume after construction.	Forecast impacts from vehicles in the future
	22	Air pollution	Air quality such as density of SO2, NO2, CO and SPM will increase in conjunction with traffic volume after construction.	Quantitative site survey by PTIO method in cooperation with JICA Study Team

	No	Target Item	Main Reasons of Rating for A and B	Methodology of Survey
Pollution	23	Water pollution	Organic polluted water will be discharged from the construction base camp, and waste oil may not be treated and managed appropriately during construction. Urbanization as a result of road improvement will cause water pollution without water treatment facilities after construction of the road.	Water place in rivers and wells along the road are identified by visual survey and GPS measurement.
	25	Waste	General solid and liquid waste generated from construction base camp, and construction waste may not be treated and managed appropriately during construction. Urbanization as a result of road improvement will cause waste management issues after construction.	Confirmation of waste treatment system in the village.
	26	Noise and vibration	Construction noise and vibration will be caused from machines during construction. Traffic noise will increase in conjunction with traffic volume after construction.	Traffic sound level (dB(A)) should be measured along the road, Lichinga, Mandimba and Cuamaba towns.
	30	Accident	Current dangerous points and alignment will be improved.	Confirmation of number of accidents and critical places in the Study area

Chapter 3 Environmental and Social Consideration Survey

3.1 Outline of the Survey

3.1.1 Objectives

The Environmental and Social Consideration Survey (ESCS) is a preliminary study carried out to analyze alternative plans, a prediction and assessment of environmental impacts, preparation of mitigation measures and a preparation of monitoring plans on the basis of secondary data and simple field surveys.

The objectives of such an ESCS are as follows:

- Before starting the environmental and social activities under Mozambique's EIA law, the proponent should assess the current status of the project site, possible impacts, required approval procedures and other relevant issues.
- The proponent should describe the required mitigation measures based on ESCS results, or adopt alternatives for the project including the option "without the project."
- The proponent should conduct an environmental and social baseline survey through a scoping report based on the ESCS.
- To support items and technical matters which are not covered by Mozambique EIA guidelines (Quantitative pollution surveys)

3.1.2 Target Items for the ESCS

An ESCS is carried out based on reconnaissance visits of the project site and by literature studies. Items to be considered for the ESCS are as presented below in Table 3.1.1

Table 3.1.1 ESCS Items

Item	
1) Social Environment	a). Resettlement b). Land use and local resources utilization c). Existing social infrastructures and services d). Cultural heritage e). Local conflicts of interests f). Water usage and rights g). Infectious diseases such as HIV/AIDS
2) Natural Environment	h). Soil erosion i). Ground water j). Hydrological situation k). Flora, fauna and biodiversity l). Global warming
3) Pollution	m). Air pollution n). Water pollution o). Waste p). Noise and vibration q). Accident

3.1.3 Results of Environmental and Social Consideration Survey

(1) Outline of the Survey

The ESCS for the Study Road has been carried out by ANE in cooperation with the Environmental Specialists of the JICA Study Team, and included the following activities.

Table 3.1.2 ESCS Outline

	Items
Data and Time Table	[13th –15th May, 2009] ▪ Interviews at district offices (Lichinga, Ngauma, Mandimba and Cuamba) [18th –19th May, 2009] ▪ Interviews at Directorate of Education, Tourism, Health and MICOA [1st – 2nd September, 2009] ▪ Interviews from Elephant Specialists(NGOs and Government's Organizations) [4th – 5th , 8th September, 2009] ▪ Resettlement Survey (Rough counting in right of way) ▪ Interview Survey regarding elephant from inhabitants [9th – 19th September, 2009] ▪ Environmental Survey (Air quality, Noise and water rights) [21st – 25th September, 2009] ▪ Literature Survey in Lichinga

(2) Current Environmental and Social Aspects

The current environmental and social aspects of the Study road as identified through the ESCS can be summarized as follows:

1) Social Environment

a) Resettlement

The target road is called the N13 (National Road 13), and it passes through Cuamba Municipality, Cuamba District, Mandimba District, Lichinga Municipality and Lichinga District. All municipalities and districts are located in Niassa Province.

As described in Article 6.1.2 Land Law, the Right of Way (ROW) for national roads extends to 30m outside the shoulders of the existing roads, on each side.

According to a reconnaissance survey, done while driving, there is a total of approximately 5,800 structures. Most of structures are permanent and built by natural materials such as clay, bricks and a thatched roof. Kiosks which are observed in Nampula-Cuamba section are not located between Cuamba and Lichinga because there are no passenger trains in this section.

Furthermore, preliminary stakeholder meetings were held in the Study Area by ANE with support from the JICA Study Team. During such meetings ANE explained to the stakeholders that the GOM will compensate any property such as structures and crops in case this would be required for resettlement and land acquisition purposed.

According to rough counting survey in ROW and Namula- Cuamba Road case, the project activities will affect 10% of structures in ROW at least.

Detailed quantitative impact forecast is given in 3.1.1 as one of key issues.

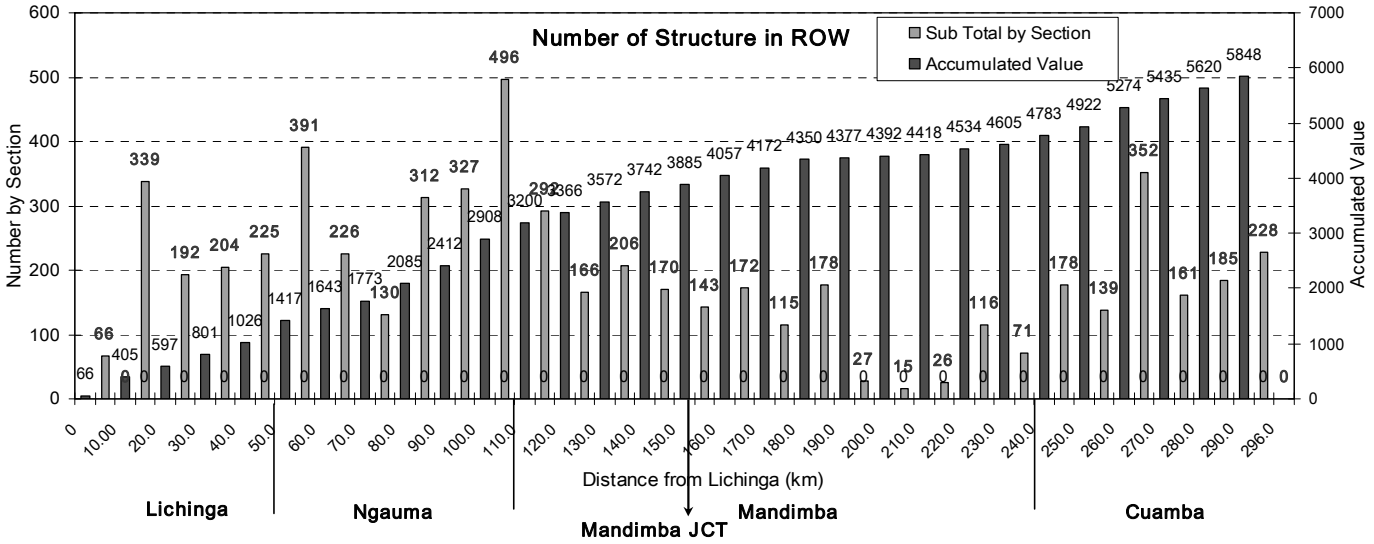


Figure 3.1.1 Number of Structures in Right of Way

Source: JICA Study Team

b) Land Use and Local Resources Utilization

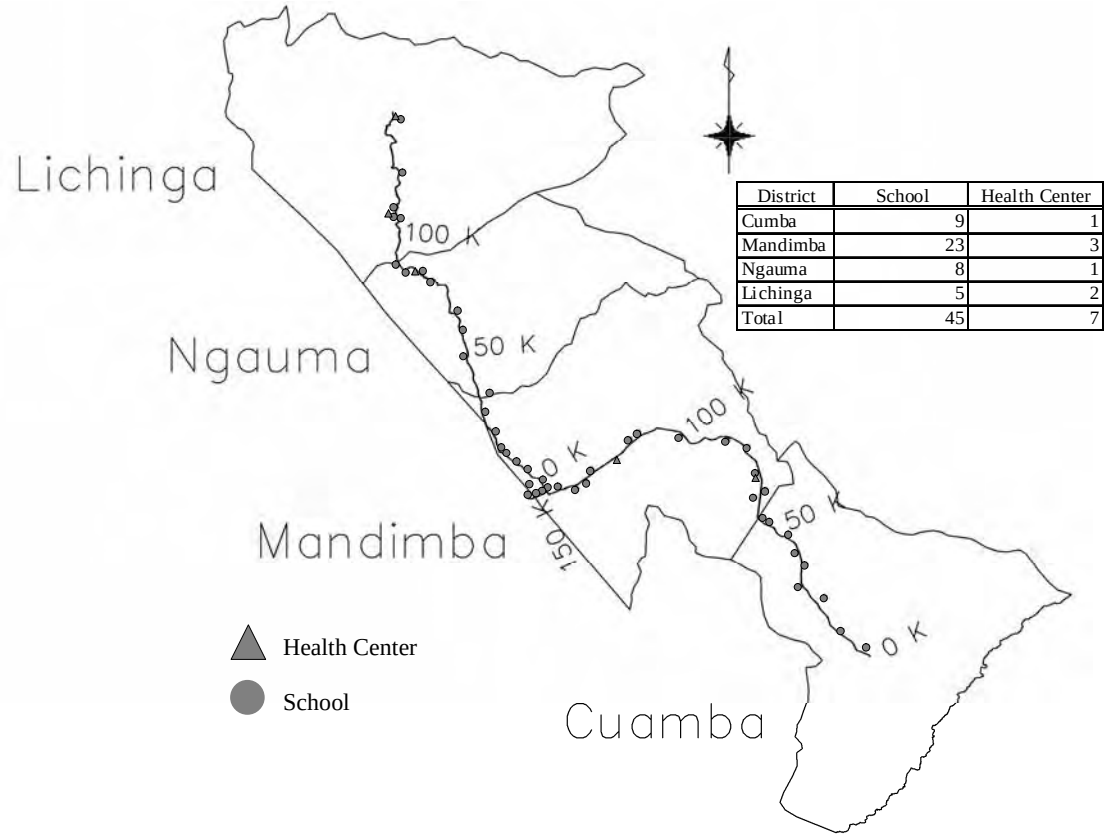
The area from Cuamba to Mandimba is categorized as flat area and is covered by open forest and grass land. On the other hand, Mandimba to Lihinga is hilly and mountainous and is covered by Miombo natural forest and palm tree plantations.

The principal land use is agriculture. Major crops are maize, beans, tobacco, mapira and peas. Generally, most farm plots are opened by cutting trees and swidden even though this is prohibited by the government. Cut trees are used as a source of cooking fire and charcoal material. Thus natural Miombo forest is deforested year by year due to uncontrolled development for agriculture.

c) Existing Social Infrastructures and Services

With regard to social infrastructures such as power lines, water supply, sewage and communication cables, only power lines are observed along the EN13 in the town section of Cuamba, Mandimba and Lichinga. Additionally, high-voltage cable crosses over the road at 41km from Cuamba.

On the other hand, some schools and health centers are located along the road as shown in following map.



District	School	Health Center
Cumba	9	1
Mandimba	23	3
Ngauma	8	1
Lichinga	5	2
Total	45	7

Figure 3.1.2 Distribution Map of Schools and Health Centers
Source: prepared JICA Study Team based on site survey

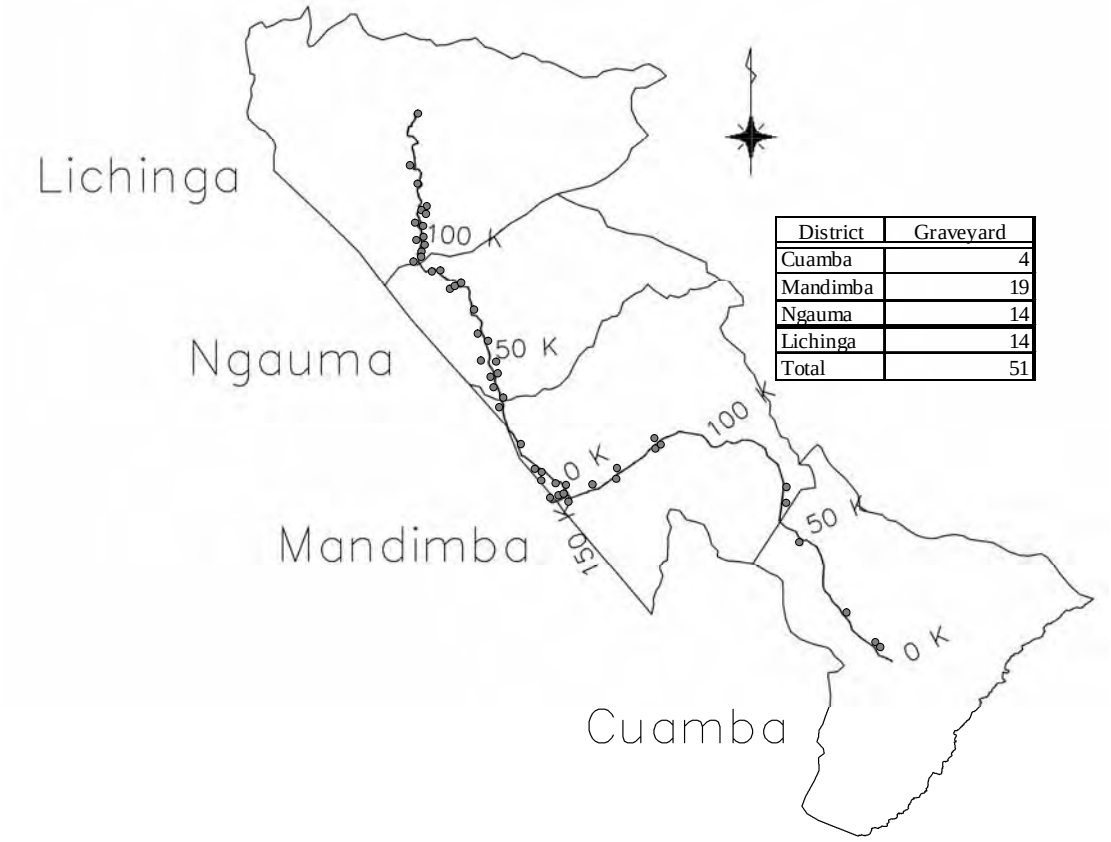
These social facilities are considered and will be avoided for new alignment, thus any replacements are not expected at the moment. However some school compounds are located 10m from current and new alignment. Therefore some counter measures for traffic safety and environmental conservation shall be considered. These countermeasures are described in "p). Noise and vibration" and " q). Accidents."

d) Cultural Heritage

According to the first stakeholder meetings in each district and municipality, there are many sacred sites at local level such as praying sites (trees, rocks, mountains, forests and so on.) However such sacred places are not located along the road according to the interview survey.

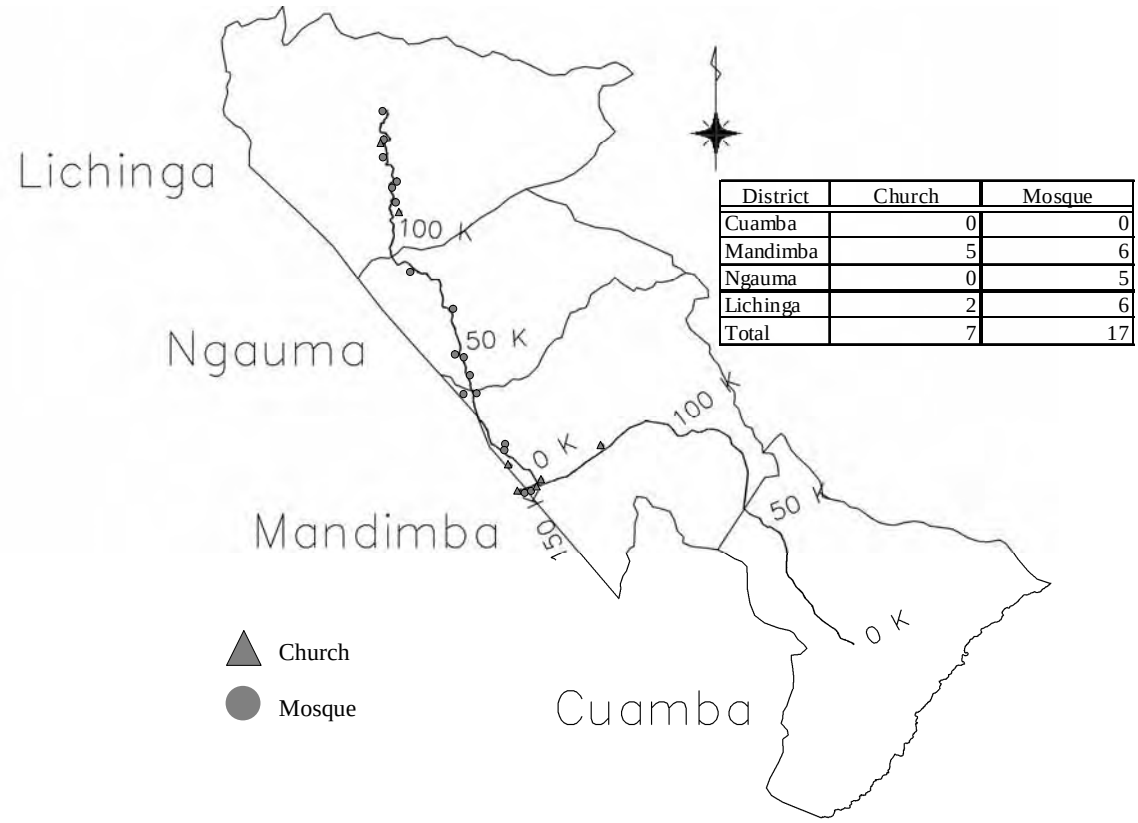
On the other hand, 51 local graveyards are observed along the road. These sites are considered and basically avoided in the new alignment. Additionally, 17 mosques and 7 churches are also observed along the road. These sites shall be confirmed in the EIA baseline survey again. Due to traditional customs it is not acceptable to re-locate them to other areas.

Location of graveyards is shown in the next figure and table.



District	Graveyard
Cuamba	4
Mandimba	19
Ngauma	14
Lichinga	14
Total	51

Figure 3.1.3 Distribution Map of Graveyards
Source: prepared JICA Study Team based on site survey



District	Church	Mosque
Cuamba	0	0
Mandimba	5	6
Ngauma	0	5
Lichinga	2	6
Total	7	17

Figure 3.1.4 Distribution Map for Mosques and Churches
Source: prepared JICA Study Team based on site survey

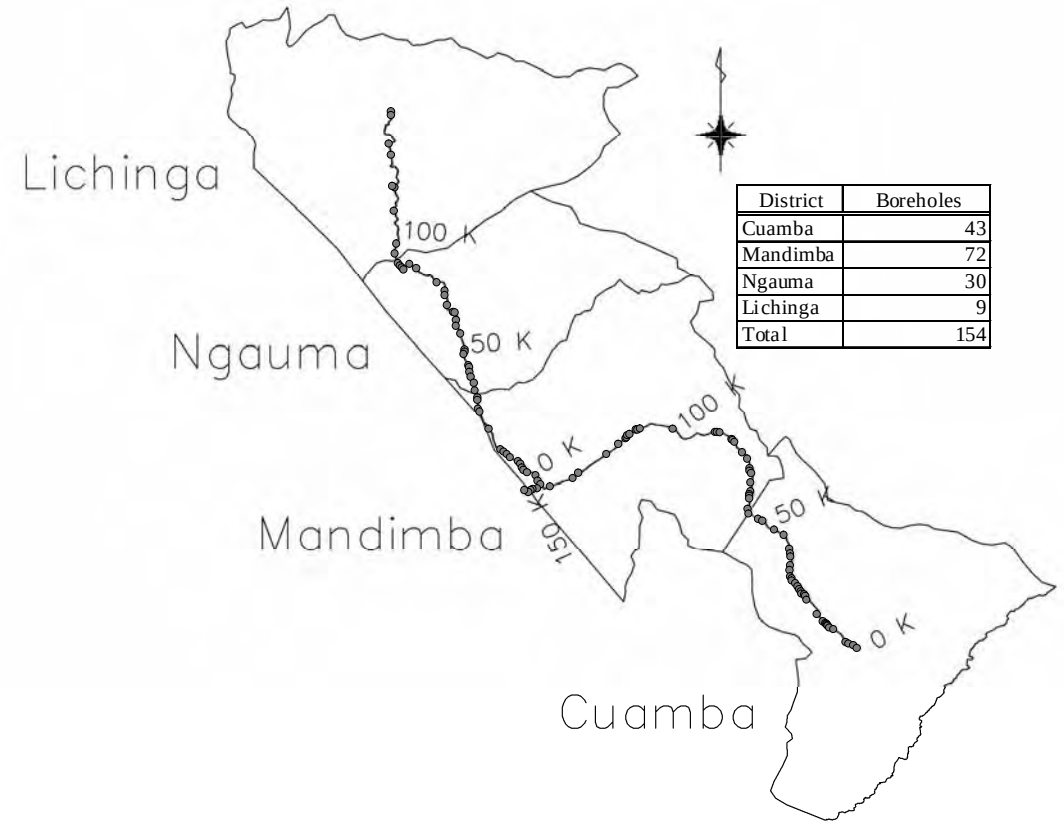
e) Local Conflict of Interest

In the first stakeholder meeting, a basic consensus was formulated for improvement of the road by all participants even though some adverse impacts will arise. Thus there are no reasons to provoke local conflicts after construction. However since employment opportunities will increase during construction, candidate construction workers may have some conflicts between communities. Therefore, construction contractors shall adopt fair processes to hire workers in consideration of gender and employees who live in the community.

f) Water Usage and Rights

Designated places with water usage rights do not exist in the Study area. Most of the residents use water from wells and rivers for their livelihood. Piped water supply systems hardly exist.

154 boreholes and wells are located along the road. These sites are considered and avoided new alignment basically. Additionally, the water places for washing and bathing are observed in 15 rivers and streams. These places should be preserved during construction of bridges with adequate mitigation measures. These sites shall be confirmed in the EIA baseline survey because they are one of the most important aspects of the basic human needs and it is extremely difficult to provide new wells in a short period of time.



District	Boreholes
Cuamba	43
Mandimba	72
Ngauma	30
Lichinga	9
Total	154

Figure 3.1.5 Distribution Map for Boreholes and Wells
Source: prepared JICA Study Team based on site survey

The following rivers are used by residents for supply of drinking water.

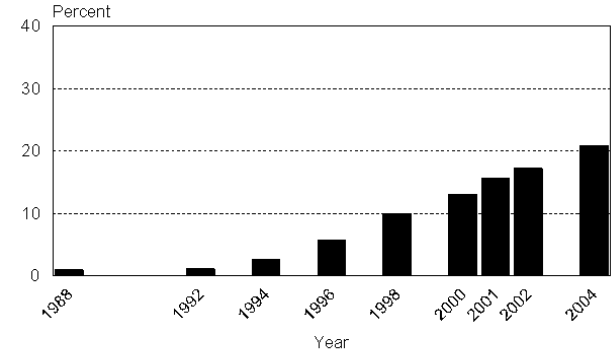
Table 3.1.3 Location of Rivers and Water Streams Used by Residents

Distance	District/ River Name	Distance	District/ River Name
0.6km	Cuamba / Muanda River	155.9km	Mandimba
47.1km	Cuamba	166.1km	Mandimba
108.3km	Mandimba / Lugenda River	166.8km	Mandimba
113.6km	Mandimba	174.0km	Ngauma
125.3km	Mandimba	176.0km	Ngauma
145.6km	Mandimba	183.9km	Ngauma
148.7km	Mandimba	199.8km	Ngauma
155.2km	Mandimba	-	-

Note) There was no heavy rain before the survey was carried out. It therefore seems that the above mentioned rivers and streams are flowing all year round

g) Infectious Diseases such as HIV/AIDS

Mozambique has also recently gone through a period of political and civil unrest with associated population displacements. The estimated adult HIV prevalence is 15 percent for 2008 in accordance with UNAIDS. The HIV rate among pregnant women in Maputo, the capital of Mozambique, has steadily risen from the late 1980s to 2004. The current prevalence rate is just over 20 percent, up from 10 percent in 1988.



Source: HIV/AIDS Data Base ID Numbers B0272, N0195, A0228, M0683, G0358, W0193, M0762, M0872.

