



REPUBLIC OF KENYA

MINISTRY OF ROADS, PUBLIC WORKS & HOUSING

ROADS DEPARTMENT

ENVIRONMENTAL IMPACT ASSESSMENT
(EIA)STUDY

PROPOSED WORLD BANK FUNDED MAJI YA CHUMVI-
MIRITINI ROAD (A109) REHABILITATION AND
RECONSTRUCTION PROJECT

(COAST PROVINCE-KENYA)

FINAL REPORT

February, 2004

SCANNED FIVE COPY	
Commission No. <i>1000/2004</i>	Box No. <i>133</i>
DATE	Log #
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EQUIVALENTS

CURRENCY EQUIVALENTS

(24TH February, 2004 Exchange rates)

Currency Unit	=	Kenya shilling (KSh)
1US\$	=	K.Sh 76.3889
1 Stg <i>f</i>	=	K.Sh 142.0044
1 Stg <i>f</i>	=	Us\$ 1.8589

WEIGHTS AND MEASURES

1 Metric Tonne (t)	=	2205 Ibs
1 Kilogram (Kg)	=	2.2.5 Ibs
1 Metre (m)	=	3.281 ft
1 Squire Metre (m ²)	=	10.765 Square feet
1 Foot (ft)	=	0.305 m
1 Kilometre (Km)	=	0.621 mile
1 Square Kilometre (Km ²)	=	0.386 Square Mile
1 Hectare (Ha)	=	2.471 Acres

FISCAL YEAR

July 1-June 30

ABBREVIATIONS

AADT	=	Average Annual Daily Traffic
AC	=	Approved Contractor
ADT	=	Annual Daily Traffic
ADB	=	African Development Bank
AE	=	Assistant Engineer
ALEU	=	Axle Load Enforcement Unit
ARE	=	Assistant Resident Engineer
BOO	=	Build Operate and Own
BOT	=	Build Operate and Transfer
CA	=	Chief Architect
CAP	=	Caption
CBD	=	Central Business District

CD	=	Consultancy Design
CIDA	=	Canadian International Development Agency
CEE	=	Chief Electrical Engineer
CER	=	Chief Engineer Roads
CME	=	Chief Materials Engineer
CMTE	=	Chief Mechanical and Transport Engineer
CPE (E)	=	Chief Projects Engineer (East)
CPE (W)	=	Chief Projects Engineer (West)
CSE	=	Chief Structural Engineer
CSE (B)	=	Chief Superintending Engineer (Bridges)
CSE (C)	=	Chief Superintending Engineer (Construction)
CSE (D)	=	Chief Superintending Engineer (Design)
CSE (M)	=	Chief Superintending Engineer (Maintenance)
CSE (P)	=	Chief Superintending Engineer (Planning)
CSE (RWI)	=	Chief Superintending Engineer (Roads Works Inspector)
CSE (TA)	=	Chief Superintending Engineer (Technical Administration)
CSE (TC)	=	Chief Superintending Engineer (Technical Compliance)
DANIDA	=	Danish International development Agency
DD	=	Departmental Design
DFID-UK	=	Department for international Development
DRE	=	District Roads Engineer
DWO	=	District Works Engineer
E	=	Engineer
EC	=	European Community
EIA	=	Environmental Impact Assessment
EIC	=	Engineer – in – Chief
EMCA	=	Environmental Management Coordination Act
EMP	=	Environmental Management Plan
EU	=	European Union
FE	=	Foreign Exchange
FY	=	Financial (Fiscal) Year
GBCP	=	Gravelling, Bridging and Culverting Programme
GIS	=	Global Information Systems
GOK	=	Government of Kenya
GPS	=	Global Positioning Systems

IDA	=	International Development Association (World Bank)
IDB	=	Islamic Development Bank
ILO	=	International Labour Organisation
KfW	=	Kreditanstalt für Wiederaufbau
KIHBT	=	Kenya Institute of Highway Building Technology
Kph	=	Kilometre per Hour
KRB	=	Kenya Roads Board
MOAL	=	Ministry of Agriculture and Livestock
MOE	=	Ministry of Environment
MOH	=	Ministry of Health
MOR&PW	=	Ministry of Roads and Public Works
MOTC	=	Ministry of Transport and Communications
MRP	=	Minor Roads Programme
NES	=	National Environment Secretariat
NGO	=	Non Governmental Organisation
NMRRP	=	Nairobi-Mombasa Road Rehabilitation Project
OIC	=	Officer in Charge
PBO	=	Provincial Works Officer
PPIAF	=	Public Private Infrastructure Advisory Facility
PRA	=	Participatory Rural Appraisal
PRE	=	Provincial Roads Engineer
PWO	=	Provincial Works Officer
RARP	=	Rural Access Rural Programme
RJA	=	Roy Jorgensen Associates
RMFLF	=	Road Maintenance Fuel Levy Fund
RSU	=	Road Safety Unit
SC	=	Supervising Consultant
SE	=	Superintending Engineer
SH	=	Stakeholder
SIDA	=	Swedish International Development Agency
SDC	=	Swiss Development Cooperation
SEO	=	Senior Environmental Officer
SSE	=	Senior Superintending Engineer
TEU	=	Technical Engineering Unit
TOR	=	Term of Reference