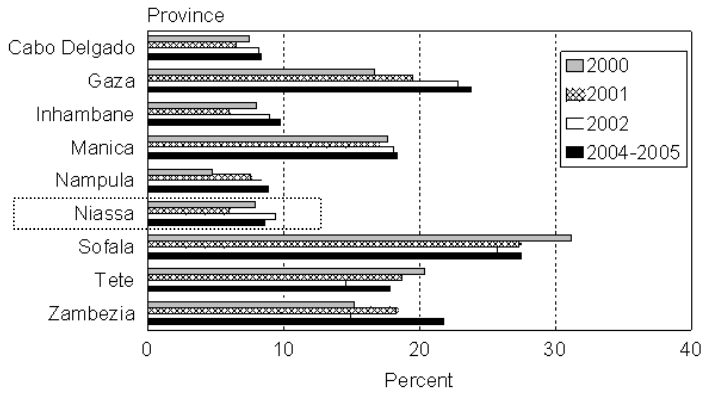
Figure 3.1.6 HIV Seroprevalence for Pregnant Women, in Maputo, Mozambique : 1988-2004

Source: HIV/AIDS Profile Mozambique US Census Bureau

In examining seroprevalence data among pregnant women for nine provinces, rates were higher in 2004/2005 than in 2000 in most of the provinces. Sofala consistently had the highest prevalence levels from 2000 to 2004/2005 with just under 30 percent of pregnant women testing HIV positive in 2004/2005. On the other hand, Niassa has held less than 10% since 2000 due to few human migrations at the moment.

However, human migration will be accelerated in conjunction with expansion of economic activities after completion of Nacala Development Corridor. This human migration will impart serious impacts to inhabitants, thus adequate health education and mitigation measures are shall be implemented by the relevant organizations.

As regard this issue, ANE has prescribed mitigation measures regarding HIV/AIDS prevention in its internal regulations. These mitigation measures are conducted in major road projects.



Source: HIV/AIDS Data Base ID Numbers M0683, W0193, M0762, M0872.

Figure 3.1.7 HIV Seroprevalence for Pregnant Women, in Selected Provinces, Mozambique: 2000-2005

Source: HIV/AIDS Profile Mozambique US Census Bureau

2) Natural Environment

h) Soil Erosion

Soil erosion is common on the road, particularly on some of the steep slopes. Annual rainfall is around 1,000 mm, but the rainfall intensity can be very intense washing out soils from the agricultural fields to the seasonal rivers.

According to following erosion hazard map, erosion risks between Mandimba and Lichinga are high due to mountainous areas. Therefore, sections of cut and fill slope and embankment should be protected not to cause soil erosion by appropriate materials such as grasses and gabions.

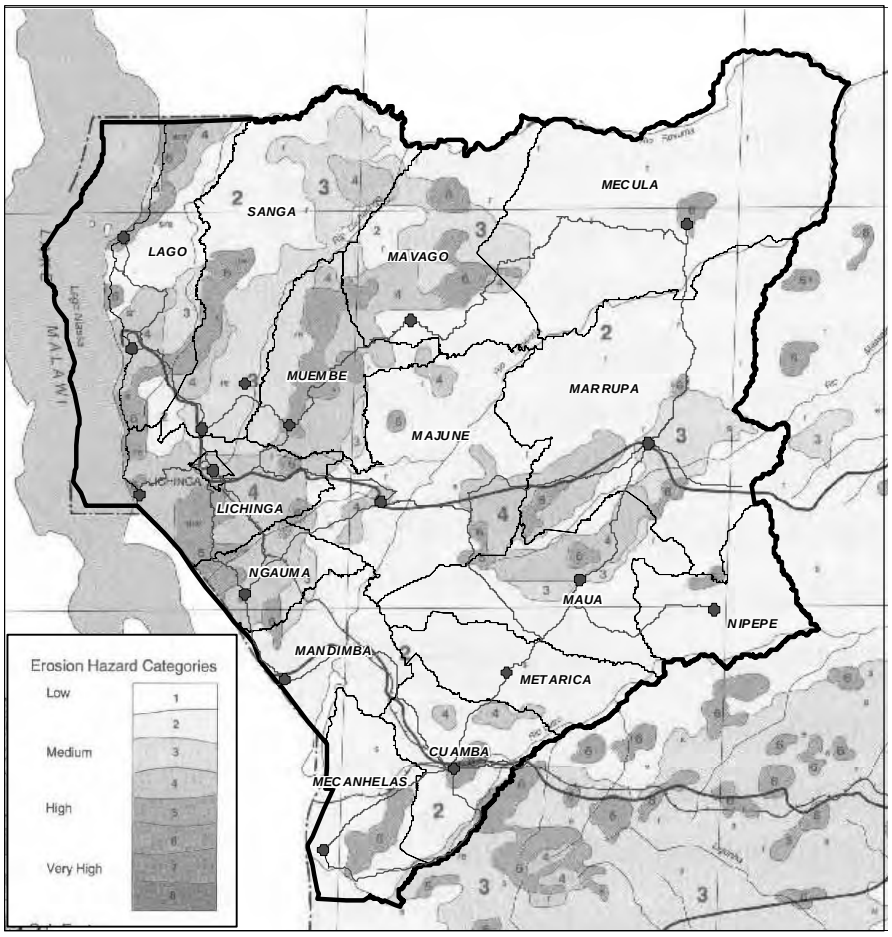


Figure 3.1.8 Erosion hazard map of Niassa Province.

Source: Niassa Province GIS and SADCC, Undated), PARTNERSHIP TO DEVELOP INTEGRATED NATURAL RESOURCE MANAGEMENT IN NIASSA PROVINCE A collaborative partnership between: Fauna & Flora International, USA & UK / Niassa Provincial Government, Mozambique / Sociedade para Gestao e Desenvolvimento da Reserve do Niassa, Mozambique and / ResourceAfrica, South Africa

i) Underground Water

There are some boreholes along the road as shown in "f) Water Usage and Rights". According to the local people, the underground water is fresh, found at about 10 to 30m depth. These sites are considered and are avoided in the new alignment basically. These sites shall be confirmed in the EIA baseline survey because they are one of the most important aspects of the basic human needs and it is extremely difficult to provide new wells in a short period of time.

j) Hydrological Situation

The N13 has approximately 24 bridges and 271 culverts on the section from Cuamba to Lichinga. Major river basins in the northern area of Mozambique are as follows. Approximately 70% of Study area is located in the Lugenda River basin and Cuamba is in Lurio River basin. Especially Lugenda is one of the important basins as a water source for the Niassa Reserve, thus development activities of the basin in upstream area should be considered carefully. Therefore, the Study Team recommended that an existing bridge in Lugenda River should be reused from the view of its soundness and natural environment.

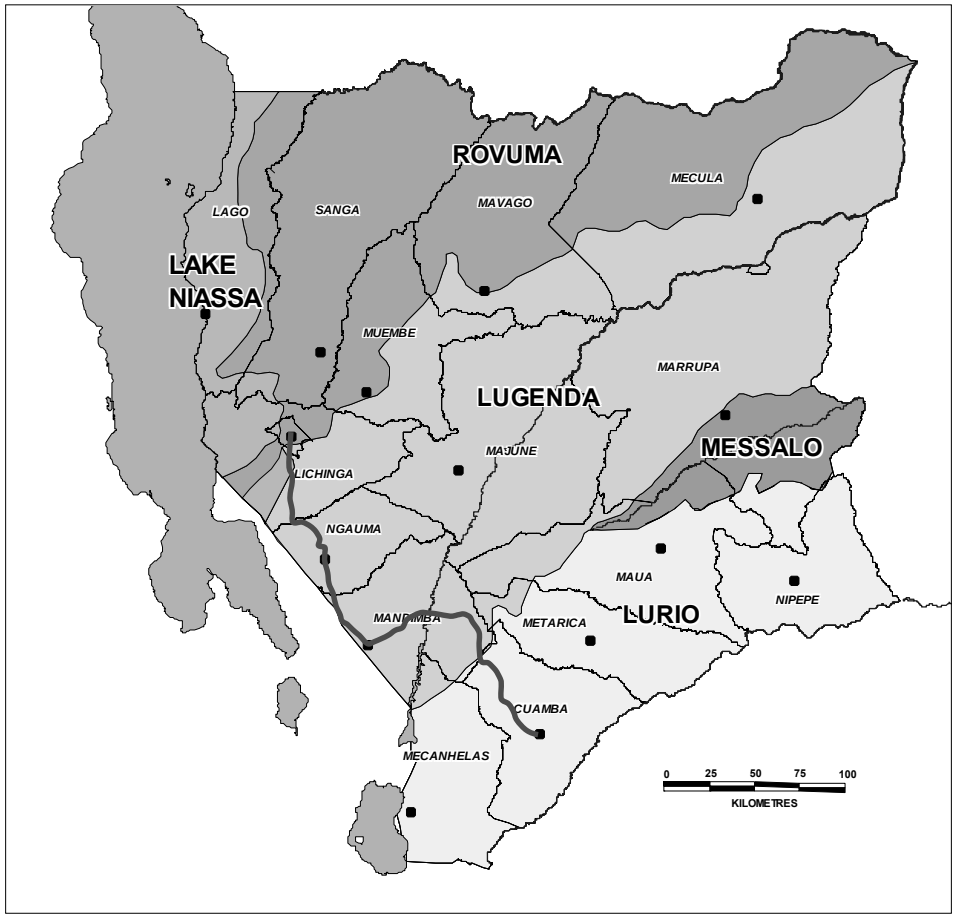


Figure 3.1.9 Catchment areas and principal drainages of Niassa Province

Source: Niassa Province GIS / PARTNERSHIP TO DEVELOP INTEGRATED NATURAL RESOURCE MANAGEMENT IN NIASSA PROVINCE A collaborative partnership between: Fauna & Flora International, USA & UK / Niassa Provincial Government, Mozambique / Sociedade para Gestao e Desenvolvimento da Reserve do Niassa, Mozambique and / Resource Africa, South Africa

k) Biota and Ecosystems

✓ Flora

The main native vegetation in the Study area is savanna grass land, and forest and bush land known as Miombo forest in Ngauma and Licihing District. However, most of the native vegetation in Cuamba and Mandimba District has disappeared by the "slash-and-burn" farming practice, and what is left is mostly fruit trees and seasonal grasslands in the swampy areas. Such deforested area is increasing in Ngauma and Licihiga District due to production of charcoal.

There are no designated and protected forest reserves and national parks, and according to the Directorate of Agriculture in Niassa Province, there are neither any rare and endangered species due to development in the Study area. On the other hand, 80 flora species and 229 rare fauna species are listed as endangered in Mozambique in accordance with the IUCN red list. However, there is no detailed flora and fauna survey of the Study area available at the moment.

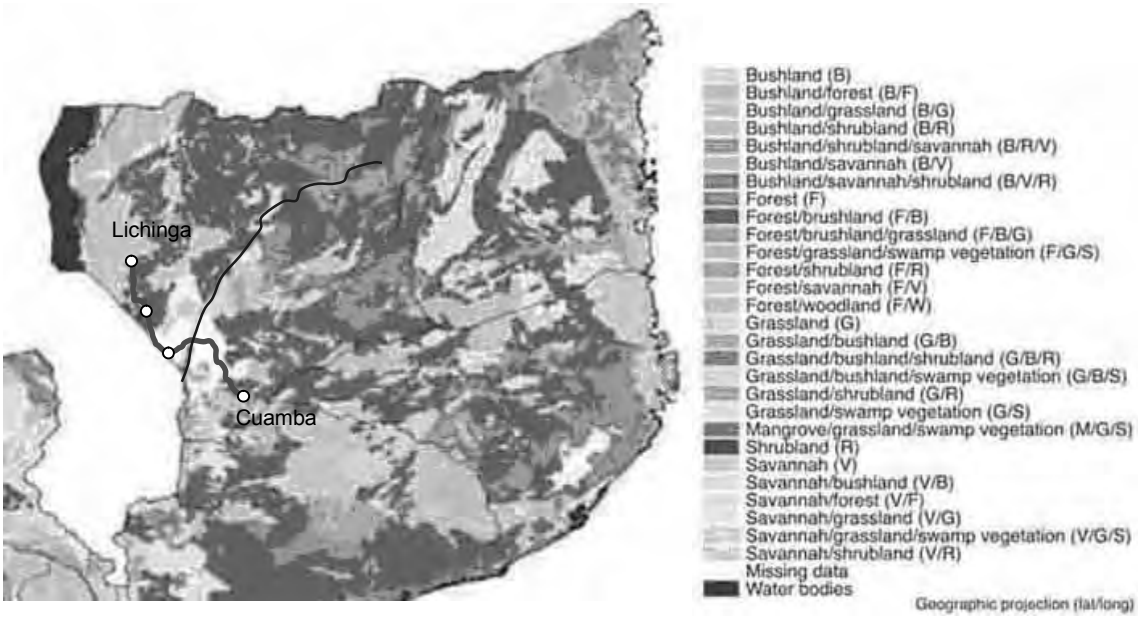


Figure 3.1.10 Vegetation Map of Niassa Province

✓ Fauna

➢ Major Mammals

With regard to wildlife, some documents state that rich animal diversity such as hyena, wildcat, mongoose, lion and African elephant exists in the Study area.

However, only the presence of African elephant, Nile crocodile, hippopotamus and mongoose has been confirmed by the interviews from the Directorate of Agriculture in the Province and districts. As explained in the article of flora, any habitats of rare and endangered species are not reported except those of African elephants.

➢ Literature Survey regarding African Elephants

Main elephant migration corridors have been surveyed by the Society for the

Management & Development of Niassa Reserve (hereinafter referred to as "SGDRN") in association with the University of Pretoria. It has defined through interviews from relevant specialists in Mozambique four major indentified routes based on academic investigation as shown in the next figure.

Other international organizations such as WWF, IUCN, Ministry of Agriculture and Ministry of Tourism do not have any studies concerning elephant in the Study area and northern area of Mozambique.

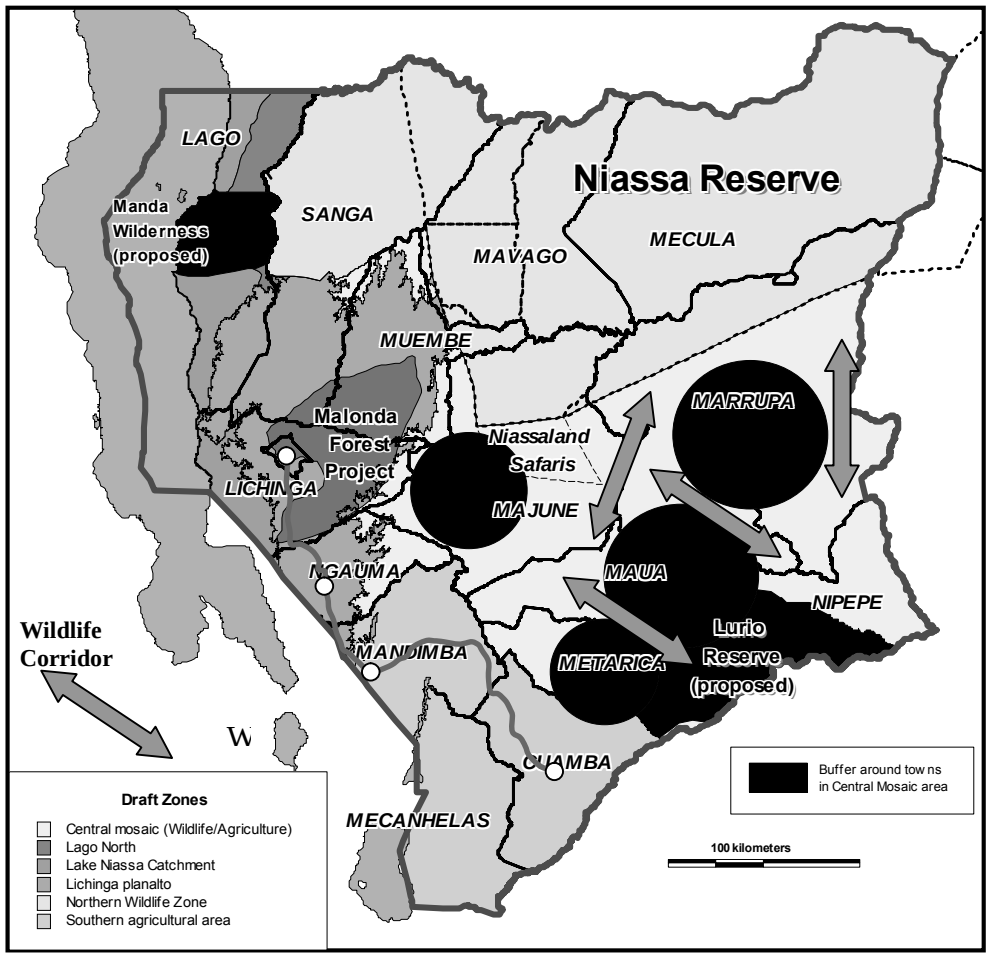


Figure 3.1.11 Zoning Map for Niassa Province

Source: PARTNERSHIP TO DEVELOP INTEGRATED NATURAL RESOURCE MANAGEMENT IN NIASSA PROVINCE / A collaborative partnership between: Fauna & Flora International, USA & UK Niassa Provincial Government, Mozambique Sociedade para Gestao e Desenvolvimento da Reserve do Niassa, Mozambique and Resource Africa, South Africa/ A Zonation Plan for Niassa Province By Rob Cunliffe October 2006 Prepared for Resource Africa, South Africa

The Study area is located in the Southern Agriculture area and Lichinga plantation area in accordance with the map. This zoning map means that the Study area is a developed and populated area, not categorized as considerable wildlife area. However, it seems that the Study area is an uninvestigated area regarding elephants since no literature documents have been confirmed, thus site interview survey from inhabitants is required to identify elephant migration routes.

- Interview Survey from specialists regarding African Elephants

Results of interview survey from specialists are as follows. Although all interviewees except District and Province officers explained elephant's ecological cycle and their migration patterns, most of them are based on secondhand information, not empirical study. Only officers in the wild animal section of the Directorate of Districts and Province are accumulating conflict cases between inhabitants and wild animals, however, the records are not stored statistically and some of them are missing at the moment. On the other hand, nonetheless, the officers have plenty of reliable experiences and reports of sightings in their territory of jurisdiction.

Below is an outline of interview survey from specialists, and conclusion;

Although some elephant migration routes are reported from interviewees, they are not based on reliable survey data. However, district officials have the following same opinions regarding elephant migration routes and periods:

-An elephant route crosses near Mississ in Mandimba and Mebolachem in Cuamba District, and goes south to Micanhela District.

-Elephants mainly migrate during the harvest season such as from May to August.

Table 3.1.4 Result of Interview Survey from Specialists regarding Elephants

Interviewee	Date	Information	Opinions
[**Government Organization**] 1. Directorate of MICOA **Niassa** Province Mr. Manuel Goygoy / Chief of Env. Management	18th May/2009	According to some reports, it is not major, a minor elephant route is crossing the N13 between Cuamba and Mandimba.	This project will use current road basically, thus significant adverse impact is not predicted. However it is recommended that following measures are conducted; - Land use management (prohibit building any structures, burning fields and developing farm) - Set up sign boards to speed down
2. Directorate of Tourism **Niassa** Province Mr. Geraldo Pauro Chizamgo / Department of Conservation Area	18th May/2009	13,000 elephants are moving in Niassa Reserve and some of them have route along Lugenda River to Amaramba Lake.	Number of elephants is not so huge, thus this project will not give significant adverse impact.
Mr. Manuel Simaol, M. Eliga Mazive	1st Sep. 2009	- There is no information because this directorate is in charge of only national parks, reserves and conservation areas. - Generally most elephants are migrating in harvest season from March to November. - According to animal density survey every year in Niassa Reserve, approximately 12,500 elephants are staying. - Tourists with permission from the Government can hunt even elephants in hunting areas. The cost of hunting for an elephant is app. 4,000USD. - Well known four elephant	Most important mitigation measure is land control.

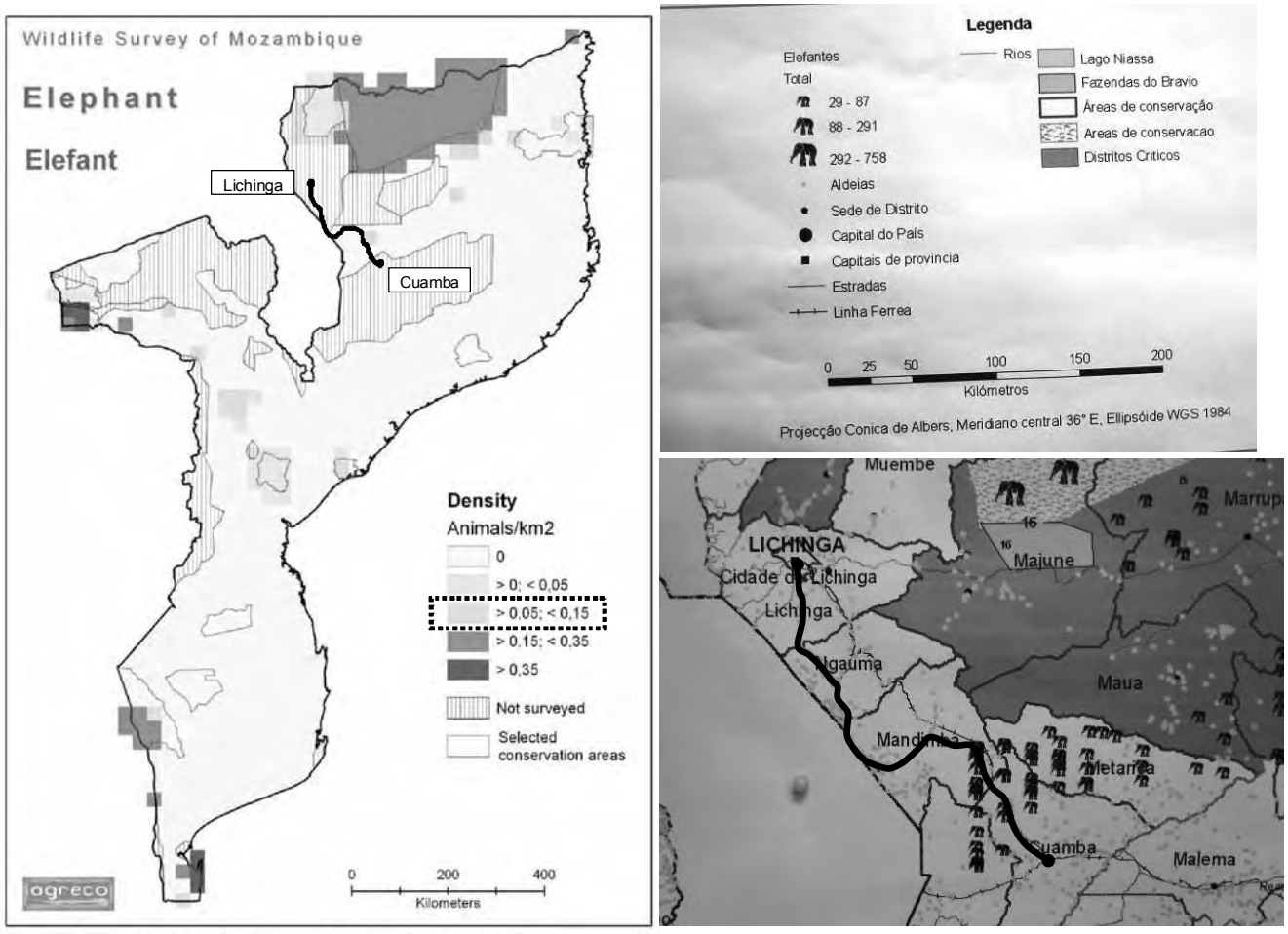
Interviewee	Date	Information	Opinions
		migration routes are between Niassa - Majune, Majua - Metarica & Maua, Nipepe - Maua & Marrupa and Nipepe – Niassa (these routes were reported by M. Anabela Rodrigues / General Manager Niassa Reserve)	
3.Ministry of Agriculture & Fisheries in **Maputo** Mr. Mascelino Foloma/ DNTF Chief of Wildlife Mr. Saubarro Bouifo / CITES management	9th Aug. 2009	- Reliable data of elephant corridor in eastern area of Niassa is defined by some surveys, but there is not enough data in western area at the moment. However, elephants do not migrate to Malawi with crossing EN13 due to populated and agricultural developed area in Malawi. - However, a census by taking aerial photos was done in 2008 and prepared a final report in December 2008. (National Census of Wildlife Dec. 2008) According to the census, a part of Mandimba was surveyed and some elephants were confirmed. - This census aim to establish an adequate land use plan for harmony between human and wild animals. But this census is the first step and aim to collect fundamental information.	- Following activities and phenomenon may affect elephants [After Construction] a) Poaching by illegal hunters. They must use improved road for illegal hunting and number of illegal hunters will increase after construction b) Urbanization and development Urbanization and development on elephant routes will cause many conflicts with elephants [During Construction] c) Poaching and damage such as cutting trees and clearing by construction workers without permission from local authorities - However, improvement of the road is necessary for inhabitants, therefore the following mitigation measures are required [After Construction] a) Establish an appropriate land use plan in each district based on the census by districts b) Natural resource control by districts c) Periodical patrol for illegal poaching by districts [During Construction] d) Set up sign boards where elephants are observed e) Environmental education for construction workers during construction (prohibit cutting trees, developing, poaching and etc…) Although the project will give a degree of impact to elephants, the elephants will never change original migration routes.
4. Directorate of Forest & Wild Animals in **Niassa** Province Mr. Combe / Chief of Wild Animals	1st Sep. 2009	- A major elephant corridor is crossing Lichinga – Montepez Road, however adverse impacts are not observed after construction of Lichinga –	The project does not give serious impact to elephants in accordance with the case of Lichinga – Marrupa Road.