USA	=	United States of America
USAID	=	United State Agency for Internat onal Development
VOC	=	Vehicle Operating Costs
VPD	=	Vehicles per Day
WB	=	World Bank

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EXECUTIVE SUMMARY

1.0 INTRODUCTION

From 1963 to the 1980's the Kenyan Road Sector was tremendously improved through various programmes such as the Rural Access Programme and the Minor Roads Programme. Through these programmes, the classified road network has increased significantly. This road network has however been characterised by poor riding surfaces leading to high vehicle operating costs. This status of classified roads in Kenya today is attributed to inadequate funds for maintenance of the expanded classified roads network.

To achieve an efficient road transport system the Kenya Government in 1990's in liaison with the multilateral donors started pursuing road maintenance policies, which while combining both labour and equipment would lead to a sustainable road sector. Hence the introduction of the local Road Maintenance Fuel Levy Fund and the implementation of the mainly donor funded Roads 2000 Programme and Nairobi-Mombasa Road Rehabilitation Project (NMRRP). These aim at sustaining basic accessibility on a network basis while supporting Government efforts in other economic sectors.

The Maji ya Chumvi-Miritini section of the Nairobi- Mombasa Road Rehabilitation Project will be implemented across the 2 (Two) districts of Kwale and Mombasa. This shall be funded using finances yet to be availed by the World Bank through the International Development Association.

The newly enacted Kenyan Environmental Management and Coordination Act, 1999 requires that Environmental Impact Assessment (EIA) be undertaken prior to implementation of any project. The Road sector Rehabilitation and Maintenance Programmes entail project activities that generate potential negative environmental impacts. This coupled with the legal requirements necessitated the MoRP&W to initiate the incorporation of EIAs in their roads' programmes.

On 20th February, 2001 a team of experts was constituted and tasked to address the EIA as per the TOR specified in the Appendix 7.

2.0 PROGRAMME DESCRIPTION

The scope of the project comprises mainly of:

- Preliminary design and tender documentation of a technically sound and economically viable proposal for the Reconstruction and Rehabilitation of the Maji ya Chumvi-Miritini section of the Nairobi-Mombasa Road, to cover the following:
 - (a) Review of the existing data of the proposed road
 - (b) Collection of physical, social, economic, environmental and operating data necessary in the design of the project.
 - (c) Preliminary engineering survey, materials sourcing and design work for the optical alignment in accordance with local standards including preliminary cost estimates

- Procurement of Consultancy services for design review and supervision of works
- Procurement of Contracting Services through open tenders
- Project audit
- Institutional strengthening of the proposed Environment and Social Unit in the Roads Department

The Nairobi-Mombasa Road Rehabilitation Project will be addressing the following objectives: -

- To rehabilitate and strengthen Kenya's main road network.
- To improve the efficiency of the transport system in order to support economic and social development through effective market integration.
- To enhance the effective maintenance of classified road network to an economic level of serviceability and increase mobility through reduced vehicle operating costs and travel time and/or costs.
- To safeguard the only feasible road connection between the Port of Mombasa and other urban centres of Kenya and the Region thus ensuring all weather accessibility with high potential agricultural areas and creating an integral road network.
- Provide employment opportunities to the local population and alleviate poverty during the implementation.
- To enhance Kenya's export-oriented growth strategy and external trade relations.

Road Maintenance activities can be divided into routine and periodic stages.

- Routine Maintenance involves activities such as grading, grass cutting, drain clearing and shoulder repairing. These activities are executed frequently depending on weather conditions.
- Periodic maintenance activities are typically scheduled over periods of several years and include resurfacing, bridge repairs, flood repairs, emergency maintenance after major failures associated with rains as well as repair and replacement of road signs and safety features.

Road Rehabilitation is different from maintenance in that it involves more substantial intervention to strengthen a road, repair structural defects and restore the road to its initial condition. Rehabilitation is usually applicable when a road has deteriorated to an un-maintainable state.

3.0 PROJECT SETTING

The project road is a 35.3 Km section of the international trunk road A109 located in the Coast Province of Kenya. This is on the Trans African Highway and forms part of Kenya's principal arterial highway connecting the Port of Mombasa with the Capital of Nairobi and major national and international centres in East and Central Africa. The road forms part of one of the two corridors serving Northern Tanzania and the landlocked countries of Sudan, Rwanda, Burundi, Democratic Republic of Congo and Uganda amongst others. Its improvement is therefore of both international and national importance.

The coastal region also houses some of the most important National Parks in Kenya with rich wildlife resources, beautiful beaches and hotels and an active Export Processing Zone. The tourism and manufacturing industries are a key foreign exchange earner in this region and hence the maintenance of an efficient road network is very crucial to improved access and communication.

The Nairobi –Mombasa Road Rehabilitation Project though overdue, is being implemented at a crucial time when the country is adopting aggressive strategies of economic recovery and growth. It will positively contribute to the current poverty eradication strategy being implemented by the Government of Kenya.

4.0 LEGISLATION, POLICY AND INSTITUTIONAL FRAMEWORK

The policy, legal and institutional framework listed in the chapter specifically relates to the road sector.

Outlines of the various international conventions and treaties, WB policy, National legislation policy, National Road Sector Development Strategy, Programme Implementation Strategy, the Roads Department and training needs of all stakeholders related to the programme are elaborated.

5.0 ENVIRONMENTAL IMPACT ASSESSMENT.

Environmental Impact Assessment (EIA) is becoming increasingly important in guiding environmentally sustainable decisions. Since environmental impacts from road developments are quite common, such projects should be subjected to EIAs.

Chapter 5 outlines the environmental impacts assessment process, identify potential environmental impacts and proposes the mitigation measures for the selected Maji ya Chumvi- Miritini Section of Nairobi- Mombasa road.

Potential Environmental Impacts

The envisaged rehabilitation Road and Maintenance Potential Impacts are:

- Soil erosion
- Disturbance of water flows
- Water pollution by oils spillage and contamination from concrete works
- Traffic disruption
- Noise, Gaseous and Dust Pollution
- Waste material from drains cleaning, pavement reconstruction and discharge into rivers will cause pollution
- Operational hazards of road workers such as danger posed by motorists
- Encroachment by upcoming generated infrastructure such as markets and other business premises

- Landscape disturbance
- Haphazard movement of livestock to relocate watering points
- Disturbance of flora and fauna in their natural ecosystem
- Increased litter
- Negative cultural influence (Resultant increase in promiscuity in the local community)
- Increase Commerce
- Enhanced accessibility
- Generated employment opportunities
- Positive foreign cultural values
- Enhance non-motorist traffic safety (Wider Pedestrian and Cyclist Paths)
- Heavy vehicle parking bays at the Weighbridge and in abutting urban centres
- Reduced Vehicle Operating Costs, Commuter travel time and/or costs
- Easier access to social amenities
- Enhance security
- Improved level of serviceability of the Road
- Landscaped Road Environment

Proposed Environmental Mitigation Measures

The proposed environmental mitigation measures to minimize potential impacts resulting from the project activities are:-

- Discourage habitation of plant and animal species in the road reserve by routine bush clearing
- Avoid wetlands in new alignments or realignments of roads
- Regular watering of road works in operational areas
- Periodically water diversions
- Installation of subsurface runoff filter drains
- Provide necessary and adequate drainage works
- Increase in the number of scour checks and interval of mitre drains to reduce or avoid cascade effect at culvert outfalls
- Avoid materials extraction in human settlement areas wherever possible
- Rehabilitate quarries into water points or by replanting vegetation
- Protect erosion susceptible surfaces by grassing and stone pitching and/or with mulch fabric
- Cure gullies abutting the road

- Use architectural input to design final landscape on completion of road projects
- Promote roadside tree planting to serve as physical barriers to lower the noise levels
- Enforce air and noise pollution standards
- Provide, located and maintain adequate latrines and roadside litter disposal facilities
- Create awareness on HIV/AIDS and other related diseases and avail limited health care services
- Enforce Section 91 of the Traffic Act, Cap 403 of the Laws of Kenya.

Incorporation of environmental mitigation measures in road tender documents.

Contract Specifications should include clauses on Environmental concerns. In this WB funded Project the environmental clauses amongst others would include: -

- (i) The contractor shall submit to the Roads Engineer a camp and site office plan indicating all facilities to be provided.
- (ii) The Contractor shall limit environmental degradation through minimal oil spillages, reducing dust and gaseous emissions
- (iii) The Contractor to restore all excavated material sites including quarries by: -
 - Preserving trees during material stockpiling
 - Levelling stripped ground, plant trees and grass to enhance water percolation, reduce soil erosion and prevent water ponding
 - Ensuring safety measures for local residents where a quarry has been identified as a watering point for livestock and people.
 - Protect ecologically vulnerable sites

It is crucial that a record of all mitigation measures implemented be availed by the Contractor through the Supervision Consultant to the Chief Engineer Roads for purposes of future mitigation monitoring and evaluation.