Interviewee	Date	Information	Opinions
		Marrupa Road at the moment. - Rare species are not distributed along the EN13.	
Mr. Ricards Rocha / Chief of Wild Animal Distribution	2nd Sep. 2009	- There are seven migration routes around Niassa Reserve. - This original elephant corridor map which was provided by Mr. Awasse was prepared by our organization. - The route in the west area is as follows; a) Niassa Reserve – Movago - Maua b) Niassa Reserve – Movago – Majune – Metarica – Mississi (EN13) – Micanhela (border of Malawi) - Some elephant groups are crossing the EN13 from May to August and fromeptember to November. Information regarding elephants is given from district officers, although such data are not accumulated, but the total number which is crossing EN13 is 200 a year. Thus reliable data such as elephant numbers is not provided. - With regard to conflict cases with elephants, incidents are recorded and reported to Niassa Province.	Following mitigation measures are recommended; - Setting up sign boards for not only drivers but also inhabitants and farm owners - Land use management and periodical monitoring to stop building any structures and developing agriculture areas. The government should construct displaced structures and crop fields after compensation.
5. Directorate of Economic Activities & Agriculture, Department of Forest & Wild Animals in **Cuamba** Mr. Manuel Chivansa	4th Sep. 2009	- An elephant corridor is located. Elephants are coming from Metarica along the Luleiu River and crossing the EN13 between Mepica and Mississi, and then they go to Micanhela. It seems that the center of corridor is Mocoropo (45km from Cuamba) - Information regarding elephants is given from inhabitants and only conflict cases are recorded and reported to Niassa Province. Therefore, reliable and accumulated data which can estimate elephant numbers are not registered. - Elephant groups are coming during harvest season from May to August.	- Elephants can cross the EN13 after paving because a migration route is fixed since ancient times. Therefore the project does not give serious impact to them directly. - However, urbanization and development must provoke conflicts with elephants. Therefore, the following mitigation measures are recommended; a) Set up sign boards along the road and in the corridor b) Land use management (prohibit development and building any structures in the elephant corridor)
6. Directorate of Economic Activities & Agriculture, Department of Forest & Wild Animals in **Ugauma** Mr. Benjamin Aly Mirasse	4th Sep. 2009	Elephants are staying in western side of Ugauma district. They never come along the EN13.	-

Interviewee	Date	Information	Opinions
7. Directorate of Economic Activities & Agriculture, Department of Forest & Wild Animals in **Mandimba** Mr. Fonaeca Americo	8th Sep. 2009	- There is no elephant corridor in northern area of Mandimba Town. On the other hand, it seem that an elephant route is crossing the EN 13 between Mandimba Town and Mississi. - Most elephant sightings by inhabitants are reported from July to December during harvest season. - According to inhabitant's reports, elephant routes are as follows; a) Metarica-along the Luleuyu River – Mississi b) Metarica- along Luleuyu Riv. – Majune – Metande (10km from Congerenge) - There are 3-10 elephants in a group. - 11 cases in 2009 and 20 cases in 2008 were reported from inhabitants.	- This road improvement project will not give serious impacts to elephant corridors and their lifestyle directly. - However, it is very important not to disturb their route through urbanization and development. - Mozambique government prohibits building of any structures and development without permission, but some people think that the land belongs to their tribes and ancient families. Thus such people do not follow the government.
[**Other Organization**] 8. WWF in **Maputo** Mr. Rito Mabunda / Forest Programmer Coordinator	24th Aug. 2009	No information regarding elephant corridor in Niassa	If some impacts will be given to the elephant corridor, mitigation measures such as setting up sign boards should be taken at crossing points.
9. WWF in **Lichinga** Mr. Geraldo Pauro Chizamgo / Provincial Coodinator	2nd Sep. 2009	- No quantitative data exist, however, it seems that some elephant groups are moving between Niassa Reserve and Amaramba Lake in Malawi. - According to information from district directorate of economic activity, only 5 elephants were reported in 2006. - The WWF in Lichinga does not have any activities regarding elephants at the moment.	- The project does not give significant impact to elephant migration because the area between Lichinga and Cuamba is already developed and urbanized. - However, the following mitigation measures are recommended; a) Set up sign boards and humps for slowing down vehicles and urging attention to inhabitants b) Land use management (prohibit development and building of any structures in the elephant corridor)
10. Society for the Management & Development of Niassa Reserve in **Maputo** (SGDRN) M. Anabela Rodrigues / General Manager (Representative Niassa Reserve Management Conpany)	26th Aug. 2009	- This SGDRN proposed some zoning in Niassa Province such as central mosaic, Lichinga plantation, wildlife and agriculture area based on surveys. - Elephant migration routes are indentified only in the east area based on reliable surveys with the Pretoria University. - As far as the SGDRN knows, no elephant migration route in western area has been clarified due to their being no data at the	Generally land use management is most important. Districts should observe land use and appropriate land use plans should be prepared.

Interviewee	Date	Information	Opinions
		moment. - Miombo forest is important for elephants as habitat, however such forest does not exist in the target area. Additionally, the area from Cuamba to Licihiga is urbanized and agriculturally developed area. Thus it seemsthat the target area is not a main habitat for elephants. - Most elephant groups move from June to September to search for water and bait. - Density of elephant in Niassa Reserve is 0.3 / km^2. (13,000 elephants are staying in the 42,000km Niassa Reserve)	
	12th Oct. 2009	*The JICA Study Team explained results of all interviews from specialists and inhabitants. She commented on the draft report the Study Team submitted; "This literature and interview surveys are a well-analyzed report about elephants in western area where there is no reliable data."	- As most of the specialists mentioned, this road improvement project is not likely to give serious impacts to elephant migration routes in the Study area. - Important mitigation measures are: setting up sign boards along the road and land control. Although sign boards may be set up by ANE, recommendation of land use plan should be done through districts and Ministry of State Administration of Management. - Another proposed mitigation measure is control of construction workers. Not only environmental education for waste management and STDs control, but also practical measures for natural conservation are required such as provision of protein source and prohibition of illegal hunting. - Additionally, backfill of borrow pits is very important.
11. Management of wildlife & tourism for Chipanje Chetu area in **Lichinga** Mr. Justin R-Soundergaard / Director of Operations	1st Sep. 2009	No information in the project area	The project area is developed area by farming and urbanization, thus major elephant corridors cannot pass through.
12. Molanda Foundation in **Lichinga** Mr. Belindo Manhica / Environmental Program Officer	1st Sep. 2009	No information in the project area, but it seems that major route does not exist in the project area, some elephants are crossing the EN13.	- If the ANE will construct high embankment, animal corridor under the embankment should be constructed. - Land use management not to built any structures in the corridor

Interviewee	Date	Information	Opinions
			- Setting up sign board to seed down for drivers
13. IUCN in Maputo Mr. Roberto Zolho (he was a manager of national park in Mozambique)	8th Oct. 2009	No information in the Study area. Generally human occupation after civil war is causing conflicts with elephants. Concepts of mitigation are as follows; - Zoning for human activities and wildlife should be separated - Natural conservation (management of deforest and poaching) - Control poaching	It is not likely to have serious impact on the elephant corridor. However, road improvement will provide opportunities for poaching, thus periodical monitoring is required.



Map 7. Density distribution of elephant in Mozambique

Figure 3.1.12 Elephant Distribution

Source: Left National Census of Wildlife Dec. 2008 / Right Ministry of Agriculture DNTF based on the National Census of Wildlife Dec. 2008

- Interview Surveys from Inhabitants in the Study Area

Interview surveys from inhabitants were carried out every 10 – 20km to identify elephant migration routes on the EN13 between Cuamba and Lichinga.

According to the results of surveys, reports of sightings at 20 or 30 points were collected from inhabitants. This information is concentrated from 27 to 97km in Mississi and from 108 to 125km in Chipa. This information matches with specialists' reports in previous articles.

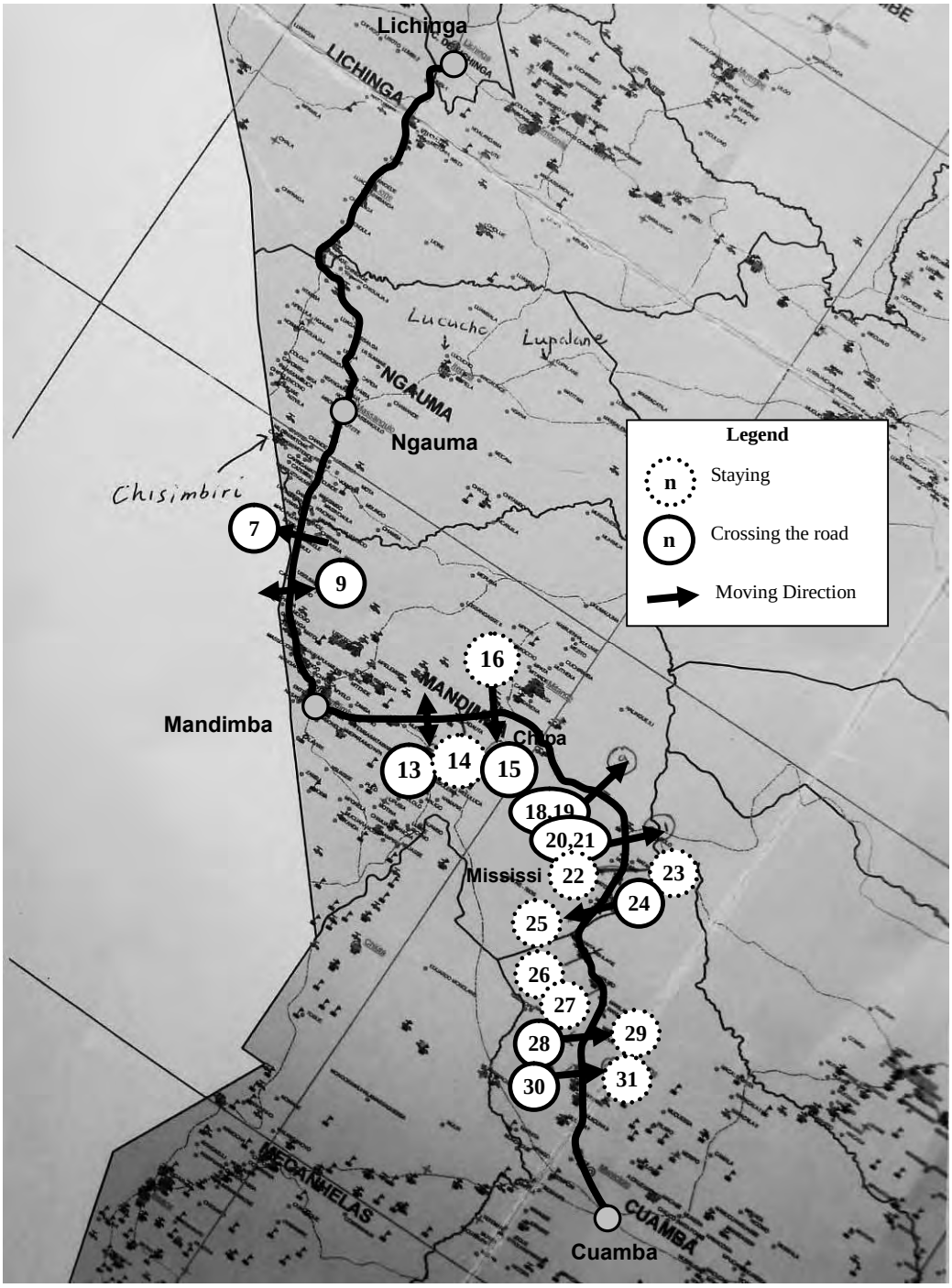


Figure 3.1.13 Elephant Observed Points along the EN13

Source: prepared by the JICA Study Team based on site interview survey from inhabitants in September 2009

Most specialists stated that the intended road improvements are not likely to cause significant adverse direct impact on the elephant migration route. However indirect impacts such as increased deforestation for charcoal production and land development for farming and urbanization will have much more serious effects and

increase conflicts with humans. Recommended mitigation measures are described in the chapter on the environmental management and monitoring plan.

l) Global Warming

From a literature study, the estimated greenhouse gas emissions are calculated using the formulas presented in Table 3.1.5.

Table 3.1.5 Formula for CO2 Emissions

Year	Vehicle Category	Formula for Estimation of CO2 Emission (g-CO2/km)
2000	Passenger car / Mini bus	EF= 1524.94/v – 2.9973v+0.02494v^2+202.844
	Big bus / Cargo truck	EF= 50.6414/v – 27.313v+0.20876v^2+1592.74
2010	Passenger car / Mini bus	EF= 1427.33/v – 2.8375v+0.02360v^2+191.762
	Big bus / Cargo truck	EF= 50.2788/v – 27.312v+0.20876v^2+1592.69
2020	Passenger car / Mini bus	EF= 1353.01/v – 2.7243v+0.02264v^2+183.809
	Big bus / Cargo truck	EF= 50.2141/v – 27.312v+0.20876v^2+1592.67

Source: Ministry of Land, Infrastructure and Transport in Japan

According to these formulas, the current volume of greenhouse gas emission is estimated at approximately 16tonne/day for the 296km long Cuamba – Lichinga Section.

The current and future level of greenhouse gases is estimated in the next table.

The current volume is estimated at approximately 16t/day. For the projected year 2035, the levels without and with the project are respectively 337t/day and 410t/day. The estimated volume of greenhouse gasses with the project in 2035 is about 120% of the "without project" scenario. This forecast demonstrates that although the impact cannot be ignored in the project site, the total number of vehicles and gas emissions in the country stays almost at the same level. Therefore it is not likely to give serious impact.

Table 3.1.6 Estimated Greenhouse Gases Volume

Item / Case		Traffic Volume (Mandimba-Lichinga)			Average Speed	Unit volume g-CO2/km a vehicle		Estimated Volume (t/day)
		Total	Small	Large		Small	Large	
2009 (present at Lichinga)		273	244	29	60km/hr	10	6	16
2035 (target year)	With project	8,189	7,640	550	80km/hr	289	121	410
	Without project	6,736	6,260	476	60km/hr	230	100	330

Note) Most vehicles in the site are old models from 6-7 years ago, thus unit volume is adopted as 2000 for present 2009 and 2020 for target year 2035

3) Pollution

m) Air Pollution

Most residents along the road, pedestrians, bicycles and passengers in open trucks suffer from terrible dust pollution along from the road. Additionally, uncontrolled burning in the dry season causes smoke all over the Study area.

Since there is no quantitative data, some item such as suspended particle matters (hereinafter referred to as "SPM"), NOx and SO2 were measured in the Study area.

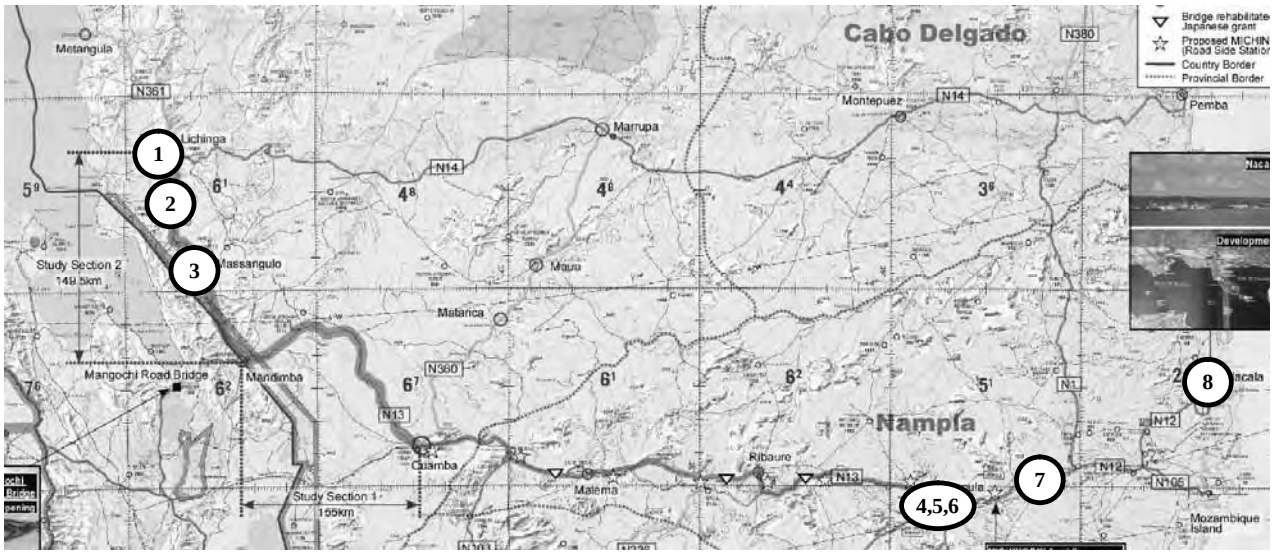


Figure 3.1.14 Location of Air Quality Survey along the EN13

Source: prepared by the JICA Study Team

Table 3.1.7 Air Quality Survey Result

Item / Site		Detailed Location	Date	Air Quality (Japanese Standard)			Traffic Volume for 12hrs in 2009 (counted number for 10 minutes during noise survey)
				SPM mg/m3 (0.2)	NO2 ppm (0.04)	SO2 ppm (0.1)	
No1	Lichinga Junction	Roadside (paved)	8-9Sep	0.018	0.0125	0.002	272(3)
		Residential area	8-9Sep	0.021	0.0055	0*	-
No2	Vombe Village (Lichinga)	Roadside	10Sep	**0.183**	-	-	(2)
No3	Masangulo intersection	Roadside (paved)	10-11Sep	0.011	0.0035	0.0015	(3)
		Residential area	10-11Sep	0.013	0.0040	0.001	-
No4	Nampula at Bamboo Hotel	Roadside	19Sep	**0.064**	-	-	(9)
No5	Nampula near Girassol Hotel	Roadside (paved)	19Sep	0.012	-	-	(118)
No6	Nampula near Shop Rite	Roadside (paved)	18Sep	**0.037**	-	-	(113)
No7	Namiaro	Roadside (paved)	17-18Sep	**0.009**	**0.0030**	0.0015	(8)
		Residential area	17-18Sep	0.009	0.0035	0.002	-
No8	Nacala	Roadside (paved)	18Sep	0.031	-	-	(45)
No9	Maputo (N1 near ANE)	Roadside (paved)	13Oct	0.048	**0.020**	0	-
		Residential area	13Oct	0.028	0.0085	0.0015	(221)

Source: Prepared by the Study Team based on the site survey in Sep. 2009

Note) No9 Maputo is out of this map, * means that value is not exceeding quantitation limit

According to analyzed results, it seems that value of dust increases in conjunction with traffic volume in paved sections. However, in unpaved sections, the results show no consistent relationship to traffic volume. With regard to NOx and SOx,

there is no significant relationship between survey points except No.9 due to low traffic volume.

Although Ambient Air Quality Standards (AAQS) for effluent emissions such as NOx, SOx and CO have been established in the environmental policies in Mozambique, no significant air pollution (except dust) exists on the Study road due to the low traffic volumes.

Table 3.1.8 Environmental Standard Values for Air Quality

		Environmental Standard Value	
		Mozambican (Effluent Emission)	Japanese (Environmental Standard)
NO_2	Hourly. Max.	0.426ppm	-
	Daily Ave.	0.194ppm	-
	Annual Ave.	0.043ppm	0.04ppm
SO_2	Hourly Max.	0.426ppm	0.1ppm
	Daily Ave.	0.194ppm	0.04ppm
	Annual Ave	0.043ppm	0.04ppm
CO	Hourly Max.	34.360	-
	8 hours Ave.	8.590	20ppm
	Annual Ave	-	10ppm
SPM	Hourly Max	-	0.2mg/m3
	Daily Ave.	-	0.1mg/m3

- * GOM standard is converted to Japanese Units (ppm)
NO2: 1 ppm nitrogen dioxide = 1880 μg/m3, 1 μg/m3 nitrogen dioxide = 5.32 × 10–4 ppm
SO2: 1 ppm (20 °C, 1013 hPa) = 2660 μg/m3, 1 mg/m3 = 0.3759 ppm
CO: 1μg/m3 carbon monoxide = 8.59 × 10–4 ppm

n) Water Pollution

A total of 15 rivers and streams with permanent water are confirmed in the Study area. It is observed that some of them are polluted by organic matters from residential areas such as Cuamba and Mandimba.

During construction, organic polluted water and night soil may be discharged from the base-camp site. Furthermore waste oil may not be managed in adequate and prescribed way.

On the other hand, there are not likely to be any activities that cause direct water pollution after construction. However, growth of population and urbanization without sewerage system will cause serious water pollution in the nearest rivers. Recommended mitigation measures and monitoring plan are explained in the next article.

o) Waste

Most residents live with a constrained financial budget which does not allow them to buy consumer goods. Therefore solid waste is not an issue in the Study area at the moment.

During construction, organic waste and night soil may be discharged from the base-camp site. Furthermore construction waste may not be managed in adequate and prescribed way.

Growth of population and urbanization without waste collection and management system will cause serious waste problem. Recommended mitigation measures and monitoring plan are explained in the next article.

p) Noise and Vibration

Data for noise and vibration does not exist, and there are no complaints from residents regarding noise or vibration at the moment.

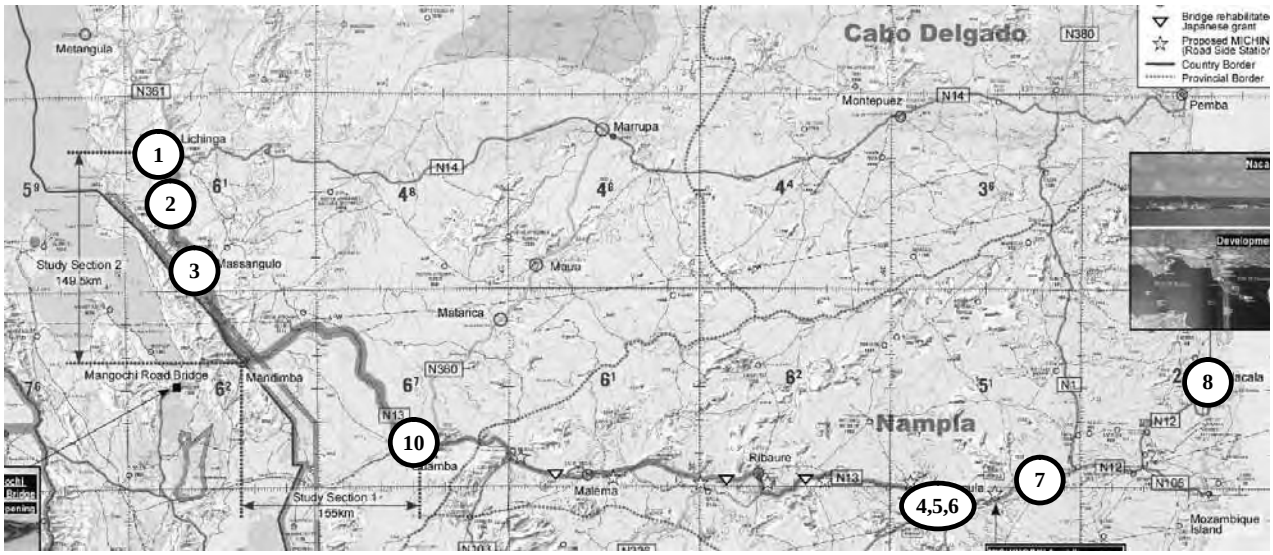


Figure 3.1.15 Location of Noise Level Survey along the EN13

Source: prepared by the JICA Study Team

Table 3.1.9 Noise Level Survey Result

Item		Detailed Location	Date	Noise Level (dB(A) Laeq, 10min.) (Japanese Standard along trunk road 70 dB(A) in the daytime	Traffic Volume for 12hrs in 2009* (counted number for 10minites)
No1	Lichinga Junction	Roadside (paved)	8-9Sep	57.4	272(3)
		Residential area	8-9Sep	42.5	-
No2	Vombe Village (Lichinga)	Roadside	10Sep	63.3	(2)
No3	Masangulo intersection	Roadside (paved)	10-11Sep	**57.0**	(3)
		Residential area	10-11Sep	45.9	-
No4	Nampula at Bamboo Hotel	Roadside	19Sep	57.9	(9)
No5	Nampula near Girassol Hotel	Roadside (paved)	19Sep	67.4	(118)
No6	Nampula near Shop Rite	Roadside (paved)	18Sep	**71.2 (exceeds standard)**	(113)
No7	Namiaro	Roadside (paved)	17-18Sep	70.0	(8)
		Residential area	17-18Sep	49.8	-
No8	Nacala	Roadside (paved)	18Sep	70.1 **(exceeds standard)**	(45)
No9	Maputo (N1 near ANE)	Roadside (paved)	13Oct	70.9 **(exceeds standard)**	(221)
		Residential area	13Oct	49.4	-
No10	Cuamba city center	Roadside	8Sep	57.3	141

Source: Prepared by the Study Team based on the site survey in Sep. 2009

Note) "No9 Maputo" is out of this map. Traffic volume is daily average in weekday based on traffic survey by the Study Team

Generally noise level increases in conjunction with traffic volume. However, traffic volume is very low from Cuamba to Lichinga, and most noise comes from human voices and natural sounds such as noise of the wind.

According to traffic demand forecast, approximately 7,000 vehicles in Cuamba-Mandimba section and 8,000 vehicles in Mandimba-Lichinga section are estimated in 2035. This traffic volume will cause serious traffic noise pollution because most public infrastructures such as schools, health centers and religious facilities are located along the EN13. Detailed impact forecast is given as one of key issues in the next article.

Table 3.1.10 Current and Future's Traffic Volume

	Current Daily Traffic Volume in 2009			Future's Daily Traffic Volume in 2035								
				scenarioA: Normal Traffic			scenarioB: Normal + Improved Cuamba - Mandimba + Divered Traffic			scenarioC: Normal + Improved Cuamba-Lichinga + Diverted Traffic		
	Small	Large	Total	Small	Large	Total	Small	Large	Total	Small	Large	Total
Cuamba	128	14	142	5,504	457	5,961	6,133	514	6,647	6,815	564	7,379
Mandimba	114	20	134	-	-	-	-	-	-	-	-	-
Lichinga	244	29	273	6,260	476	6,736	7,078	549	7,627	7,640	550	8,190

Source: prepared by the Study Team

q) Traffic Accidents

Some dangerous points exist along the Study area, from a traffic safety viewpoint, especially in mountainous sections between Mandimba and Lichinga.

Additionally, most drivers never slow down even in residential areas due to paved sections. As concrete statistical data in the Study area is explained in the article of " (6) Traffic Accident", there were 69 accidents of which 14 cases were fatal.

Table 3.1.11 Critical Points for Traffic Accidents

Site \ Item		Distance from Lichinga Junction	Accident time
Lichinga District	Lumbe	15 km	06-09
	Lione	45 km	12-15
Ngauma District	Curuzament de Ngauma	75 km	06-09
	Caracol	85 km	09-15
	Matamanda	105 km	09-12
	Luelele	120 km	15-21
Mandimba District	Mtembo	125 km	15-18
	Chanica	135 km	06-12
	Lissiete	143 km	10-14
	Congerenge	185 km	09-15
	Mississi	225 km	06-24
Cuamba District	Mabulacha	250 km	15-21
	Mepica	270 km	12-15
	Macau	272 km	09-24
	Mucuapa	312 km	10-16
	Lurio	330 km	09-15

Source: Traffic police station in Niassa Province August 2009

3.2 Key Issues and Impact Forecast

Serious impacts are not expected based on this environmental and social consideration survey, however some detailed and quantitative analyses have been required in other environmental guidelines.

These key items are "Social impacts" such as resettlement and infection diseases, and "Biodiversity". The elephant migration corridor is an issue which was raised by the JICA's environmental and social consideration committee. Resettlement is a major issue in any large development project. Additionally, air and noise pollution should be analyzed quantitatively based on the requirements of other guidelines. Predicted impacts and required mitigation measures are as follows.

3.2.1 Social Issues

(1) Resettlement

Approximately 6,000 structures are located in the right of way (within 30m from road shoulder) based on preliminary survey. The exact impact is unknown at the moment until detailed alignment is defined. However, the same concept as Nampula-Cuamba section shall be adopted between Cuamba – Mandimba Section. The recommended concept is Corridor of Impacts (hereinafter referred to as "COI") - it means area which is affected and developed by construction of new road and diversion during construction period. Image of COI is shown in below.

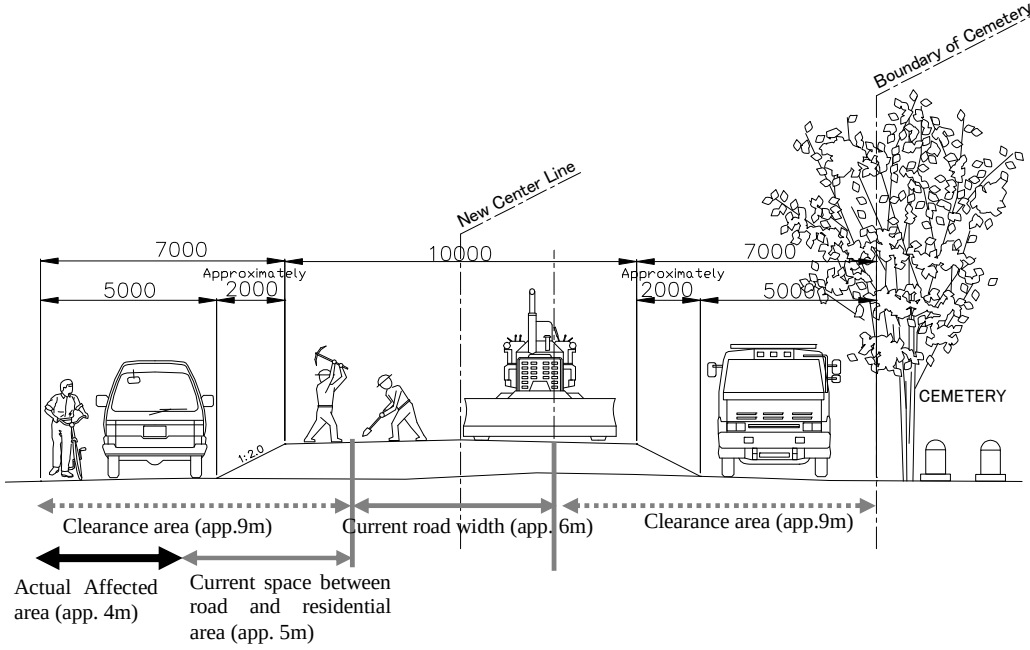


Figure 3.2.1 Image of COI Concept
Source: prepared by the Study Team

Current road width is approximately 6m, thus additional developed width is 9m. However most of structures are located away at least 5m from road shoulder currently, thus affected area is estimated at about 4m in width.

Predicted number of affected structures is 5,848 for full ROW and 390 structures for COI concept.

With regard to section of Mandimba - Malawi border, 295 structures are counted in ROW, thus a bypass alignment as a mitigation measure is adopted from the view of economic and social consideration. This bypass alignment will affect 25 structures.

Table 3.2.1 Estimated Affected Numbers of Structures in ROW

Number of Alternative	Clearance Width of ROW (each side from road shoulder	Other Conditions	Affected Number of All Structures	Affected Number of Structures per km	Remarks
Alernative-1	Approximately 30m (total 60m width 30 + 30 + road width without shoulder)	Including all towns and villages	5,848	19.8	Concept: Full-ROW 30m of ROW is established by the Land Law
Alernative-2	Approximately 7m from designed shoulders (total 14m width)	Excluding major villages and towns	390 (970)	1.3 (3.3)	( ):calculated number out of consideration of actual location of residential area

Note) Approximately 30 structures are affected by new bypass alignment

On the other hand, in the town sections such as Mandimba, Lione and Masangulo, basically construction activities should be carried out in limited area to spare the high density residential areas along the road.

With regard to the section from Mandimba junction to the border, 295 structures are counted in ROW of current road, thus bypass alignment is recommended to reduce the number of resettlements. According to this alignment, approximately 30 structures are affected.

Adverse impacts regarding resettlement are mitigated by the COI concept, but the following mitigation measures shall be carried out by ANE.

- ✓ Implementation of adequate resettlement action plan (herein after referred to as "RAP") and compensation under the land law and Resettlement Policy Framework (RFP)
  - Sound and fair negotiation with project affected persons regarding compensation through stakeholder meeting in the RAP stage. ANE and Niassa Province shall explain compensation is including not only material cost, but also labor cost, registration cost and so on in a series of stakeholder meetings.
  - Concrete income restoration program for affected persons should be described in the RAP.
  - Affected assets should be shown on drawings with aerial photos after detailed design stage.
- ✓ Setting up of a complaint register by relevant bodies (ANE and the provincial authorities) in the detailed measurement survey, compensation stage and during and after construction.

(2) Infection Diseases such as Sexually Transmitted Diseases (STDs)

In construction phase, the project base camp will be constructed in the project site. It is estimated that roughly 2,000 labors per day will work on the site, and more than 90% of them are from the project site. Generally such concentration of laborers creates a downtown with commercial sex workers, and STDs such as HIV/AIDS are spreading in the Study area. Therefore ANE should control laborers' behavior in some ways such as STDs education and supply of condoms during construction from the view of protection against STDs.

Furthermore, human migration after completion of Nacala Development Corridor, connection of rural area and prime towns/cities is one of the reasons for spreading STDs. Hence, not only ANE but also relevant organizations should mitigate spreading STDs in some ways such as a campaign.

3.2.2 Natural Environment: Elephant Migration Corridor

According to interview survey with specialists and inhabitants, elephant migration route mainly crosses the EN 13 in Mandimba. Although direct impacts by the road improvement are not marginal, indirect impacts such as uncontrolled land development and other human activities will have a degree of effect on the elephant migration route.

Proposed mitigation measures at this stage:

[For direct impacts] (measures to be implemented mainly by the project proponent)

- ✓ Setting up sign boards every 20km to alert drivers on elephant migration routes from 27 to 97km in Mississi and from 108 to 125km in Chipa (see reference sign board set up between Majune and Marrupa)

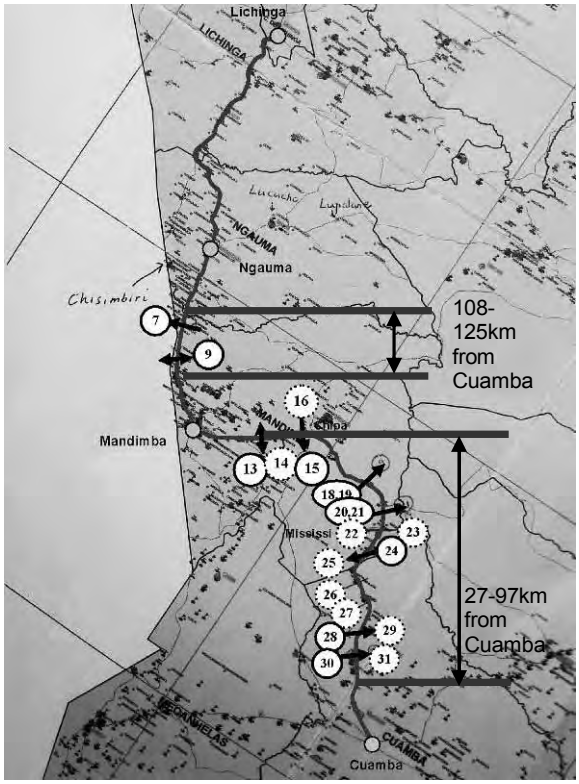


Figure 3.2.2 Range for Setting up Sign Boards
Source: prepared by the Study Team

- ✓ Minimize cutting of trees and re-plant trees along the road in the crossing area

- ✓ Implementation of environmental education for construction workers and inhabitants (prohibit cutting trees, illegal hunting, development and dumping of wastes without permission from local authorities)

[For indirect impacts] (by responsible organizations)

- ✓ Preparing development plans and management of land use on the routes based on census which was conducted by Ministry of Agriculture in 2008 (Cuamba, Mandimba and Ngauma District, Ministry of Agriculture & Fisheries and Ministry of State Administration of Management)

- ✓ Control and management of illegal hunting and deforestation (Cuamba, Mandimba and Ngauma District, and Ministry of Agriculture & Fisheries)

3.2.3 Pollution and Other Items

With regard to pollution, even though currently not much attention is being paid to this issue in Mozambique, traffic volume is expected to increase by a factor of 30 to 50 times on some of the road sections in the future. This will cause negative impacts, and such issues were pointed out by JICA's environmental and social consideration committee. Therefore, a quantification of expected pollution through modeling and by taking relevant samples will be required.

The magnitude of these impacts for the scope of this Study will be indicated by NO2, SO2 levels and noise pollution

(1) Air quality

According to the traffic forecast, approximately 7,000-8,000 vehicles a day are expected in 2035.

In general, the 'Plume and puff' methodology will be adopted as an atmospheric diffusion model to forecast air quality. This forecast methodology requires hourly wind direction, wind velocity and reference background air quality data. However, such information obtained from weather stations that monitor wind and air quality does not exist in the Study area. Thus, the Study Team forecasted through a quantitative air quality survey. According to the survey findings, 0.003-0.012 NO2ppm and 0-0.002 SO2ppm are observed. Although most of data except N1 show no difference between roadside and non-roadside areas due to low traffic volume, the N1 case indicates clear differences between them due to high traffic volume.

With regard to NO2, 0.02ppm along the N1 and 0.0085ppm are observed and it means 0.0115ppm mainly originates from traffic emissions of approximately 21,000 vehicles. In accordance with this survey result, NO2 density of 0.0083ppm, comprising 0.0028ppm from traffic and 0.0055ppm from background, is predicted in the Study area in 2035.

Since this value does not exceed the Japanese environmental standard of 0.04ppm or the Mozambique standard of 0.043ppm, impacts are not serious. With regard to SPM, this value will generally be improved due to pavement and fuel quality in the future.

Table 3.2.2 Air Quality

Item		Detailed Location	Date	Air Quality (Japanese Standard)			Traffic Volume for 12hrs in 2009 (counted number for 10 minutes during noise survey)	
				SPM mg/m3 (0.2)	NO2 ppm (0.04)	SO2 ppm (0.1)	Actual counted number for 10min	Estimated traffic number for 24hrs
No9	Maputo (N1 near ANE)	a) Roadside (paved)	13Oct	0.048	0.020	0	(221)	20,685 (23,711 in 2004)
		b) Residential area	13Oct	0.028	0.0085	0.0015	-	-
Impact from traffic emissions				-	0.0015	-	-	20,685
Estimated density per 1,000 vehicles				-	0.00034	-	-	1,000
Estimated air quality in Study area in 2035		Impact by traffic		-	0.0028	-	-	8,190 (at Lichinga)
		Background		-	0.0055	-	-	-
		Total			**0.0083**	-	-	8,190
Environmental standards		Japan			0.04			

Source: Prepared by the Study Team based on the site survey in Sep. 2009

Note) No. 9 Maputo is off this map, * means that value does not exceed the quantification limit

*) Estimated traffic number = observed traffic number for 10 min x 6 (1 hour) x 12 hours x 1.3 (day/ night ratio)

(2) Noise

The MOG does not establish an environmental standard for permissible noise level at the moment. Therefore some criteria should be adopted from other relevant organizations such as the Japanese Government or the World Health Organization (WHO).

The main criteria for noise levels are as follows;

Table 3.2.3 Noise Criteria in some Guidelines

	Criteria	Description
WHO	70 dB(A) Laeq24	Industrial, commercial shopping and traffic areas, indoors and outdoors
Japanese	70 dB(A) Laeq Daytime 65 dB(A) Laeq Night time	Along trunk roads
	55dB(A) inside of school	Sensitive area such as school and hospitals

Note) Laeq: Equivalent level with an A frequency weighting

- WHO: WHO Guidelines for Community Noise, Japanese: Environmental standard value

With regard to the noise prediction methodology, a formula will be proposed by the JICA Study Team which is based on the Acoustical Society of Japan.

Outline of the formula is as follows;

[ASJ Model 1998]

ASJ Model-1998 predicts equivalent continuous A-weighted sound pressure level according to energy-based calculation. In this model, the first step is to calculate the time history of A-weighted sound level at the receptor point caused by an isolated vehicle passage on the road (lane) under consideration. This gives a "unit pattern" (for each vehicle type and for each lane of a particular road under consideration) at a receptor point. By squaring and integrating the unit pattern, total sound pressure exposure over the time interval during which the source passes the lane under consideration is obtained. The quantity expressed in dB(A) of the total sound pressure exposure is sound exposure level (L_{AE}). By considering the traffic volume, equivalent continuous sound pressure (A weighted) level (L_{Aeq}) for a particular lane is obtained by using the following equation:

$$L_{Aeq}(without\ buildings) = 10\log_{10}(10^{L_{AE}/10}\frac{N}{t}) \quad (1)$$

where, N is traffic volume (vehicles/ second) and t is time interval in seconds.

The calculation mentioned above is carried out for all the lanes of the road under consideration and for all vehicle type, and finally L_{Aeq} is calculated by combining these results on energy base (for detailed calculation procedures refer to Tachibana [4], Oshino [7] &Yamamoto [8]).

Precise calculation of multiple scattering, diffraction and reflection, is practically very difficult in built-up areas. The problem is approached by statistical methods to predict noise level in such area. In this case ASJ Model-1998 provides a method for estimating sectional energy-averaged equivalent continuous A-weighted sound pressure level ($\overline{L_{Aeq}}$) which is calculated by the next equation:

$$\overline{L_{Aeq}} = L_{Aeq,T} + \overline{\Delta L_{builds}} \quad (2)$$

where, $L_{Aeq,T}$ is the predicted noise level assuming no buildings are present (see eqn (1)) and $\overline{\Delta L_{builds}}$ is the sectional energy-averaged excess attenuation by the buildings. $\overline{\Delta L_{builds}}$ is calculated according to the density of the buildings and the distance from road to the evaluation section, by summing the sound-energy contributions from the sound paths propagating through the buildings and over them . In this model the buildings are classified as first row of buildings (FRB) directly facing a road and the rear group of buildings (RGB) behind it.

$$\Delta L_{builds} = \log_{10}(\frac{C_1 + C_2 + C_3}{C}) \quad (3)$$

where,

- C is the sound-energy contributing from the line source without buildings;
- C_1 is the contribution from Path 1 which propagates through both FRB and RGB;
- C_2 is the contribution from Path 2 which propagates over FRB and through RGB;
- C_3 is the contribution from Path 3 which propagates over both FRB and RGB; (see fig. 1)

Detailed calculation procedure can be found in Uesaka [1]. The method has been validated by field survey in Tokyo. The values calculated by the method are in good agreement with the measured data [1].

[Traffic noise level along the road]

A prediction of the noise level assuming 7,000 and 8,000 vehicles a day in Cuamba – Mandimba and Mandimba-Lichinga section respectively is shown in the next table.

The result does not exceed the permissible 70dB(A) in the daytime and 65dB(A) in the night time. Therefore it is not likely to give serious impact to inhabitants after construction

Table 3.2.4 Predicted Noise Level

Target Year \ Item		Predicted Noise Level			Criteria (Japanese Standard Value)
		In Town 60km/h	Out of Town		
			80km/h	100km/h	
Present Surveyed Noise level (2009) roadside	Daytime 10min	57-63dB(A)			70 dB(A)
Forecasted noise level on boundary (2035)	0600-2100	66 dB(A)	68 dB(A)	70 dB(A)	70 dB(A)
	2100-0600	62 dB(A)	64 dB(A)	65 dB(A)	65 dB(A)

Note)

-Forecast point: 60km/hr (Mandimba and Masangulo), 80km/hr in Cuamba-Mandimba section, 100km/hr in Mandimba- Lichinga section

-Estimated traffic volume: 7,379 in Cuamba-Mandimba section, 8,110 vehicles in Mandimba- Lichinga section a day

-Traffic pattern: refer to the value of the baseline survey

- Typical cross section is shown in " Image of COI Concept"

[Traffic Noise in Sensitive Area]

Generally, most public infrastructures are built along trunk roads in Mozambique, especially, according to the Directorate of Education and Health, GOM has a policy to build public facilities such as schools and health centers along the roads to secure easy access from rural areas. Since this policy does not consider any impacts from

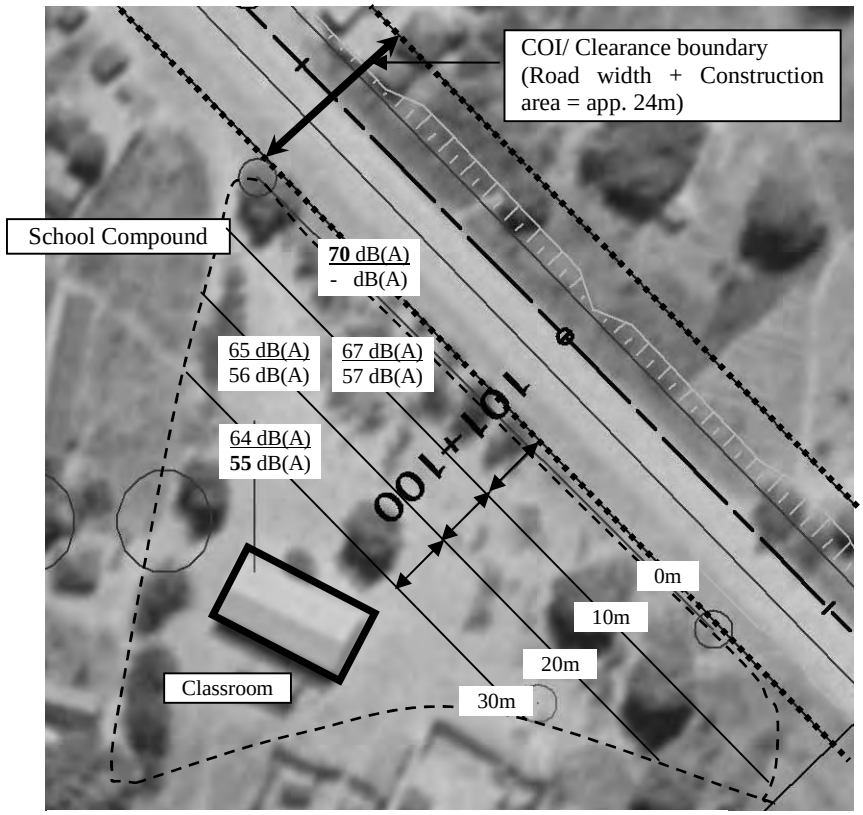
trunk roads, some environmental issues will be caused in the near future.

Predicted noise level along the road is as follows;

Table 3.2.5 Predicted Noise Level from the Road (2035)

Case \ Noise Level		Predicted Noise Level Laeq, dB(A)							Criteria: Japanese standard value along trunk road * (sensitive area)
		0m	5m	10m	15m	20m	25m	30m	
Without countermeasures	0600-2100	70	68	67	66	65	65	64	70 dB(A)
	2100-0600	65	64	63	62	61	60	60	65 dB(A)
With countermeasures (Soundproof wall of 1.8m on boundary)	0600-2100	-	58	57	57	56	55	55	55dB(A)
	2100-0600	-	54	53	52	51	51	50	-

Note) Although forecasted point is in Cuamba – Mandimba section, 100km/hr is adopted as design speed due to sample analysis



( ) Forecasted noise level in the daytime: **without** / **with** counter measure

Figure 3.2.3 Forecasted Noise Level Line in the Daytime (With/ Without Countermeasures)
Source: prepared by the Study Team

Some schools and health centers are located along the road as shown in "c) Existing Social Infrastructures and Services". Most of them are away from the new alignment. According to forecasted noise level, noise is 70 dB (A) on the boundary and 64 dB(A) at 30m from the boundary without countermeasures. This value exceeds the Japanese standard in sensitive areas, therefore mitigation measures such as setting up soundproof wall on the boundary will be needed. Expected noise level with the measures does not exceed 55 dB (A) which is specified in the standard as sensitive.

Chapter 4 Recommended Mitigation Measures

Proposed mitigation measures and monitoring plans are shown in Table 4.1.1 below.

It is recommended that the results of monitoring should be reported once a month with supervision monthly reports made to ANE and MICOA.

Table 4.1.1 Proposed Major Mitigation Measures

Items		Proposed Mitigation Measures				Monitoring Plan
		Rating	During Construction	Rating	After Construction	
Social Environment	1. Resettlement	A	a) Adoption of COI concept (see "3.2 Key Issues and Impact Forecast") b) Holding stakeholders meetings at districts and municipalities * The first stakeholder meetings have already been held in all districts and municipalities. A summary of the results is attached in appendix c) Set up complaint register by relevant bodies d) Carry out appropriate Resettlement Action Plan (RAP) and compensation scheme under land law and Resettlement Policy Framework (RPF 2006) (see article of "Key Issues and Impact Forecast")	D	Not required*note	[During Const.] Periodical interview survey from inhabitants (based on RAP which will be prepared by ANE) Major items to be monitored: -Progress of payment of compensation -Progress of preparation of transfer site -Progress of implementation of resettlement [After Const.] Periodical observation about livelihood of displaced persons and families though interview survey (based on RAP which will be prepared by ANE) Major items to be monitored -Status of income restoration -Grievance from PAPs
	2. Local economy, employment and livelihood	C	Not required	C	Not required	
	3. Land use and local resources utilization	B	Agricultural areas along the road may be affected by new alignment. Appropriate negation and compensation should be carried out based on the RAP which will be prepared by ANE.	B	Awareness campaign to prohibit illegal cutting of trees and agricultural development without permission by Directorate of Agriculture	Periodical monitoring of land use is required for conservation of forests and animal migration routes
	4. Social institutions and local decision-making institutions	C	Not required	C	Not required	Not required
	5. Existing social infrastructures and services	B	Some schools, health centers and religious facilities are affected by new alignment. Appropriate process should be taken based on the RAP which will be prepared by ANE.	D	Not required	Same as "1.Resettlement" based on the RAP
	6. The poor, indigenous and ethnic peoples, gender and children rights	C	Not required	C	Not required	Not required
	7. Maldistribution of benefits and damages	C	Not required	C	Not required	Not required

Items		Proposed Mitigation Measures				Monitoring Plan
		Rating	During Construction	Rating	After Construction	
	8. Cultural heritage	B	Some cemeteries, historical monuments and religious facilities are affected by new alignment. Sufficient discussions with stakeholders and appropriate process should be taken based on the RAP which will be prepared by ANE.	D	Not required	Same as "1.Resettlement" based on the RAP
	9. Local conflicts of interests	B	Construction contractors should hire workers from the nearest villages through fair process under ANE's regulations.	D	Not required	[During Const.] Confirm worker list once a month [After Const] Not required
	10. Water usage and rights	B	New wells shall be set up instead of affected wells and water place in the river.	D	Not required	[During Const.] [After Const] Periodical check of availability of water in the wells
	11. Public sanitation	C	Not required	C	Not required	Not required
	12. Infectious diseases such as HIV/AIDS	B	Healthcare education for workers and local residents (These fundamental mitigation measures are prescribed in ANE's regulation)	B	Periodical HIV/AIDS protection campaign should be carried out by relevant organizations	[During Const.] Periodical health check for construction workers by construction contractor [After Const] Observation of rate of infection disease such as HIV/AIDS by ANE in cooperation with Directorate of Health
Natural Environment	13. Topography and geographical features	C	Not required	C	Not required	Not required
	14. Soil erosion	B	Setting up appropriate slope protection such as covered by grass and gabion	B	Periodical monitoring and maintenance	[During Const.] [After Const] Periodical visual monitoring
	15. Underground water	B	In the case of closing down drinking water supply, the proponent should set up new wells or prepare water place in the river	B	If prepared new well does not have enough volume, alternative well shall be set up by ANE	[During Const.] [After Const] Periodical monitoring of water level
	16. Hydrological situation	B	In case of major change for hydrological situation, appropriate countermeasures shall be carried out	B	In case of major change for hydrological situation, appropriate countermeasures shall be carried out	[During Const.] [After Const] Periodical monitoring and maintenance
	17. Coastal zone (mangroves, coral reefs, tidal flats, etc.)	D	Not required (no impacts)	D	Not required (no impacts)	Not required (no impacts)

Items		Proposed Mitigation Measures				Monitoring Plan
		Rating	During Construction	Rating	After Construction	
	18. Flora, Fauna and Biodiversity	B	a) Minimize cutting of trees along the road and re-plant trees along the road b) Setting up sign boards for elephant migration and crossings (see details ""6.3.2 Key Issues and Impact Forecast") c) Implementation of environmental education for construction workers and inhabitants (prohibit cutting trees, development and dumping wastes without permission from local authorities)	B	a) Appropriate development plan and land use management under Ministry of Agriculture, Niassa Province and districts b) Control of illegal hunting and deforestation by Ministry of Agriculture, Province and districts	[During Const.] [After Const] Collect information from Directorate of Agriculture in Cuamba & Mandimba and inhabitants
	19. Meteorology	C	Not required	C	Not required	Not required
	20. Landscape	C	Not required	C	Not required	Not required
	21. Global warming	B	Not required	B	Not required	Not required
Pollution	22. Air pollution	B	Spraying water near residential areas to reduce dust level by construction contractor	B	Periodical cleaning of road surface to remove soil	[During Const.] Measure dust level near residential area once a month *Digital dust meter was provided to ANE through this feasibility study [After Const] Measure dust level at same current survey points to confirm effects of road improvement
	23. Water pollution	B	a) Chemical and waste oil shall be managed and stored in appropriate way, not discharged to rivers. b) Turbid water from construction areas shall be treated by sedimentation tanks	B	Treatment of organic polluted water from urbanized areas by districts	[During Const.] Measure turbidity in some rivers once a month [After Const.] Not required
	24. Soil contamination	C	Not required	C	Not required	Not required
	25. Waste	B	a) Chemical and waste oil shall be managed and stored in appropriate way, not discharged to rivers. b) Construction waste and night soil from base-camps shall be managed and disposed in compliance with the law	B	Establish of solid and liquid waste management system in urbanized area by districts	[During Const.] Periodical monitoring once a month [After Const.] Not required
	26. Noise and vibration	B	a) Fixing construction work hours (daytime only) b) Consideration for praying times and Sunday	B	Set up soundproof wall (more 1.8m) for schools and health centers within 300m from boundary of clearance area	[During Const.] Measure sound level near residential areas, schools and health centers once a month *Digital sound level meter was provided to ANE through this feasibility study [After Const] Measure sound level at same current survey points for confirm effects of road improvement
	27. Ground subsidence	C	Not required	C	Not required	Not required

Items		Proposed Mitigation Measures				Monitoring Plan
		Rating	During Construction	Rating	After Construction	
	28. Offensive odors	C	Not required	C	Not required	Not required
	29. Bottom sediment in sea and rivers	C	Not required	C	Not required	Not required
	30. Traffic accidents	B	a) Education on traffic rules and safety for workers b) Employing staff for traffic control and traffic safety	B	a)Traffic safety campaign by police and relevant organizations b) Installation of traffic safety facilities such as zebra crossing and sign boards in the town sections.	[During Const.] [After Const.] Periodical monitoring of accident cases once a month

Note 1) “Not required” : if some impacts are identified in EIA, adequate mitigation measures should be taken by ANE and relevant organizations

Chapter 5 Recommendations for the EIA and Design

The following are the recommendations for the EIA and the Design.

5.1 TOR for EIA

- Mozambique's EIA guidelines cover most of the important issues that are included by other relevant guidelines such as those from JBIC, JICA and AfDB. However, Mozambique's guidelines do not present much detail on social areas. These social items should be added to the TOR for the EIA, and the revised TOR was accepted by ANE in June 2009.

- With regard to the stakeholder's meetings, ANE in cooperation with JICA held preliminary meetings in May 2009 with the affected persons. However, ANE should hold other additional stakeholder meetings in the EIA scheme and RAP after the new alignment has been confirmed. In the EIA scheme, stakeholder meetings shall be held twice at least in the scoping stage and draft EIA stage.

5.2 Appropriate Environmental and Social Consideration for other relevant activities

Detailed information regarding quarry sites and borrow pits are not given due to feasibility study at the moment. Environmental permission for opening new quarry site and borrow pits will be required from provincial MICOA, however, it is very difficult to have the permission since such sites are decided and procedures for environmental approval are taken by construction contractors in the construction stage. Thus detailed candidate sites shall be surveyed and evaluated in detailed design stage by environmental consultants.

Chapter 6 Current Progress of Environmental and Social Considerations in Mozambique

GAT in ANE will undertake the required EIA procedures based on the following proposed timetable.

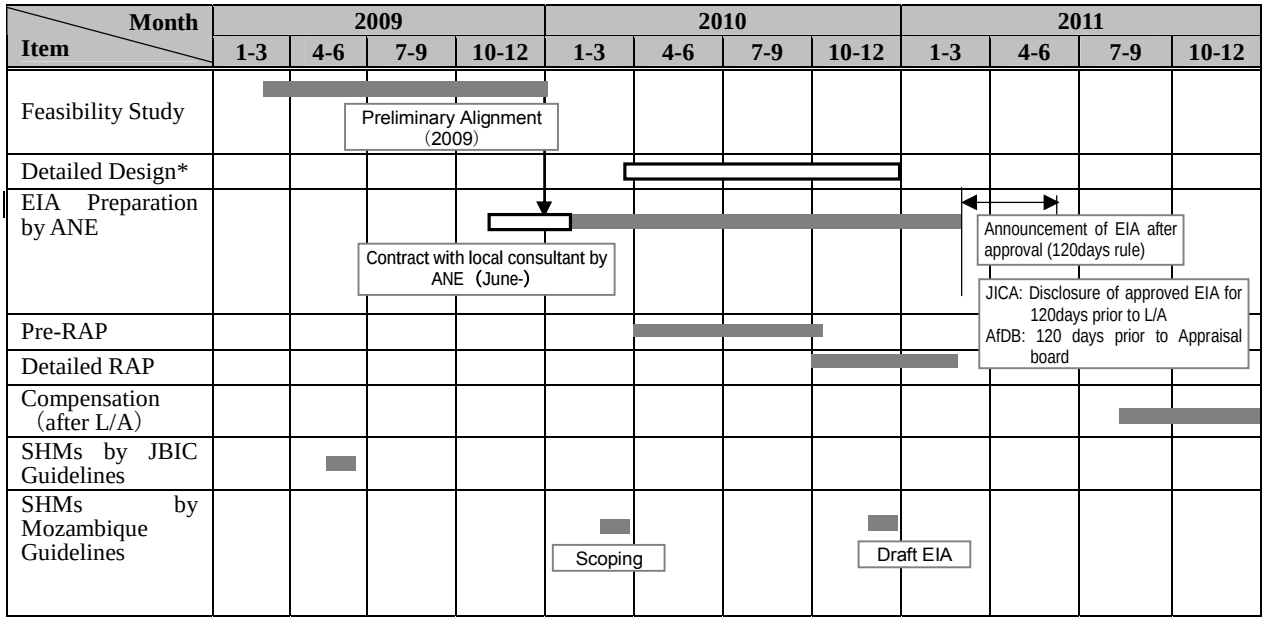
ANE is contracting an environmental consultant for carrying out the EIA and RAP study at the moment. And ANE will be able to receive EIA approval from MICOA by end of 2010.

Table 6.1.1 Proposed EIA Timetable and Current Progress (2009-2010)

Year/Month / ITEM	2009				2010											
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec-March
Prequalification for environmental consultant	■ ■ ■ ■															
Preparation of proposal report, evaluation		▬	▬	▬												
Negotiation and contract with local consultant					▬											
Baseline survey based on the FS (including review screening and scoping by MICOA)						▬	▬	▬	▬	▬	▬	▬	▬			
Preparation of EIA and RAP											▬	▬	▬	▬	▬	
Review, Revised and Approval draft EIA report (by MICOA)																▬
SHM (public consultation for EIA)							1st ▲			2nd ▲						

Note) DD: Detailed design for Cuamba- Mandimba section

Table 6.1.2 Long Team EIA Process Schedule (Tentative)



*: It is expected in the Cuamba-Mandimba section at the moment

Appendices

Appendix-A

Minutes of Stakeholder Meeting

(May 2009)

ADMINISTRAÇÃO NACIONAL DE ESTRADAS

Visto,
O Director:

_____

Data: 02 / 06 /2009

Meeting Minutes for Stakeholder Meetings

Name: Artur Chilaule e Leonel Arlindo da silva

Posission: Tech. Sup. N2

General Direction GAT

Report / GAT (Cross Cutting Issue Section: Environment Section) Date: 02/06/2009

Visited Province: Niassa

1. Introduction:

Visited the province of Niassa for the project of Nacala development corridor road improvement (N13 Cuamba-Mandimba-Lichinga) in the districts of Ngauma, Mandimba and Cuamba from 19th to 23rd of May, ANE technician composed of Mr Leonel da Silva and Artur Chilaule, from JICA Mr. Kuroki, Muto, Toda and Sasaki

Objective of the Visit:

-Public consultations

PRESANTAION

1- EXPLANATION ABOUT THE STUDY PLAN WAS DONE POSETIVLY

1-1 STUDY AREA

- Cuamba-Lichinga (approximately 305km)

1-2 ACTIVITIES OF THE STUDY

1-2-1 Analysis of the viability of road improvement (just study phase not construction phase)

-Trafic survey

-Survey of roads and bridges conditions.

-Survey for border construction in Mandimba

-Topographic and natural conditions survey.

-Analysis of road alignment and alternatives

-Analysis of natural and social environment.

2-Reginal development plan

-Rural development program

1-3 POSETIVE IMPACTS EXPECTED

1-3-1 Direct Posetive Impacts

-Reduction of travel time (to major cities, hospitals and schools.

-Reduction of fuel consumption for cars and motorcycles

-Easy driving /circulation of motorcycles and pedestrians

-Reduction of road acidents and car break down

- Increase of transport for income agriculture products

- Dust reduction

1-3-2 Indirect Posetive Impacts

- Increase of employment opportunities in the nearest big cities

- Reduction of prices of goods and Fuel

2- EXPLANATION ABOUT THE NEGATIVE ENVIROMENTAL AND SOCIAL IMPACTS

2-1 WHAT IS E.I.A?

EIA: Environmental Impacts Assessment

- Mozambique and JICA have to forecast and mitigate the environmental impacts before the construction of the infrastructure

- EIA includes the following, survey, analysis and evaluation.

a) Social Environment

Resettlement, use and expropriation, impacts of culture, gender and economy

b) Natural environment

Fauna, flora, soil erosion and geographical characteristics

c) Pollution

Pollution of air, water, noise, vibration, waste and soil

2-2 EXPECTED NEGATIVE IMPACTS

2-2-1 Direct Negative Impacts

- Resettlement (depending on the road alignment)

- Pollution during construction (noise, vibration, dust and traffic congestion)

2-2-2 Indirect Negative impacts

- Spread of infectious diseases such as HIV /AIDS

- Acceleration of deforestation caused by charcoal production

- Pollution caused by urbanization (noise management, water pollution etc

RIGHT OF PASSAGE

3- EXCHANGE OF VIEWS

1. Information along the road

a) Elephant corridor

b) Land mines

2. Problems of development (Actual problems in communities)

a) Social economic problem other than those related to the road

3. Questions about the study

4. Formulation of consensus about the project

Public consultation meeting had the following sequence

1. Ngauma, 20 de Maio 2009 Ngauma, 20th of May 2009

The opening of the session was guided by her Excellence the District administrator; she highlighted the importance of the project to the province of Niassa, with a particular emphasis on Ngauma district.

Then Mr. Kuroki of JICA made a presentation which was well understood by the people present. At last people started asking some questions.

In their first speech, community leaders welcomed the project and said it was expected since long time. They said Lichinga-Mandimba section is an elephant corridor and there were some occasional crossing from one said to another in search of water in Mulukumese river and Lugenda river.

Then Mr. Vicente Kalamule wanted to know from the presenter if the project has some resettlement plan in case if it goes through some populated area. He also wanted to know what will be done to avoid and prevent sexually transmitted diseases, including HIV and AIDS

I wanted to know what method the road constructor would use when hiring labor during construction.

Mr. Mateus raised the problem of dust due to poor condition of the road and said the project will be welcomed, since heavy machine will be used for road alignment, he wanted to know what will be done about the cemeteries historical places and sacred. In addition he wanted to know what will be the destination of old bridges in this project.

Mr. Manul Pedro, a journalist said that the new road alignment will reduce curves thus minimizing the number of accidents.

Mr. Zimbabwe Janeto said that one of the factors that have delayed the socio –economic development of the district, is the lack of an asphalt road, electricity and drinking water. He also said that one of the ways to minimize diseases such as diarrhea would be the provision of drinking water and decent houses to the people.

In his speech, the Permanent secretary said not everything was going bad, since there was great Improvement in expansion of schools and health network, but farmers experience many problems of market when selling their agriculture products due to lack of access road.

Responding to some of the raised issue, Mr. Sasaki clarified all the phases of the project until execution, He said the initial phase is the general plan and at this moment is a feasibility study phase which would end in January 2010, After this phase a detailed design of the project will follow which might enable the Mozambican government to manage some road funds from its co-partners.

Regarding the problems of resettlement, cemeteries, cultural sites and sacred, Mr. Chilaude explained to the people present that during the detailed design phase there would be taken all possible steps to ensure that the alignment will not pass through these sites and where there is no alternative, each case will be analyzed and given its final destination(Compensated)

After the Permanent secretary closure meeting the entire participant were invited for launch

2. Lichinga, 20th May 2009

The opening session was guided by his Excellence the Permanent secretary, He highlighted the importance of the road to Niassa province, in particular the city of Lichinga. In addition he said that the road rehabilitation project could bring some negative impact, but never at any time should overcome the positive impacts. He also informed people that their policies already defined for expropriation and should be respected by both parties involved

Ms. Permanent secretary congratulated the Japan International Cooperation Agency and ANE for what they are doing to take Niassa out of anonymity since it is reach in mineral resources and agriculture but there is a setback of roads.

Mr. Kuroki made a presentation which was clearly understood by the participant. At last the participant started asking some questions.

Mr. Daniel Guidione asked what road improvement means, he added saying that the road has been improved various times but they have negative results and he proposed the construction of a paved road with two lanes

Ms. Permanent secretary responded saying that it was only a problem of terminology, when we talk about road improvement we mean that the study that is being done is for the construction of an improved paved road

The Mayor recommended that the people doing the study should be careful of land mines and other military weapons that might exist along the road; he also recommended that there should be good collaboration between various institutes. He also talked about the possible existence of sacred places, culture, historic and cemeteries along the alignment and people, who are affected, should have a special consideration.

In addition he explained that there was no elephant corridor, but only a few elephants have been noticed crossing in the zone near Lugenda River.

The Permanent secretary said that a study about the existence of land mine has been carried out and the results are with the Institute of Deming

In addition the permanent secretary said that the construction of Cuamba, Mandimba, Lichinga road will create other types of investments along the road for example the fixing of mobile phone antennas.

The head of JICA Study Team asked, why the road Cuamba, Mandimba road has not been constructed until now.

One of the participants said that there was lack of interest by the government to develop Niassa province probably the government has other goals to achieve.

The permanent Secretary responded immediately and said that the country has got three development corridors, in particular Maputo, Beira and Nacala. She explained that the government has its plans for implementation of projects and due to scarcity of funds it has not been possible to carry out all of them simultaneously

At the end of the meeting a snake was served for all the participants.

3. Mandimba, 21st May 2009

The opening of the session was in responsible of the senior member of the District Government on the behalf of the District Administrator, having highlighted the importance of the project for the province of Niassa, with emphasis on Mandimba district, he said the road is the central point of all projects.

In addition he said that the road rehabilitation project is welcomed in the district because it will allow a fast connection between Mandimba, Lichinga and Cuamba thus causing a rapid development for the districts. He also highlighted that it is through Mandimba that Nacala corridor connect Malawi.

Soon after the opening speech Mr Artur Chilaule made a presentation that was well understood by the participants and at the end of his speech people started asking some questions.

One of the community leaders wanted to know if the road rehabilitation is about a compacted dust road or asphalt road, since every year the road cannot be used in rain season.

They wanted to know what will be done in case road alignment passes through farms, cemeteries, local historical, culture and sacred, in addition they wanted to know what will be done about the old bridges in this project.

Without wasting time the speaker explained to the participant that during the detailed design phase all possible steps will be taken to ensure that the alignment does not pass through these sites, where there are no alternative, each case will be analyzed and given its destination accordingly, he explained that it is impossible for a project of this scale not to bring negative impacts directly or indirectly but they are not of large scale that's why at this stage there are doing community consultation so that the community can contribute for the successes of the project and there are a part of it, he said " this project is yours and you must participate actively in order to minimize negative impacts" to the participants.

At the end there was a look of hope on the faces of the participant, they thanked the work being done by JICA and ANE and they asked the two to work seriously on the study phase up to the start of the road construction.

Lunch was served to all the participants

4. Cuamba, 22nd May 2009

In Cuamba the opening speech was done by the District Administrator, he highlighted the importance of the project for the province of Niassa in particular for Cuamba district

In addition he said that the road rehabilitation project is welcomed by the district because it will allow a rapid connection between Cuamba, Mandimba and Lichinga and as a result the district will develop fast.

The participants wanted to know if the project Cuamba-Mandimba-Lichinga was the same with Nampula Cuamba project and whether there is or not interference between them. There also wanted to know if the project Nampula Cuamba has already been financed. In the context of the question a participant asked if ANE has any policy for maintenance of the roads that it is building or not and if it was possible to hire them as labor in this project.

Mr. Sasaki explained that they were two different projects, and that the detailed design for Nampula-Cuamba has already been concluded and the next stage will be implementation. He explained that Cuamba-Mandimba section will be financed by AfDB(African Development Bank).

About the road maintenance, Mr Arthur Chilaule said this matter should be dealt with in other meeting since the present team is composed of environmental and social expects

As regards to the recruitment of local labor he said this can only be done at the project execution stage and there is clause which mentions this in the contracts

At the end of the meeting a delicious lunch was served and shared with all participants

Summary: all communities and community leaders are expecting this project with great anxiety and some of them even think that it is taking

time, but we explained that it is necessary to follow all steps necessary and that everything depends on the study that is being carried out.

We had a positive assessment in all places where we had meeting scheduled and we were warmly received

Maputo, 2rd June 2009

Appendix-B

Attendance List of Stakeholder Meeting (May 2009)

Ngauma
1/3

Attendance List for the Stakeholder Meeting

Title : Stakeholder Meeting for the Cuamba-Lichinga Road Improvement

Date : 20th May, 2009

Venue : Ngauma

No	Name	Organization	Position	Contact Number	Signature
1	matamanda S.Taju	Regulo matamanda			matamanda
2	Gabriel Tomás Farahane	Padre Anglicano	Padre		Gabriel Tomás Farahane
3	Duarte A. Musse	SDPI	Director	825850079	82 - [illegible]
4	JOSÉ CARLOS MTAMBO	S.D.A.E	DIRECTOR	82-7211858	[illegible]
5	Vicente B. Kalamale	ÍBIS	F. TEMÁTICO	Kalamale2004@yahoo.com.br	[illegible]
6	Felisberto A. Maquiche	Observatório R.Nacional	Observador	827400981	[illegible]
7	Marcos Moisés Banaca	Animador Católico	Animador		[illegible]
8	João Catumbo	SDEJT	Director	828141578	[illegible]
9	Mitamba Mtalica	Regro			[illegible]
10	Aly Saide	PRM	CDTE	826361694	[illegible]

Ngauma
2/5

Attendance List for the Stakeholder Meeting

Title : Stakeholder Meeting for the Cuamba-Lichinga Road Improvement

Date 20th May, 2009

Venue : Ngauma.

No	Name	Organization	Position	Contact Number	Signature
1	Zimbabwe Janato	Secretario-sede		~~82~~	
2	Maunde Airo	Servente -Hosp.			
3	Manuel Pedro	Comunitária	Jornalista		Manuel Pedro
4	ELIAS CAETANO PEDRO	GOVERNO DISTRITO	SPD	827612356	[illegible]
5	Diamantino João	SDAE-Ngauma	Auxiliar Tecnico	829755435	Diam
6	Moressi Chipala	Radio Communitario ~~Vice-presidente~~	Vice-presidente ~~Radi~~	82-9952751	Moressi Chipala
7	António Matias	Representante R. Chitobi		46.000	[illegible]
8	Belinho J. Beuk	Rep. TBS	T. T.	825406922	B Beuk
9	Manuel Domingos	Chefe da Repartição da Cultura J. Desportos	Chefe da Repartição		[illegible]
10	Maria Adelaide Machiza	Governo distrital	Administradora	828877580	Adelaide

Ngauma
2/3

Attendance List for the Stakeholder Meeting

Title : Stakeholder Meeting for the Cuamba-Lichinga Road Improvement

Date : May, 2009

Venue :

No	Name	Organization	Position	Contact Number	Signature
1	Moises Adamo	C/Posto Administrativo		82.47.15620	
2	Carmita Sueta	Secret. Distrital			
3	Arnaldo Ibraimo Hage	Secret. Distrital			
4					
5					
6					
7					
8					
9					
10					

Lichinga
1/4

Attendance List for the Stakeholder Meeting

Title : Stakeholder Meeting for the Cuamba-Lichinga Road Improvement

Date 20th May, 2009

Venue : LICHINGA

No	Name	Organization	Position	Contact Number	Signature
1	Augusto L. Assique	CMCL	PCM	823030687	[illegible]
2	Domingos A. Meque	CHIKWETI	Director	826230074	[illegible]
3	Mário Carimo	G.D. Lichinga	Chefe do Posto Admin. Lione	826077231	[illegible]
4	Carlito Vasco Nipuaite	G. D. Lichinga	c/ Posto Administrativo	824273485	[illegible]
5	Paulo Américo	SDEJT Lichinga	Chefe da Repartic E.G.	824599163	[illegible]
6	Paulo Aurélio	Lichinga-Sede	Chiuaula	823980019	[illegible]
7	Tugaloni Wile	Lider comunit	Chimbonila	—	Tugalone
8	Jassimo Abinala	Régulo	Chimbunila	826623800	[illegible]
9	Bonifácio Anussa	Lider religioso	Chimbunila	828117746	[illegible]
10	Joni Ajade	Régulo —	cidade	827745586	[illegible]

Lichinga
2/4

Attendance List for the Stakeholder Meeting

Title : Stakeholder Meeting for the Cuamba-Lichinga Road Improvement

Date 20 May, 2009

Venue : LICHINGA.

No	Name	Organization	Position	Contact Number	Signature
1	Estevão Jasso	C.M.C.L.	Vereador	82681485O	
2	Namassaya Adine	C.M.C.L.	Vereador	824992330	
3	Daniel Guiliche	CMCL	Vereador	824273326	
4	Ussene Omar Amisse	CMCL	Vereador	828277799	
5	Cristina Maria Domingos	SPOPH	Chefe de Planificação	827038880	
6	Eduardo Furia	MLT	Operation Manager	820741480	20.05.2009
7	Esmeria A. Gabriel	SDAE	Directora do Serviço	820562370	
8	Fernando A. Bandasse	Distrito - Lichinga	Secretário Permanente	826102727	
9	JUMA TARATIBO	GO Lichinga	Administrador substituto	827773115	
10	Hideyuki SASAKI	JICA Study Team	Deputy Team Leader		

Lichinga
3/4

Attendance List for the Stakeholder Meeting

Title : Stakeholder Meeting for the Cuamba-Lichinga Road Improvement
Date : 26th May, 2009
Venue : LICHINGA

No	Name	Organization	Position	Contact Number	Signature
1	Bernardino Nhachungo	ANE	Técnico	82 390 4390	
2	TITO GOUVEIA	FUNDAÇÃO MALONDA	DIR. OPERAÇÕES	823186060	
3	ANDRÉ JONAS	NOTÍCIAS, SA	JORNALISTA	826917001	
4	PAULO OAZIMOTO	TVM	JORNALISTA	820894690	
5	Fernando M. Uacha	CMCL	Administrador	827445794	
6	Lucas Lopes	TVM	Operador de Câmara	828271103	
7	Olga Alcaia	DPAcções Ambientais	chefe do Depto	826660520	
8	Alberto Enoque	D. P. Agricultura	Técnico	824683530	
9	Saho Toda	JICA			
10	Hirashi MUTO	JICA			

4/4
Lichinga

Attendance List for the Stakeholder Meeting

Title : Stakeholder Meeting for the Cuamba-Lichinga Road Improvement

Date : May, 2009

Venue :

No	Name	Organization	Position	Contact Number	Signature
1	Abel Lucas	ATRAN'S.	Presidente	828605617	
2	Hiranori KUROKI	JICA			
3					
4					
5					
6					
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8					
9					
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Attendance List for the Stakeholder Meeting

Title : Stakeholder Meeting for the Cuamba-Lichinga Road Improvement

Date 21st May, 2009

Venue : MANDIMBA.

No	Name	Organization	Position	Contact Number	Signature
1	Bento F. Nicuassala	Chefe da Localidade			
2	Winesse Ndalo	Macedinha	Regulo		
3	Bernardo Namucha		Delegado M		
4	Manuel Atitende		Regulo		
5	Mulone Filipe		Secretário		
6	Rasmo Benesse		chefe Local.	827245495	
7	ALBINO MAMO		régulo Mapulo		
8	Gémola Saide		Conselho Islamico	829512718	
9	Jassin Salimo		secretario		
10	Afonso Vaeque Muaco	SDPI	Director.	825969531	

M

2/2

Attendance List for the Stakeholder Meeting

Title : Stakeholder Meeting for the Cuamba-Lichinga Road Improvement

Date : 21st May, 2009

Venue : MANDIMBA.

No	Name	Organization	Position	Contact Number	Signature
1	Carminda José Abudo	Directora de Trabalho			[signature]
2	Inácio Salimo	Técnico Prof.		829235064	[signature]
3	Salur Basílio Augusto	Téc. Agrário		825969503	[signature]
4	João A. Malaca	Auxiliar fd.		829230693	[signature]
5	Amigo Sitar	STANGE CONSULT		82 5523679	[signature]
6					
7					
8					
9					
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1/3

Attendance List for the Stakeholder Meeting

Title : Stakeholder Meeting for the Cuamba-Lichinga Road Improvement

Date 22nd May, 2009

Venue : CUAMBA.

No	Name	Organization	Position	Contact Number	Signature
1	Yafar Goriate	CISLAMO		825465339	[signature]
2	Carlos Arade	Caso			[signature]
3	Orlando Amir	coordenador		826461680	[signature]
4	Idrissa Limbichiue	Cabo			[fingerprint]
5	[illegible]	Director Mepula		826461680	[signature]
6	Simão [illegible]	chefe do Posto		821452580	[signature]
7	AUGUSTO S. TAIBO	COORDENADOR		827	[signature]
8	BAPTISTA [illegible]	[illegible]		8272 40 46	[signature]
9	Albert [illegible]	R. [illegible]		82[illegible]53[illegible]	[signature]
10	Buela [illegible]	CABO CHUVELA			[signature]

Attendance List for the Stakeholder Meeting

Title : Stakeholder Meeting for the Cuamba-Lichinga Road Improvement

Date 22nd May, 2009

Venue : CUAMBA.

No	Name	Organization	Position	Contact Number	Signature
1	Daiross Paissi	cabo da sede			[fingerprint]
2	Joaquim gilberto gomes	CMC-Cuamba	tec. urbanizaçã	82-5473055 84-6412188	[signature]
3	Lúcio B. Salimo	FORASC	Presidente	82-7074960	[signature]
4	Arthur Kangan	AGECA-Private sector	Chairman	848890210	[signature]
5	Pedro Manjate	Cristã	Animador	826650840	[signature]
6	Abdul Omar	FORASC	Secretário	824248890	[signature]
7	Vasco A. Arruda	S.D.P.I. Cuamba	S.D.O.P.H. cuamba	828036810	[signature]
8	Manuel Cabral Breia	Governo	Adm/Dge	8254644	[signature]
9	[illegible] C.T.	A.M.	Presid. A.M.	823054523	[signature]
10	Arnaldo Malaga	Pres. Mun.	Pres. Munic.	823054552	

Attendance List for the Stakeholder Meeting

Title : Stakeholder Meeting for the Cuamba-Lichinga Road Improvement

Date 22nd May, 2009

Venue : CUAMBA.

c/ 8/3

No	Name	Organization	Position	Contact Number	Signature
1	MANUEL DELGADO	SAN/JFS	DIRECTOR GERAL	827375621	[signature]
2	Aurélio Florêncio	MOç. Leaf Tabac	Administ.	827083290	[signature]
3	Remo Jerónimo Metela	Membro Consultivo	Agricultor	828633314	[signature]
4	Adelino Paissone	S.D. TRABALHO	CHEFE SECTOR	823166736	[signature]
5	JOÃO M. PAUNDE	STANGE CONSULT	INSPECTOR	828484895	[signature]
6	Afonso Molande		Regulo Matias		[fingerprint]
7	[signature]	OXFAM	Cordinator	826908362	[signature]
8					
9					
10					

Appendix-C

Elephant Survey Sheet

(September 2009)

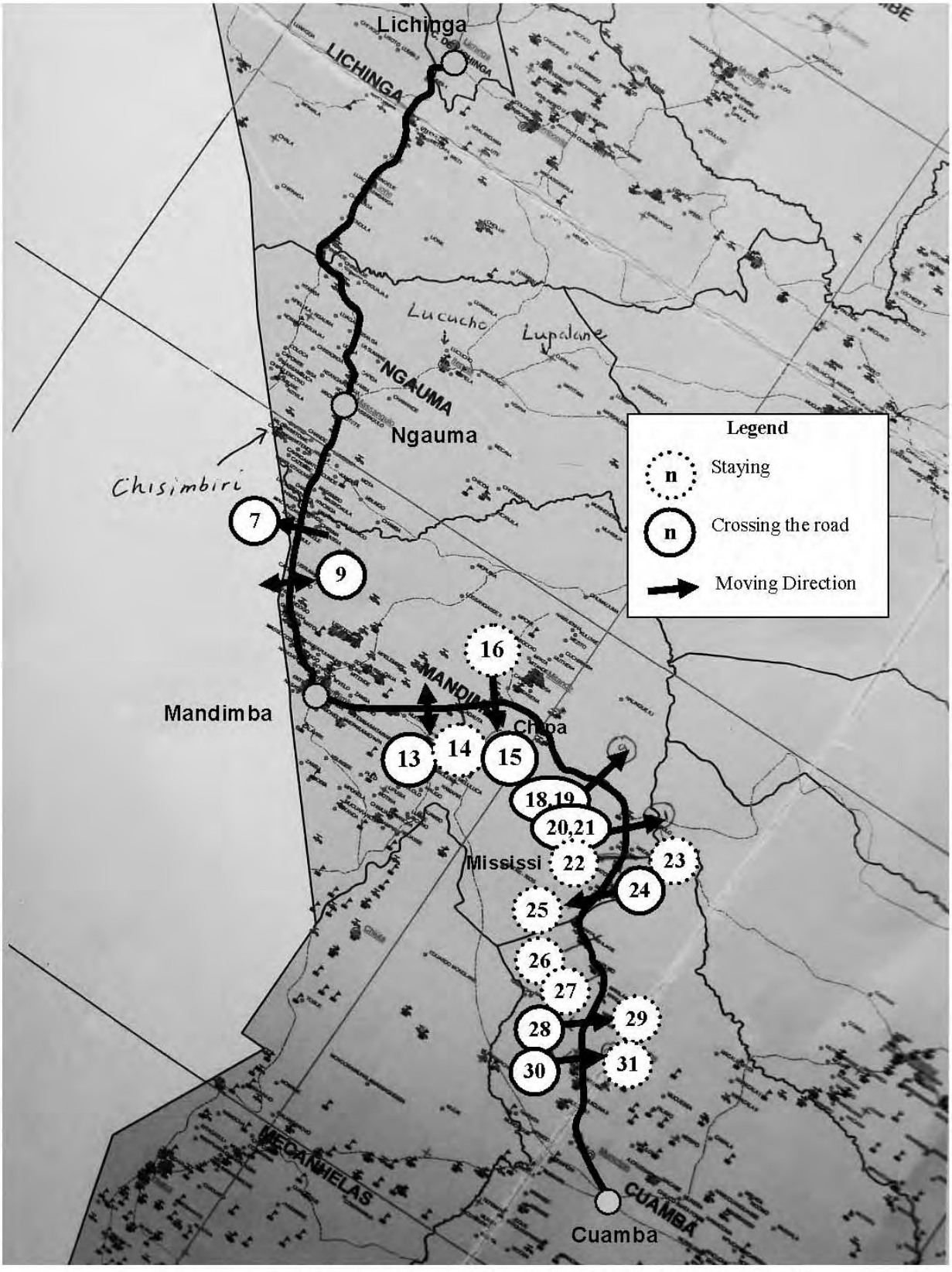


Figure 3.1.13 Elephant Observed Points along the EN13

Source: prepared by the JICA Study Team based on site interview survey from inhabitants in September 2009

Elephant Interview Survey

ID	Date	Time	Distance from Cuamba (km)	Distance from Lichinga (km)	coordinates E	coordinates S	Elevetion	Interviewee District	Interviewee Village Name	Interviewee Interviewee Name	Information regarding Elephant Where	Direction	When(year/month/date)	Numbers	Conflicts
1	03.09.09	8:15	296	0	25 15 00	13 20 11.3	1400m	Lichinga	Lichinga	Alube Momade	no	no	no	0	no
2	03.09.09	8:49	276	20	35 1457.9	13 28 14.4	1223m	Lichinga	Bombo	Winaci Inacio	no	no	no	0	no
3	03.09.09	9:15	256	40	35 15 07.6	13 45 15.2	1208m	Lichinga	Lione	Teresa Fransisco	no	no	no	0	no
4	03.09.09	9:43	236	60	35 16 52.2	13 45 15.2	1206m	Ngauma	Majiga	Benjamin Issufo	no	no	no	0	no
5	03.09.09	10:11	216	80	35 23 45.4	13 50 49.6	1329m	Ngauma	Chitumbi	Ambuye Biliate	no	no	no	0	no
6	04.09.09	14:19	205.5	90.5	35 25 28.2	13 55 33.6	1122m	Ngauma	Chima	Fernando John	no	no	no	0	no
7	03.09.09	10:33	196	100	36 26 24.0	14 00 07.9	1095m	Ngauma	Nacange	Carlos Iassin	Nacange	W to E	June 2008	3	no
8	04.09.09	14:00	186	110	35 28 07.8	14 05 24.5	975m	Mandimba	Matola	Quim Cassomo	no	no	no	0	no
9	03.09.09	10:58	176	120	35 29 23.8	14 10 34.9	940m	Mandimba	Kanje	Achimu Amade	Kanje	E - W/ W- E	Octomber 2008	3 + 3	Ate banannas
10	04.09.09	13:39	165.8	130.2	35 31 55.9	14 15 03.0	926m	Mandimba	Chedoko	Sober Chaibu	no	no	no	0	no
11	03.09.09	11:27	156	140	35 36 19.1	14 18 33.0	814m	Mandimba	Quilasse	Amise Nicute	no	no	no	0	no
12	03.09.09	12:22	136	160	35 44 52.8	14 19 42.9	725m	Mandimba	Achoho	Chavier Tizora	no	no	no	0	no
13	04.09.09	11:36	125.32	170.68	35 49 47.3	14 16 25. 2	665m	Mandimba	Lusangazi	Simon Waires	Chisangazi	E - W/ W- E	August 2009	4	Destroyed crops
14	03.09.09	12:42	116	180	35 53 41.6	14 13 17.1	642m	Mandimba	Machado	Elias Paulo	Machado	Staying	July,Aug & Spt 2009	30+	Eat Maize
15	03.09.09.	13:06	108	188	35 57 44.0	14 11 33.5	618m	Mandimba	Chipa	Amissi issa	Chipa	E -W	01.09.09	13	Ate banannas
16	03.09.09.	13:06	108	188	35 57 44.0	14 11 33.5	618m	Mandimba	Chipa	Amissi issa	Chipa	Staying	all over the year	20 this year	Eat Banannas
17	04.09.09	11:07	101	195	36 01 20.5	14 12 27.5	653m	Mandimba	Masserepa	Assiatu Amin	no	no	no	0	no
18	03.09.09	13:29	96	200	36 03 08.2	14 14 02.4	643m	Mandimba	Nacaisse	Lorencio Antonio	Nucaisse	W - E	29.08.09	2	Ate Peas
19	03.09.09	13:29	96	200	36 03 08.2	14 14 02.4	643m	Mandimba	Nacaisse	Lorencio Antonio	Nucaisse	W - E	August & september 2009	2 in 2 months	Distroy crops
20	04.09.09	10:46	86	210	86 18 85.5	36 08 39.3	675m	Mandimba	Namilanje	Eugenio Bonifase	Namilatu	W - E	01.09.09	5	Ate Peas
21	04.09.09	10:46	86	210	86 18 85.5	36 08 39.3	675m	Mandimba	Namilanje	Eugenio Bonifase	Namilatu	W - E	January - December 2008	groups of 5 to 2	Destroyed crops
22	03.09.09	13:53	76	220	36 12 26.5	14 16 09.0	692m	Mandimba	Mississi	Artur Augostinho	Mississi	Staying	2009/9/1	6	Ate beans & bananna
23	03.09.09	13:53	76	220	36 12 26.5	14 16 09.0	692m	Mandimba	Mississi	Artur Augostinho	Mississi	Staying	August 2009	5	Destroyed crops
24	04.09.09	10:20	66	230	36 14 07.0	14 21 11 8	732m	Mandimba	Micovola	Luis Adam	Micovola	E - W	02.09.09	3	Destroyed crops
25	04.09.09	10:20	66	230	36 14 07.0	14 21 11 8	732m	Mandimba	Micovola	Luis Adam	Micovola	Staying	Feb - Oct	groups of 3 to 8	Destroyed crops
26	03.09.09	14:21	56	240	36 13 38.8	14 26 05.4	697m	Cuamba	Mepulachem	Manuel Filizado	Mupulachem	Staying	August 2009	groups of 5	Destroyed crops
27	04.09.09	10:00	46	250	36 18 17.4	14 29 13.0	675m	Cuamba	Macoropa	Antonio Armando	Macoropa	Staying near village	August 2009	3	Destroyed crops
28	03.09.09	14:49	36	260	36 20 38.8	1 4 33 20.6	683m	Cuamba	Mojolo	Assuman Kororcolo	Mojolo	W - E	22.08.09	7	Ate maize
29	03.09.09	14:49	36	260	36 20 38.8	1 4 33 20.6	683m	Cuamba	Mojolo	Villagers	Mojolo	Staying	February to September	7 a day	Destroyed crops
30	04.09.09	9:30	27	269	36 21 39.1	14 38 07.9	670m	Cuamba	Mepica	Benjamin Goa	Mepica	W - E	August 2008	6+ 12	Destroyed crops
31	04.09.09	9:30	27	269	36 21 39.1	14 38 07.9	670m	Cuamba	Mepica	Benjamin Goa	Mepica	Staying near village	2009	groups of 2 or 3	Destroy crops
32	03.09.09	15:26	16	280	36 24 56.1	14 52 38. 2	632m	Cuamba	Makawe	Rodinho Assan	no	no	no	0	no
33	03.09.09	15:46	0	296	36 31 36.6	14 48 19.0	564m	Cuamba	Cuamba town	Traffic police	no	no	no	0	no
Total														"=167(Max for 2 years 2008 and 2009)	

Appendix-D

RAP Framework

The Preparatory Survey on Road Improvement Plan
in Nacala Development Corridor
(N13: Cuamba-Mandimba-Lichinga)
in the Republic of Mozambique

Proposed Outline of Resettlement Action Plan based on JBIC Guidelines

February 2010

The Preparatory Survey on Road Improvement Plan in Nacala Development Corridor (N13: Cuamaba-Mandimba-Lichinga) in the Republic of Mozambique

Final Report

Table of Contents

Proposed Outline of Resettlement Action Plan based on JBIC Guidelines

1. Introduction

1.1 Project Outline

The project road alignment will follow an existing road basically. Additionally, other structures and facilities such as drainage, bridges and culverts will be constructed on the same alignment. It is further expected that all of the existing gravel road will be paved.

The major concepts of design are as follows:

The upgrading of the Study road will essentially satisfy the geometric standards of SATCC for road safety; however, it is clearly important that the negative impacts on the social and natural environmental aspects be minimized. Accordingly, the following concepts of re-alignment were accepted through discussions between ANE and the Study Team.

- The existing centerline shall be followed in the towns and major villages to minimize of the necessity of resettlement
- Other sections shall satisfy the SATCC Standards but should as much as possible take into account the existing centerline
- Bridges considered to be in good condition shall be used with a view to minimize the initial capital costs
- Basically two design speeds, 100km/hr for Cuamba-Mandimba in flat areas and 80km/hr for Mandimba-Lichinga in mountainous areas were adopted to reduce the cost and for environmental reasons.

Major project's activities are shown in following table.

Table 2.1.1 Project Outline

Project Name	Road Improvement Plan in Nacala Development Corridor (N13: Cuamaba-Mandimba-Lichinga)
Major Activities	Type of Project: Road improvement (re-alignment, widening 10m with tow carriage way and pavement, app. 2m embankment and 5m for construction area) Road Distance : 302km (Cuamba-Mandimba 296km, Mandimba- Malawi border 6km) Design Speed : 100km (Cuamab-Mandimba), 80km (Mandimba – Lichinga), 60km (Mandimba, Masangulo and Lione Town) Planned Traffic Volume: 7,000 – 8,000 vehicles a day
Other Activities	Construction of border facilities in Mandimba (One Stop Border Post)

1.2 Legal Framework

Legal framework regarding resettlement is desivribed in article " 6.0 LEGAL FRAMEWORKS FOR RESETTLEMENT " in the Resettlement Policy Framework for the Road Sector, 2006 ANE.

Major relevant laws and guidelines are as follows;

1.2.1 Land Law

The current land law of Mozambique was established in 1997. This legislation covers regulation of the key aspects of land occupation and land use in Mozambique. Also covered in the legislation are the various scenarios of land acquisition, including among others:

a) The acquisition of the right of land use and benefit by customary occupancy,
b) The acquisition of the right of land use and benefit through the official channels;
c) The rules governing protection zones;
d) The relationship between the public and the Cadastral Services; and
e) The rights and duties of the title holders

Some of the Articles of relevance to construction projects are briefly described below:

Article 3 in the land law stipulates that land is the property of the government. This is also prescribed in Article 46 of the Constitution. Hence, land may not be sold, alienated, mortgaged or attached. The law stipulates that although land is owned by the government, all Mozambicans have the right to use land and benefit from it. Specifically, Article 9 provides for the acquisition of the right of land use and benefits by local communities; Article 10 provides for the right of land use and benefit by occupancy, in good faith, by national individuals.

And Article 18 stipulates in case of land acquisition "revocation of the right of land use and benefit for reasons of public interest, should be preceded by payment of fair indemnification and /or compensation"

The Mozambique Land Law Legislation, spelled out in Article 24, recognizes the rights acquired through the system of customary occupancy and the role of communities in the management of land, natural resources and conflict resolution. Article 27 provides for the requirements and modalities regarding consultation on land matters, with the local communities.

Article 30 dictates that the mechanisms for representation of and action by local communities, with regard to the rights of land use and benefit, shall be established by law; while Article 23 empowers District Administrators, to authorize applications for land use and benefit, in cases where there are no Municipal Councils.

The Land Law Legislation captures and observes internationally innovative features that facilitate equitable development, based on relations that are mutually beneficial to local communities and to investors whether these are national or foreign.

The Right of land acquisition (Article 86 of the new constitution of Mozambique) provides for individuals and entities to have the right to equitable compensation for expropriated assets and the right to a new and equal plot of land.

According to this article, the properties in question are assessed by nominated organizations and compensated by government. Generally, real estate (structures and compounds) is assessed by Ministry of Public Works & Housing, and agricultural land and crops are evaluated by the Ministry of Agriculture.

Lastly the Land Law governs the right of way with the provisions of Chapter II Article 8 about Partial Protection Zones. The following are considered partial protection zones:

The land occupied by motorways and four lane highways, aerial, surface, underground and underwater installations and conduits for electricity, telecommunication, petroleum, gas, and water, including a bordering strip of 50 m on each side, as well as the land occupied by roads including a bordering strip of 30 m for primary roads and 15 m for secondary and tertiary roads. Generally the "bordering strip" is understood to be outside the shoulder of the road.

1.2.2 Resettlement Policy Framework (RPF) for the Road Sector

A resettlement policy framework (hereinafter referred to as "RPF") was established in November 2006 and is being translated into Portuguese by ANE with support from the World Bank. This RPF will be considered in all projects (starting from 2007) for carrying out the social impact assessment and preparing the Resettlement Action Plan (hereinafter referred to as "RAP").

The RPF has two basic objectives:

a) To provide a policy framework that will guide the preparation of any future Resettlement Action Plan for the road sector. The RPF is prepared based on the policies of the GOM and the World Bank.

b) To provide a framework for RAP for the three road sections to be rehabilitated namely Jardim-Benfica, Xai-Xai – Chissibuca and Massingue-Nhachengue . (The Resettlement Action Plan for the above three road sections has been prepared as a separate document)

This RPF establishes the general principles to be considered in preparation of RAPs. The RPF will be required whenever the final section and alignment of roads to be constructed, rehabilitated or maintained under the project are not precisely known. Once a segment of road is selected and designed, a detailed RAP will be prepared in order to guide land acquisition and resettlement activities of that particular section.

The RPF is intended to outline procedures for future road development activities to ensure that where acquisition of land and other assets, or impact on livelihood by the project activities is inevitable, resettlement and compensation activities for lost resources shall be conceived and executed in a sustainable manner. This entails providing for sufficient investment resources to meet the needs of the persons affected and/or displaced from their habitat and resources.

It also requires adequate a process of collaborative consultation and consensus building to achieve an agreement with the project-affected persons (hereinafter referred to as "PAPs") to ensure that they maintain or improve their livelihood and standards of living after the project.

Basically all activities relevant resettlement and compensation on this project will be carried out based on this RPF, accordingly ANE/GAT.

2. Scope of Land Acquisition and Resettlement

2.1 JICA's Requirements and Items to be surveyed in the RAP

JICA's requirements in RAP and current progress are shown in the next table.

JICA's Requirements and Items to be Surveyed in the RAP

Item to be reviewed (JICA's Proposal Items for RAP)		RPF	Results of JICA Study	RAP
1.Land acquisition	1-1 Map of the area and villages affected by land acquisition	Census in affected area is conducted based on article "4.0 ESTIMATED POPULATION DISPLACEMENT AND CATEGORIES OF AFFECTED PEOPLE" in RPF.	Affected area is shown in drawings. But alignment is the feasibility study level	Detailed affected area will be identified and finalized based on detailed design (hereinafter referred to as "DD") study.
	1-2 Total land area acquired for the project	↑ Ditto	Estimated area based on preliminary design is shown in **2.2 Estimated Impact Forecast based on Preliminary Alignment in Feasibility Study**	↑ Ditto
2. Population/households affected from land acquisition and resettlement	2-1 Total number of PAPs	↑ Ditto	↑ Ditto	↑ Ditto
	2-2 Size of relocation (number of population/households to be relocated)	↑ Ditto	↑ Ditto	↑ Ditto
	Size of those who lose their assets	↑ Ditto	↑ Ditto	↑ Ditto
	2-3 Size of those whose business, occupation, work are adversely affected	↑ Ditto	↑ Ditto	↑ Ditto
3. Census and Inventory of losses	3-1 Demographic, education, income and occupational profiles of PAPs	↑ Ditto	Census is not conducted due to this being the preliminary alignment stage.	Census shall be conducted in RAP survey based on detailed design.
	3-2 Land type and land use(agricultural, residential, commercial land)	↑ Ditto	↑ Ditto	↑ Ditto
	3-3 Type of crops and trees	↑ Ditto	↑ Ditto	↑ Ditto
	3-4 Buildings type (size, materials used)	↑ Ditto	↑ Ditto	↑ Ditto
	3-5 Inventory of common property resources	↑ Ditto	↑ Ditto	↑ Ditto
	3-6 Inventory of assets to be acquired	↑ Ditto	↑ Ditto	↑ Ditto
	3-7 Existing civic facilities and infrastructure, etc.	↑ Ditto	↑ Ditto	↑ Ditto

2.2 Estimated Impact Forecast based on Preliminary Alignment in Feasibility Study

2.2.1 Current Situation

The target road is called the N13 (National Road 13), and it passes through Cuamba Municipality, Cuamba District, Mandimba District, Lichinga Municipality and

Lichinga District. All municipalities and districts are located in Niassa Province.

As described in Article "1.2.1 Land Law", the Right of Way (ROW) for national roads extends to 30m outside the shoulders of the existing roads, on each side.

According to a reconnaissance survey, done while driving, there is a total of approximately 5,800 structures. Most of structures are permanent and built by natural materials such as clay, bricks and a thatched roof. Kiosks which are observed in Nampula-Cuamba section are not located between Cuamba and Lichinga because there are no passenger trains in this section.

Furthermore, preliminary stakeholder meetings were held in the Study Area by ANE with support from the JICA Study Team. During such meetings ANE explained to the stakeholders that the GOM will compensate any property such as structures and crops in case this would be required for resettlement and land acquisition purposed.

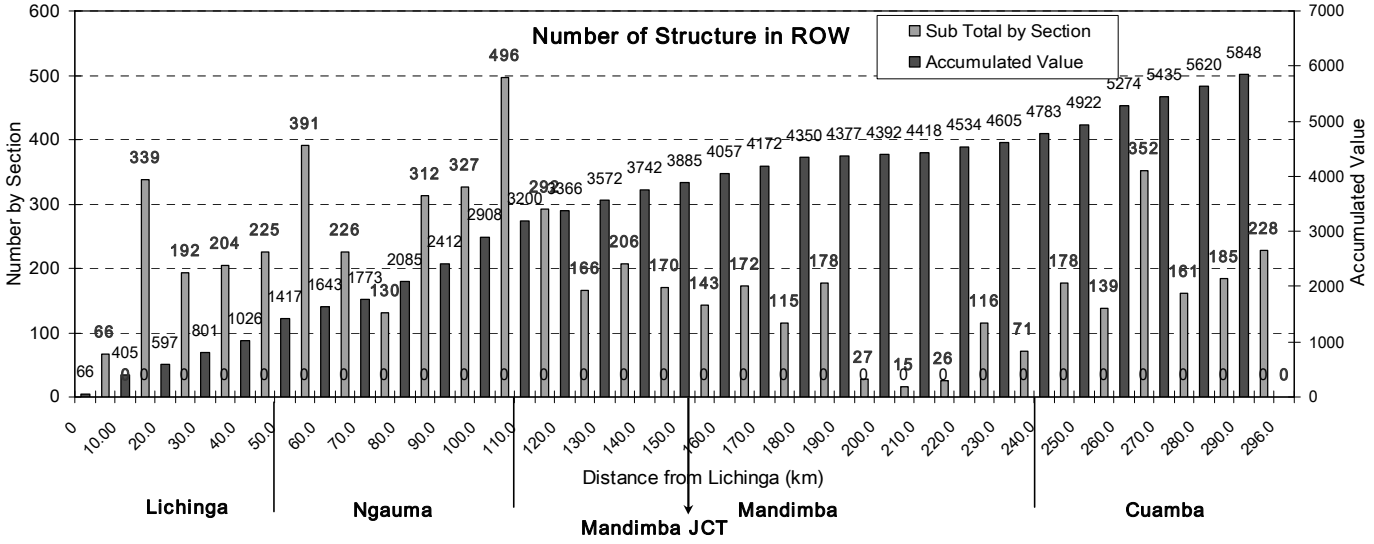


Figure 2.2.1 Number of Structures in Right of Way

Source: JICA Study Team

2.2.2 Impact Forecast based Preliminary Alignment and Recommendation

Approximately 6,000 structures are located in the right of way (within 30m from road shoulder) based on preliminary survey. The exact impact is unknown at the moment until detailed alignment is defined. However, the same concept as Nampula-Cuamba section shall be adopted between Cuamba – Mandimba Section.

The recommended concept is Corridor of Impacts (hereinafter referred to as "COI") - it means area which is affected and developed by construction of new road and diversion during construction period. Image of COI is shown in below.

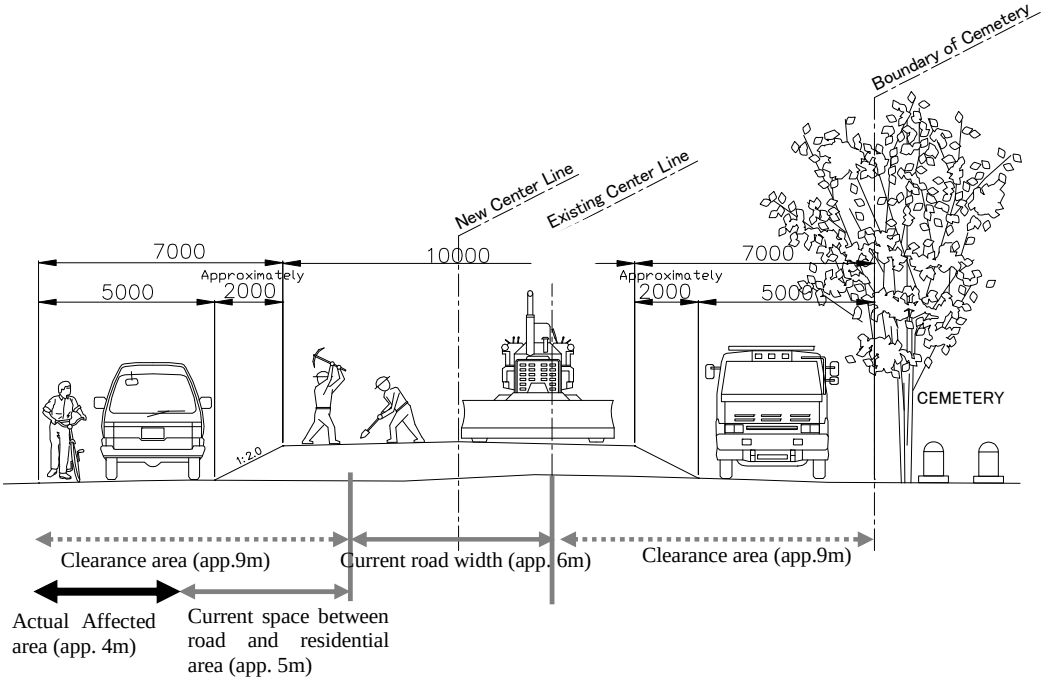


Figure 2.2.2 Image of COI Concept
Source: prepared by the Study Team

Current road width is approximately 6m, thus additional developed width is 9m. However most of structures are located away at least 5m from road shoulder currently, thus affected area is estimated at about 4m in width.

Predicted number of affected structures is 5,848 for full ROW and 390 structures for COI concept.

With regard to section of Mandimba - Malawi border, 295 structures are counted in ROW, thus a bypass alignment as a mitigation measure is adopted from the view of economic and social consideration. This bypass alignment will affect 25 structures.

Table 2.2.1 Estimated Affected Numbers of Structures in ROW

Number of Alternative	Clearance Width of ROW (each side from road shoulder	Other Conditions	Affected Number of All Structures	Affected Number of Structures per km	Remarks
Alernative-1	Approximately 30m (total 60m width 30 + 30 + road width without shoulder)	Including all towns and villages	5,848	19.8	Concept: Full-ROW 30m of ROW is established by the Land Law
Alernative-2	Approximately 7m from designed shoulders (total 14m width)	Excluding major villages and towns	390 (970)	1.3 (3.3)	( ):calculated number out of consideration of actual location of residential area

Note) Approximately 30 structures are affected by new bypass alignment

On the other hand, in the town sections such as Mandimba, Lione and Masangulo, basically construction activities should be carried out in limited area to spare the high density residential areas along the road.

With regard to the section from Mandimba junction to the border, 295 structures are counted in ROW of current road, thus bypass alignment is recommended to reduce

the number of resettlements. According to this alignment, approximately 30 structures are affected.

Adverse impacts regarding resettlement are mitigated by the COI concept, but the following mitigation measures shall be carried out by ANE.

- ✓ Implementation of adequate resettlement action plan (herein after referred to as "RAP") and compensation under the land law and Resettlement Policy Framework (RFP)
  - Sound and fair negotiation with project affected persons regarding compensation through stakeholder meeting in the RAP stage. ANE and Niassa Province shall explain compensation is including not only material cost, but also labor cost, registration cost and so on in a series of stakeholder meetings.
  - Concrete income restoration program for affected persons should be described in the RAP.
  - Affected assets should be shown on drawings with aerial photos after detailed design stage.
- ✓ Setting up of a complaint register by relevant bodies (ANE and the provincial authorities) in the detailed measurement survey, compensation stage and during and after construction.

3. Measures to minimize Land Acquisition and Losses

3.1 JICA's Requirements and Items to be surveyed in the RAP

JICA's requirements in RAP and current progress are shown in the next table.

JICA's Requirements and Items to be Surveyed in the RAP

Item to be reviewed (JICA's Proposal Items for RAP)	RPF	Results of JICA Study	RAP
1. Actions and measures to be conducted for minimizing impact	Article "4.1 ESTIMATION OF DISPLACED POPULATION" says that ANE and the consultant must avoid human settlement area in alignment planning as much as possible	COI concept is recommended by JICA Study Team. (see previous article **2.2.2 Impact Forecast based Preliminary Alignment and Recommendation) in this document.**	Final alignment shall be adjusted to minimize impacts in DD stage base on COI concept. Detailed affected area will be identified and finalized based on detailed design.
2. Consideration of alternatives with special attention to avoid and minimize involuntary resettlement	↑ Ditto	In some sections, bypass routes are proposed (see following article **3.2 Analysis of Alternatives in this document**)	↑ Ditto

3.2 Analysis of Alternatives

(1) With Project

Alternatives for new alignments are generally considered from the view of required geometric structure, economy and environment. With regard to alignment, all important social facilities such as cemeteries, religious facilities, schools, health centers and wells are identified in the site survey and considered in the new alignment. Additionally, bypass routes are analyzed in some sections which have traffic accidents at cross points with railway from the view of social environment. In Cuamba Town – Malawi Border section, adoption of bypass route will reduce the number of resettlements. Furthermore, sidewalk space is considered in cross-section design for traffic safety.

Concrete analysis is given in "Volume-2 Part III Preliminary Engineering Design".

(2) Without Project (Zero-Option)

The 'without project scenario (Zero-option)' will not cause any adverse environmental impact since there is no congestion now. However, economic growth may be stagnant and levels of absolute poverty may grow as a result of this.

4. Socio-Economic Feature of the Project-Affected People

JICA's requirements in RAP and current progress are shown in the next table.

JICA's Requirements and Items to be Surveyed in the RAP

Item to be reviewed (JICA's Proposal Items for RAP)		RPF	Results of JICA Study	RAP
1. Socio-economic profiles of PAPs	1-1 Size, gender, age, number of school children of each household	Socio-economic survey shall be implemented based on description in article "3.1 STEPS LEADING TO THE PREPARATION OF RAPS" in RPF.	General information regarding socio-economic profile is compiled in regional development program. (see **Volume 4 / Part VII Regional Development Program in the feasibility study report**)	Detailed socio-economic survey shall be implemented in RAP survey. Sufficient samples for this survey are required. Approximately 20% of affected persons is prescribed in the World Bank Guidelines.
	1-2 Occupation and means of livelihood	↑ Ditto	↑ Ditto	↑ Ditto

5. Resettlement Policy and Entitlement

5.1 JICA's Requirements and Items to be surveyed in the RAP

JICA's requirements in RAP and current progress are shown in the next table.

JICA's Requirements and Items to be Surveyed in the RAP

Item to be reviewed (JICA's Proposal Items for RAP)	RPF	Results of JICA Study	RAP
1. Compensation policy	See "2.1 BASIC PRINCIPLES AND VISION OF THE RESETTLEMENT PROGRAM" and "7.3 CALCULATIONS FOR COMPENSATION PAYMENTS AND RELATED CONSIDERATIONS" in RAP.	All policies, definitions and resettlement processes are basically referred from RPF.	No remarks (RPF's description satisfies the conditions of JBIC's Guidelines.)
2. Compensated items, process and options	Entitle matrix is shown in "APPENDIX 5.1 Entitlement Matrix for Various Categories of PAPs" Methodology for evaluation of compensated properties is shown in "7.3 CALCULATIONS FOR COMPENSATION PAYMENTS AND RELATED CONSIDERATIONS" in RPF.	Concrete calculating formulae for evaluation of structures and compensation prices for crops are shown in "5.2 Assets Evaluation for Compensation" in this document.	Compensation price of structures is concluded through SHMs based on proposed price from the Directorate of Public Works. However, most local houses do not have a market price because they are made with natural materials from the surrounding areas. Not only village leaders, but also PAPs shall participate in these SHMs. The entitlement matrix shall be included as described in RPF.
3. Legal Framework	See article "6.0 LEGAL FRAMEWORKS FOR RESETTLEMENT" in RPF	See "1.2 Legal Framework" in this document.	No remarks (RPF's description satisfies the conditions of JBIC's Guidelines.)
4. Eligibility for compensation (inclusive illegal occupants)	See "5.3 BENEFICIARIES ELIGIBILITY CRITERIA" (a) person with homes, farmland, structures or other assets within the proposed road reserve or way leave of any infrastructure proposed for construction or rehabilitation This criteria does not describe illegal or legal occupants. Thus all persons with assets are compensated.	All policies, definitions and resettlement processes are basically referred from RPF.	
5. Cut-off date	See "5.1 METHOD FOR SETTING A CUT-OFF DATE FOR ELIGIBILITY FOR COMPENSATION" in RPF	↑ Ditto	
6. Compensation by full replacement cost	See "7.3.6 Compensation for Buildings and Structures", "APPENDIX 5.1 Entitlement Matrix for Various Categories of PAPs "and "APPENDIX 5.1 Entitlement Matrix for Various Categories of PAPs"in RPF.	↑ Ditto	

5.2 Assets Evaluation for Compensation

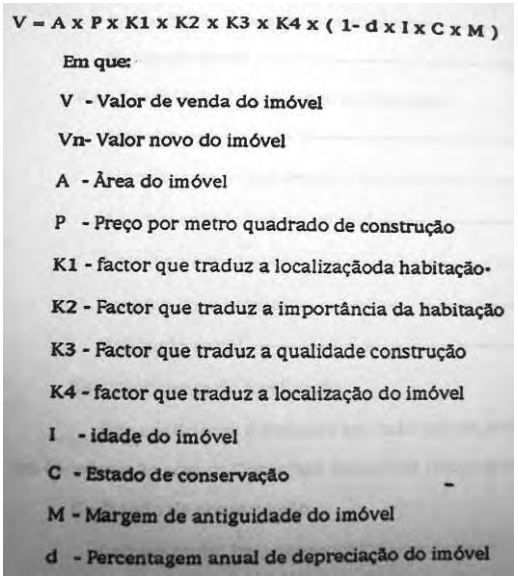
5.2.1 Prescribed Compensation Price

Directorate of Public Works and Agriculture is responsible for evaluating assets for compensation. According to interviews from them, although they have a common crop list for compensation, an authorized compensation list for structures does not exist at the moment. Additionally, since most structures are built by natural materials such as clay, timber, thatch and paint, cost estimation at market prices is too difficult. Indeed, a local building company cannot estimate total cost for a typical house in the Study Area.

Therefore a calculating formula of the government's sale price is substituted for evaluation of structures. However this price is too low for the owners of structures due to sale price from the government to people. Thus some of coefficients in calculating formula are changed through stakeholder meetings between local authority and relevant communities. According to explanation from provincial public works, this calculating formula considers many factors. Therefore, a fixed compensation price is not announced from government at the moment.

However according to the RAP report of Nampula-Cuamba, the cost of a typical house is estimated 12,500Mtn approximately.

Table 5.2.1 Calculating Formula for Structures



V=A x P x K1 x K2 x K3 x K4 x (1-d x I x C x
A: Area of housing
P: Price per square meter of construction
K1: Factor that translate localization of residenc
K2: Factor that translate the importance of resid
K3: Factor that translate the quality of construct
K4: Factor that translate the localization of hous
I: age of housing
C: condition of preservation
M: Margin of antiquity of housing
d: Annual percentage of depreciation of housing

Source: Manual de avaliacao de imoveis do estado/ Miniterio das obras publicas e habitacao, Maputo 1995

Table 5.2.2 Estimated Compensation Price

Table 6-14: Cost of affected houses

Type of House	Total Units	Average Unit cost (MZM)	Total in MZM	Total in USD
Circular huts	1	5,000	5,000	200
Rectangular huts	226	12,500	2,825,000	113,000
Mixed Cement Blocks /Bricks/Corrugated Iron	15	91,000	1,365,000	54,600
Mixed Reed/Corrugated Iron	1	6,000	6,000	240
Conventional/Corrugated Iron Roof	4	38,500	154,000	6,160
Full Conventional Houses	1	2,700,000	2,700,000	108,000
Total	**248**		**7,055,000 MZM**	**USD 282,200**

Source: Resettlement Action Plan for EN13 from Nampula-Cuamba July 2009

With regard to crops, the prescribed price by Ministry of Agriculture and surveyed price in the RAP for Nampua-Cuamba Road is almost same.

These compensation prices are evaluated in consideration with market price and they are updated periodically by the Directorate of Agriculture. Furthermore if PAPs are not satisfied with these prescribed prices, PAPs can negotiate in SHMs, RAP phase. Although regional high value crops are considered in asset evaluation, there are no such special crops in the Study Area according to the Directorate of Public Works and Housing.

According to the Directorate of Public Works and Housing in Niassa Province, most PAPs agree Government proposal price based on the prescribed compensation list and do not make complaints generally since there are sufficient alternative crop fields near roads.

Therefore it is considered that compensation prices for crops are reasonable at the moment.

Table 1.2.3 Compensation Price for Agricultural Product

Name of Fruit		Mtn/young tree	Mtn/adult tree
Cajueiros	Cashew	150	300
Mangueriras	Mango	75	175
Bananeiras	Banana	75	150
Citrinos	Citoron	150	300
Litcheria	Lychee	250	775
Pereiras/Abacateiras	Pear/Pineapple	150	250
Papaeriras	Papaya	75	150
Coquerios	Coconut	150	200
Goiaberias	Guava	75	175
Caramoboleira	Starfruit	100	250
Aterira	Sugar Apple	75	200

Name of Crop		Mtn/m2
Arroz	Rice	1.5
Milho	Maize	2
Mapira	Mapira	2
Amendoin	Almond	2
Grgelim	Sesami	3
Feijoes	Beans	2

Name of Crop		Mtn/young tree	Mtn/adult tree
Mandioca	Cassava	3	10
Batata doce	Sweet potato	10	
Batata reno	Irish potato	12	
Inhames	Yam	3	

Name of Crop		Mtn/m2
Algodao	Cotton	1.5
Ricino	Ricinus	1
Tabaco	Tabacco	-
Sisal	Sisal	-
Cana sacarina	Saccharine	

Source: Ministerio da Agricutura, Direcao Provincial Agricultura Tura de Nampula / Tabela de Custos de Curturas Alimentares Para

Compensaxao de Colheitas

5.2.2 Case Example – Nampula-Cuamba Road in Nacala Development Corridor

RAP for Nampula-Cuamba Road has just been completed. ANE will compensate to eligibility for compensation before actual construction. There are not any complaints at the moment according to the ANE.

ANE is waiting an approval from the Road Fund regarding compensation budget.

6. Resettlement Site

JICA's requirement items in RAP and current progress are shown in the next table.

JICA's Requirements and Items to be Surveyed in the RAP

Item to be reviewed (JICA's Proposal Items for RAP)	RPF	Results of JICA Study	RAP
1. Method of site selection and site alternatives	There are not any descriptions regarding method of site selection and site alternative in RPF.	Resettlement site is not selected due to this being the feasibility study at the moment.	Method of site selection and site alternatives shall be described in RAP.
2. Location, layout and design of resettlement site	There are not any descriptions.	↑ Ditto	Location, layout and design of resettlement site shall be prepared in RAP.
3. Resettlement site development (infrastructure, social service, etc.)	See "6.3 REQUIREMENTS OF THE WORLD BANK FOR RESETTLEMENT" in RPF.	↑ Ditto	Resettlement site developing planning inclusive budgeting and implementation schedule shall be prepared as required in RAP.

7. Income Restoration Program

JICA's requirement items in RAP and current progress is shown in the next table.

Rehabilitation assistance is defined instead of income restoration program in this RPF.

JICA's Requirements and Items to be Surveyed in the RAP

Item to be reviewed (JICA's Proposal Items for RAP)		RPF	Results of JICA Study	RAP
1. Background of Income Restoration		Definition of " Rehabilitation Assistance " is explained in "12 Rehabilitation of Assistance / page xii" in RPF See other related articles "9.1 RESETTLEMENT ACTION PLANS", "13.0 ESTIMATED BUDGET" in RPF	Detailed information is not described due to this being the feasibility study stage.	Although a definition of rehabilitation assistance is explained, there are not any detailed descriptions. Thus all items which are required shall be filled in during the RAP survey as required.
2. Objective and policy of income restoration		↑ Ditto	↑ Ditto	↑ Ditto
3. Income Restoration	3-1 Constraints and opportunities for income generation	↑ Ditto	↑ Ditto	↑ Ditto

Item to be reviewed (JICA's Proposal Items for RAP)		RPF	Results of JICA Study	RAP
Program	3-2 Analysis of needs, capacity, and existing skills of PAPs	↑ Ditto	↑ Ditto	↑ Ditto
	3-3 Analysis of economic activities of PAPs and communities	↑ Ditto	↑ Ditto	↑ Ditto
	3-4 Consultation and participation process	↑ Ditto	↑ Ditto	↑ Ditto
	3-5 On-going income-generating or livelihood development programs (e.g., poverty alleviation) in the project area	↑ Ditto	↑ Ditto	↑ Ditto
	3-6 Provisions for group-specific, targeted income restoration plans (e.g., microcredit or small development)	↑ Ditto	↑ Ditto	↑ Ditto
	3-7 Income restoration options	↑ Ditto	↑ Ditto	↑ Ditto
	3-8 Financial source of income restoration plans	↑ Ditto	↑ Ditto	↑ Ditto
	3-9 Implementing arrangement of the program (e.g., assistance from government agencies, community organizations, NGO, or CBO)	↑ Ditto	↑ Ditto	↑ Ditto
	3-10 Consideration of vulnerable people	↑ Ditto	↑ Ditto	↑ Ditto
	3-11 Program implementing schedule	↑ Ditto	↑ Ditto	↑ Ditto
	3-12 Monitoring	↑ Ditto	↑ Ditto	↑ Ditto

8. Implementation Arrangement

8.1 JICA's Requirements and Items to be surveyed in the RAP

JICA's requirements in RAP and current progress are shown in the next table.

JICA's Requirements and Items to be Surveyed in the RAP

Item to be reviewed (JICA's Proposal Items for RAP)	RPF	Results of JICA Study	RAP
1. Responsibilities and roles of related organization (organizations in charge of Basic Resettlement Plan preparation, resettlement execution, land acquisition, monitoring, consultation, resettlement site preparation, income restoration, etc.)	See "8.4 ROLES AND RESPONSIBILITIES" in RPF.	Resettlement process and major actors in process are shown in "8.2 Present Resettlement Procedure and Concerned Parties" in this document.	Following items shall be filled in RAP. 1. Organization char of Project Information Unit 2. Functional description 3. Job description 4. Salary sturucture 5. Qualification standards 6. Cost
2. Description of cooperation between related organization (e.g., coordination between an executing agency and NGO/CBO.	There are not any descriptions regarding roles of NGO/CBO.	↑ Ditto	Roles and relationship of NGOs / CBOs shall be described in RAP

8.2 Present Resettlement Procedure and concern parties

The present land acquisition and resettlement process is as follows.

After preparation of a draft alignment of the proposed road project, a RAP should be prepared by the project proponent based on a preliminary survey and census.

The identification of project boundaries and proposed land / property acquisition is issued in a declaration and based on the final road project. Assessment of the value of land / property affected is done by the Ministry of Agriculture and the Ministry of Public Works & Housing, and the project proponent negotiates with the affected owners and provides for the compensation scheme.

The project proponent can then start the intended project.

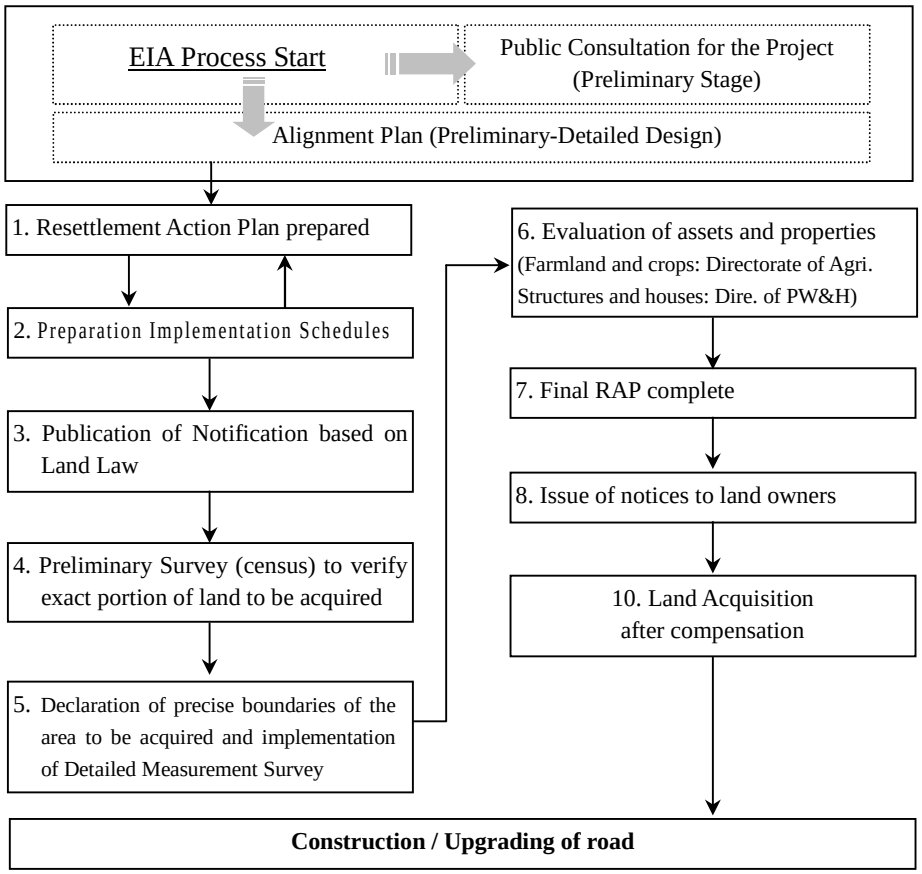


Figure 1.2.1 Land Acquisition / Resettlement Process
Source: Interview with ANE GAT

With regard to Malawi side, Public Roads Ordinance (1962) and Land Acquisition Law (1971) are bases for land acquisition and compensation. According to the National Road Authority, the safeguard policy of the World Bank is adopted as a resettlement guideline. Price of compensation such as buildings and crops is concluded in community's stakeholder meeting because most land in rural areas is categorized as customary land.

9. Implementation Schedule

9.1 JICA's Requirements and Items to be surveyed in the RAP

JICA's requirements in RAP and current progress are shown in the next table.

JICA's Requirements and Items to be Surveyed in the RAP

Item to be reviewed (JICA's Proposal Items for RAP)	RPF	Results of JICA Study	RAP
1. Schedule of resettlement-related activities	See "9.2 TIME FRAMES" and "APPENDIX 9.1 An Example of Land Acquisition and Resettlement Implementation Schedule" in RPF.	Estimated timetable for EIA and RAP is shown in "9.2 Current Progress of Environmental Activities" in this document.	Detailed timetable shall be prepared in RAP. Note) Civil work of the project must be started after completion of resettlement.

9.2 Current Progress of Environmental Activities

GAT in ANE will undertake the required EIA procedures based on the following proposed timetable.

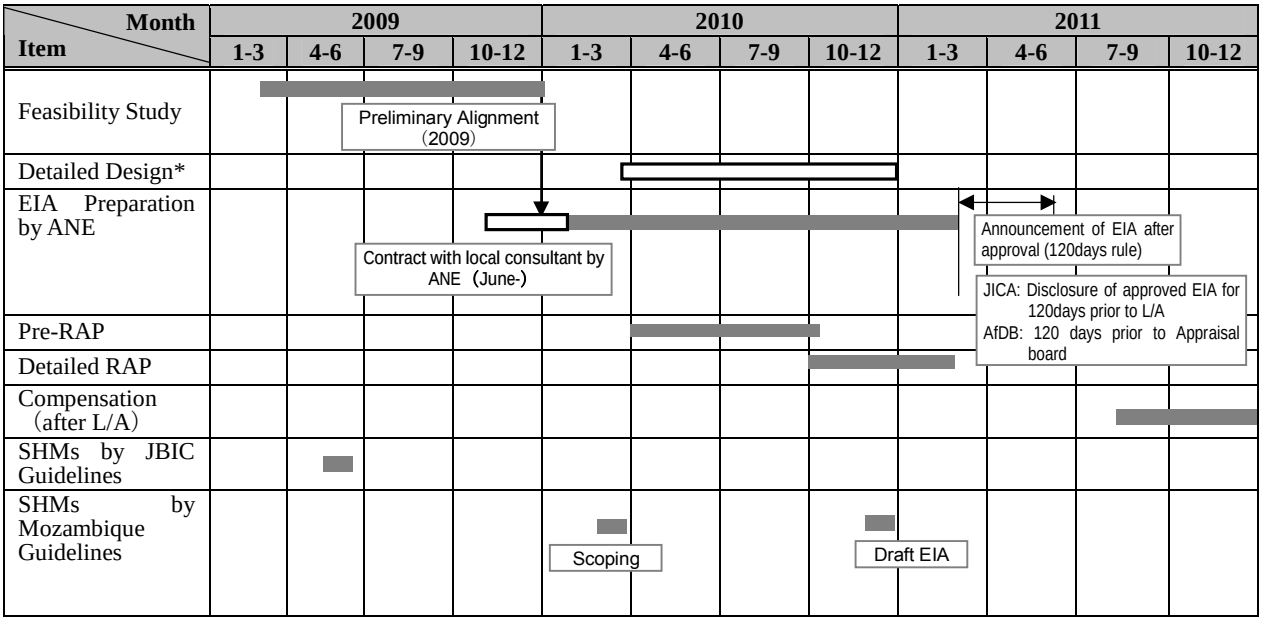
ANE is contracting an environmental consultant for carrying out the EIA and RAP study at the moment. And ANE will be able to receive EIA approval from MICOA by end of 2010.

Table 9.2.1 Proposed EIA Timetable and Current Progress (2009-2010)

ITEM \ Year/Month	2009				2010											
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec-March
Prequalification for environmental consultant	■ ■ ■ ■															
Preparation of proposal report, evaluation		■	■	■												
Negotiation and contract with local consultant					■	■										
Baseline survey based on the FS (including review screening and scoping by MICOA)						■	■	■	■	■	■	■	■			
Preparation of EIA and RAP											■	■	■	■	■	
Review, Revised and Approval draft EIA report (by MICOA)																■
SHM (public consultation for EIA)							1st ▲			2nd ▲						

Note) DD: Detailed design for Cuamba- Mandimba section

Table 9.2.2 Long Team EIA Process Schedule (Tentative)



*: It is expected in the Cuamba-Mandimba section at the moment

10. Participation and Consultation

JICA's requirements in RAP and current progress are shown in the next table.

JICA's Requirements and Items to be Surveyed in the RAP February

Item to be reviewed (JICA's Proposal Items for RAP)		RPF	Results of JICA Study	RAP
1. Policy of participation and consultation		See "3.2 PUBLIC CONSULTATION AND PARTICIPATION" in RPF.	See JBIC Guidelines	Public consultation should be conducted at least twice (1st : at the beginning of RAP survey, 2nd : when draft report of RAP is prepared) during RAP survey.
2. Place, timing, method, topics, meeting memorandum of public consultation meeting held in the past (including PAPs' opinion regarding the project and resettlement)		See "11.0 METHODS FOR CONSULTATION WITH AND PARTICIPATION OF AFFECTED PEOPLE" in RPF.	JICA's SHM was held for formulation of consensus in project initial stage in related 4 districts. The SHM was informed directly from local authority to participants. Minutes of SHM are shown in Appendix of Volume 3.	All items which are shown in this table shall be filled by the RAP survey stage.
3. Plan of participation and consultation		↑ Ditto	See JBIC guidelines	
4. Leaflet of resettlement distributed to PAPs, including followings	4-1 Objectives of the Project	There is no detailed information regarding contents of distributed leaflet for public consultation in RPF.	The Study Team did not distribut leaflets to participants in SHM. However, the following items were explained by projector screen. 4-1, 4-2, 4-4, 4-5, 4-6	
	4-2 Service area of the Project and Project site			
	4-3 Cost estimation and sources of capital			
	4-4 Project Implementation Planning (i.e., F/S, EIA, and Basic Resettlement Plan preparation)			

Item to be reviewed (JICA's Proposal Items for RAP)		RPF	Results of JICA Study	RAP
	4-5 Project Impact			
	4-6 Definition of Eligibility			
	4-7 Resettlement and compensation principles			
	4-8 Compensation policy			
	4-9 Subsidize allowances			
	4-10 Settling complain (Grievance Redress procedure)			

11. Monitoring and Supervision

11.1 JICA's Requirements and Items to be surveyed in the RAP

JICA's requirements in RAP and current progress are shown in the next table.

JICA's Requirements and Items to be Surveyed in the RAP

Item to be reviewed (JICA's Proposal Items for RAP)		RPF	Results of JICA Study	RAP
1. Monitoring of flowing aspects	Performance monitoring: physical progress against milestones established in the Resettlement Plan	See "12.0 MONITORING AND EVALUATION ARRANGEMENTS" and "APPENDIX 12.1: Example of Land Acquisition and Resettlement Process Monitoring Plan" in RPF.	Detailed information is not described due to this being the feasibility study stage. However, generally this monitoring report shall be submitted to ANE, MICOA and relevant organizations once a month with supervision report. (see "11.2 propose mitigation and monitoring plan" in this document)	Although some items are mentioned, detailed descriptions are not sufficient such as methodology, monitoring indicators, internal and external monitoring, evaluation methodology and frequency of reporting, etc.
	Impact monitoring: assessment of the effects of resettlement			
2. Internal performance monitoring process (method, indicators, period, frequency, implementation arrangement of the monitoring)				
3. Methodology of for external monitoring				
4. Frequency of reporting and content for internal and external monitoring				
5. Evaluation method of monitoring result				
6. Process for integrating feedback from internal monitoring into implementation				

11.2 Proposed Major Mitigation and Monitoring Plan

Proposed major mitigation measures and monitoring plans are shown in Table 11.2.1 below. However, detailed monitoring plan should be designed based on the Road Sector RPF and relevant guidelines.

It is recommended that the result of monitoring should be reported once a month with supervision monthly report to ANE and MICOA.

Table 11.2.1 Proposed Major Mitigation Measures

Items		Proposed Mitigation Measures				Monitoring Plan
		Rating	During Construction	Rating	After Construction	
Social Environment	1. Resettlement	A	a) Adoption of COI concept b) Holding stakeholders meetings at districts and municipalities * The first stakeholder meetings have already been held in all districts and municipalities. A summary of the results is attached in appendix c) Set up complaint register by relevant bodies d) Carry out appropriate Resettlement Action Plan (RAP) and compensation scheme under land law and Resettlement Policy Framework (RPF 2006) (see article of "Key Issues and Impact Forecast")	D	Not required	[During Const.] Periodical interview survey from inhabitants (based on RAP which will be prepared by ANE) Major monitoring items to be conducted - Progress of payment of compensation - Progress of preparation of transfer site - Progress of implementation of resettlement [After Const.] Periodical observation about livelihood of displaced persons and families though interview survey (based on RAP which will be prepared by ANE) Major monitoring items to be conducted - Status of income restoration - Grievance from PAPs

12. Grievance Redress

JICA's requirements in RAP and current progress are shown in the next table.

JICA's Requirements and Items to be Surveyed in the RAP

Item to be reviewed (JICA's Proposal Items for RAP)	RPF	Results of JICA Study	RAP
1. Step-by-step process for registering and addressing grievances and specific details regarding a cost-free process for registering complaints, response time, and communication modes	See "10.0 GRIEVANCE REDRESS MECHANISMS" in RFP.	Detailed information is not described due to this being the feasibility study stage.	All detailed items which are shown in this table shall be filled by the RAP survey stage.
2. Mechanism for appeal			
3. Provisions for approaching civil courts if other options fail			

13. Cost Estimate

JICA's requirements in RAP and current progress are shown in the next table.

JICA's Requirements and Items to be Surveyed in the RAP

Item to be reviewed (JICA's Proposal Items for RAP)	RPF	Results of JICA Study	RAP
1. Statement of financial responsibility and authority	See "13.0 ESTIMATED BUDGET" in RPF.	Rough cost estimation in the feasibility study stage is shown "Volume-2 Part III Preliminary Engineering, Table 8.5.1 Total Project Cost" in main text.	Financial responsibility and resources shall be described.
2. Source of funds and the flow of funds			
3. Estimated budget, by cost and by item, for all resettlement costs including planning and implementation, management and administration, monitoring and evaluation and contingencies			
4. Provisions to account for physical and price contingencies			

Appendix-E

Environmental Check List

Environmental Checklist: 15. Roads and Railways （1）

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations (GoM's EIA is not completed at the moment. Planned mitigation measures and other information are all from JICA's report)
1 Permits and Explanation	(1) EIA and Environmental Permits	① Have EIA reports been officially completed? ② Have EIA reports been approved by authorities of the host country's government? ③ Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? ④ In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	A1: No, not yet. Baseline survey will be started from early 2010. A2: No, not yet. It is expected by end of 2010. A3: No information at the moment A4: No information at the moment
	(2) Explanation to the Public	① Are contents of the project and the potential impacts adequately explained to the public based on appropriate procedures, including information disclosure? Is understanding obtained from the public? ② Are proper responses made to comments from the public and regulatory authorities?	A1:A basic consensus was formulated in JICA's SHM, May 2009. Additionally, Mozambique's EIA process has twice SHMs. A2:Minutes of SHM in EIA process will be submitted to MICOA, then MICOA will issue comments.
2 Mitigation Measures	(1) Air Quality	① Is there a possibility that air pollutants emitted from various sources, such as vehicle traffic will affect ambient air quality? Does ambient air quality comply with the country's ambient air quality standards? ② Where industrial areas already exist near the route, is there a possibility that the project will make air pollution worse?	A1: According to air quality forecast in JICA Study Report, forecasted value does not exceed Mozambique's and Japanese standards. A2: Industrial area is not located along the EN13.
	(2) Water Quality	① Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? ② Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater? ③ Do effluents from various facilities, such as stations and parking areas/service areas comply with the country's effluent standards and ambient water quality standards? Is there a possibility that the effluents will cause areas that do not comply with the country's ambient water quality standards?	A1: Since slope protection work will be adopted as required, soil erosion will be minimized. A2: Any hazardous matter is not run off from the road surface. A3: Railway stations and parking stations are not planned.
	(3) Noise and Vibration	① Do noise and vibrations from vehicle and train traffic comply with the country's standards?	A1: Mozambique does not have any noise standards. Forecasted value does not exceed Japanese and WHO standards for along trunk road without mitigation measures. This value exceeds Japanese standards for sensitive areas, thus mitigation measure such as setting up sound proof wall are required.
3 Natural Environment	(1) Protected Areas	① Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	A1: No, there are not any protected areas in the Study Area.

Environmental Checklist: 15. Roads and Railways （2）

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations (GoM's EIA is not completed at the moment. Planned mitigation measures and other information are all from JICA's report)
3 Natural Environment	(2) Ecosystem	① Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? ② Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? ③ If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? ④ Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? ⑤ Is there a possibility that installation of roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered? ⑥ In cases where the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments?	A1: There are not any precious natural areas in the site. A2: There are not any designated and protected habitats for considerable species. A3: No serious impacts regarding ecosystem are forecasted. A4: According to interview survey, some elephant migration routes are crossing the site. Thus mitigation measures such as setting up signboards and environmental education for workers and inhabitants are recommended by JICA's report. A5: Poaching may be increased during and post project. Therefore mitigation measure such as environmental education for workers and inhabits is proposed by JICA Study Team. A6: This project is road improvement, not new road construction. In some areas, bypass routes are planned, however project site is located in developed area. Hence environmental impacts are not serious.
	(3) Hydrology	① Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows?	A1: Cutting of land is minimized from the view of environment and economy. Planned road facilities such as bridges and culverts are designed in same site and size. Therefore, there are not likely to be serious impacts to underground water and hydrological situation.
	(4) Topography and Geology	① Is there a soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? ② Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? ③ Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	A1,A2: Slope protection work will be adopted in some sites as required. A3: Sedimentation ponds will be adopted in earth work areas and borrow pits as required.

Environmental Checklist: 15. Roads and Railways （3）

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations (GoM's EIA is not completed at the moment. Planned mitigation measures and other information are all from JICA's report)
4 Social Environment	(1) Resettlement	① Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? ② Is adequate explanation on relocation and compensation given to affected persons prior to resettlement? ③ Is the resettlement plan, including proper compensation, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? ④ Does the resettlement plan pay particular attention to vulnerable groups or persons, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? ⑤ Are agreements with the affected persons obtained prior to resettlement? ⑥ Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? ⑦ Is a plan developed to monitor the impacts of resettlement?	A1: Approximately 6,000 structures exist in the ROW. However COI (Corridor of Impact) concept is recommended by JICA Study Team, and if this concept is adopted, the number of affected structures will reduce from 6,000 to 400. A2: Sufficient SHMs will be held in EIA and RAP process. A3: A RAP will be conducted based on Road Sector RPF. Adequate compensation and resettlement will be done based on RAP. A4: SHMs for vulnerable groups such as women and religious groups will be planned in RAP survey. These minutes of meetings will be compiled in RAP report. A5: Compensation price regarding resettlement is discussed and negotiated in compensation committee consisting of PAPs, local authorities, Directorate of Public Works, Directorate of Agriculture and ANE. A6: Activities of resettlement and compensation are managed and conducted by ANE.. GAT (Cross Cutting Issues Unit) and regional office of ANE has responsibility to conduct all activities regarding resettlement. ANE under Road Fund has enough budget for resettlement matter, but ANE does not have sufficient
	(2) Living and Livelihood	① Where roads or railways are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts? ② Is there a possibility that the project will adversely affect the living conditions of inhabitants other than the affected inhabitants? Are adequate measures considered to reduce the impacts, if necessary? ③ Is there a possibility that diseases, including communicable diseases, such as HIV will be introduced due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? ④ Is there a possibility that the project will adversely affect road traffic in the surrounding areas (e.g., by causing increases in traffic congestion and traffic accidents)? ⑤ Is there a possibility that roads and railways will cause impede the movement of inhabitants? ⑥ Is there a possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?	A1: Basically this is not a new road construction project. Therefore the project does not give adverse impacts to existing means of transportation and the associated workers. A2: No, there is not. A3: Distribution of infectious diseases such as STDs is predicted during and post construction. Thus HIV prevention campaign is planned for inhabitants and workers during construction. This is one of the prescribed common mitigation measures in ANE. A4: It is expected this project does not give adverse impacts to road traffic in the surrounding area. A5: No, there are not serious impacts. Because road width is approximately 10m and traffic volume is less than 10,000 vehicles a day. A6: No, there are no serious impacts. Because there are not fly over sections.

Environmental Checklist: 15. Roads and Railways （4）

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations (GoM's EIA is not completed at the moment. Planned mitigation measures and other information are all from JICA's report)
	(3) Heritage	① Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage sites? Are adequate measures considered to protect these sites in accordance with the country's laws?	A1: No, there are not any precious cultural heritages in the site. Some graveyards and religious facilities are identified along the road, but these are considered in alignment planning and avoided basically.
	(4) Landscape	① Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	A1: No, there are not any considerable landscapes in the site.
4 Social Environment	(5) Ethnic Minorities and Indigenous Peoples	① Where ethnic minorities and indigenous peoples are living in the rights-of-way, are considerations given to reduce the impacts on culture and lifestyle of ethnic minorities and indigenous peoples? ② Does the project comply with the country's laws for rights of ethnic minorities and indigenous peoples?	A1: No ethnic minorities or indigenous peoples are living in the ROW. A2: There are no laws regarding ethnic minorities and indigenous peoples in accordance with GAT in ANE.
5 Others	(1) Impacts during Construction	① Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? ② If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? ③ If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts? ④ If necessary, is health and safety education (e.g., traffic safety, public health) provided for project personnel, including workers?	A1: Mitigation measures against public pollution are planned in environmental management and monitoring plan in EIA report. Generally, fixing working times and sprinkling water are conducted during construction in residential areas. A2: This project does not impart serious direct impacts to the natural area. However, construction workers may impart adverse impacts to surrounding environment. Thus environmental education should be planned. A3: Clearance of construction area causes resettlement. Appropriate mitigation measures will be conducted based on RAP. A4: Environmental education and health care education for workers and inhabitants will be conducted during construction.
	(2) Monitoring	① Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? ② Are the items, methods and frequencies included in the monitoring program judged to be appropriate? ③ Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? ④ Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	A1: Generally noise, turbidity, dust and waste management are adopted as monitoring items during construction. A2: If ANE adopts JICA's recommendations, it is reasonable. A3: Yes, appropriate monitoring framework is established. Monitoring survey will be conducted by supervisor consultant based on EMMP. This result is reported to ANE and MICOA in monthly report. A4: EIA guidelines do not mention about frequency of submission of monitoring report. However, such environmental monitoring reports are submitted with supervision reports to ANE once a month, then this report is forwarded to MICOA.
6 Note	Reference to Checklist of Other Sectors	① Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation). ② Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).	

Environmental Checklist: 15. Roads and Railways （5）

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations (GoM's EIA is not completed at the moment. Planned mitigation measures and other information are all from JICA's report)
	Note on Using Environmental Checklist	① If necessary, the impacts to transboundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	

1) Regarding the term “Country’s Standards” mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are made, if necessary.
In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan' experience).
2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.


JICA