6.0 ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan in the roads sector is one of the most important outputs of the environmental impacts assessment, which ensures that the implemented mitigation measures are sustained. It outlines the monitoring frequency, cost measurable and verifiable indicators as well as individual/institutions to undertake the required actions. The assumption here is that the proposed mitigation will be implemented under the contractual arrangement during rehabilitation and maintenance.

The EMP outlined in the table 6.1 below is in respect of the environmental concerns, which have been derived from the potential impacts whose mitigation measures are tabulated in Chapter 5. It recognizes similarities in environmental impacts of the roads maintenance and rehabilitation activities within the prioritised Maji ya Chumvi-Miritini road section. The environmental impacts arising here are not unique but similar to those in other sections of Nairobi – Mombasa road. These impacts are mostly due to unstable soils, seasonal rivers, inadequate vegetation cover, flat terrains prone to flooding and hilly terrains that are restrictive to traffic flow especially where optimal engineering design of the alignment is yet to be achieved. These characteristics have led to a reduced level of serviceability in this section of the Nairobi – Mombasa Road (A109).

7.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The improvement of the Maji ya Chumvi – Miritini section of Road A109 under the Nairobi – Mombasa Road Rehabilitation Projects will not only enhance economic growth at the local level but also contribute to the national economy.

The integration of environmental concerns in the implementation strategy of the WB funded Maji ya Chumvi – Miritini Road Project netters environmental practices amongst all stakeholders. This will ultimately enhance sustainable development in Kenya and the East and Central African Region at large.

Recommendations.

It is recommended that:

- The implementing agency should address all the proposed mitigation measures
- During the implementation of the Programme, positive impacts such as labour sourcing from the local community where possible should be enforced to not only improve economic gains and local skills but also alleviate poverty
- Environmental mitigation measures should be incorporated into the roads sector tender dossiers and contractual agreements
- The appropriate training needs identified should be implemented
- The Environmental Unit in the Planning Branch of the Roads Department should be strengthened in areas of personnel, equipment and funding.
- Capacity building, creating awareness, implementing mitigation measures and monitoring concerns are essential for the effective implementation of the Environmental Management Plan. To achieve this key target groups such as road workers, road users and project-affected people must be trained.

CHAPTER 1

Background

When Kenya attained independence in 1963, the country had an estimated road network of about 150,600 Km. This consisted of 41,800Km of the classified roads and 108,800 Km of unclassified roads. Out of the 41,800 Km of the classified road network only 1,811 Km were paved while 39,989 Km of earth and gravel were subject to closure for certain vehicle types during the rainy season. In addition the unclassified road network ranged from roads to footpaths.

The frequent closure of a large portion of the network constrained the pursuit of the development objectives of the people of Kenya. In order to address these constraints, the Government adopted new strategies in its commitment to policy changes that would improve agricultural output in the rural areas. This was through the enhancement of cheaper, safer and more reliable transport services with a multiplier effect on the growth of the national economy.

In the 1960's emphasis was laid on upgrading of the principal highway arteries in the trunk road system. This was followed by the improvement of the primary road network through selective bitumenization of heavily trafficked segments. At the same time feeder roads were constructed to link these segments.

In the 1970's emphasis shifted towards the construction of feeder and minor roads with a view of linking new economic areas to the country's road communication system. Towards this goal, the main thrust of the 1974-1978 National Development Plan was District Focus for Rural Development. In line with this, two rural-oriented road development programmes were initiated. The first one was the Rural Access Roads Programme (RARP), which was implemented between 1975 and 1986 through which 8,137 Km of unlinked farm to market roads were constructed using Labour Based methods. The second rural-oriented programme was the Graveling, Bridging and Culverting Programme (GBCP) initiated in 1975 which improved moderately trafficked secondary and minor roads to all weather gravel standards using equipment based methods.

In the 1980's the Government while continuing with these rural-oriented programmes realised that the aged bitumen roads and connecting secondary roads had started to deteriorate. Hence there was more emphasis on the reconstruction of the failed bitumen road sections and the improvement of linked secondary and minor roads through the Minor Roads Programme (MRP).

Today the classified road network has expanded to about 63,000 Km this being 9,000 Km of paved roads and 54,000 Km of unpaved roads. The unclassified road network has reduced to about 87,600 Km. Despite these tangible achievements, Kenya's road network is now characterised by poor surfaces of all types, with consequent effects on service levels and vehicle operating costs. The reasons for this state of affairs are many but the crucial one is inadequate funding for road maintenance commensurate to the expanded classified road network.

To achieve an efficient road transport system the road sector must be reformed. In view of this the Government with the assistance of Donors has strategised

new policies and plans to be pursued in the 1990's and beyond in order to achieve a sustainable road sector. Hence the introduction of the local Road Maintenance Fuel Levy Fund and the implementation of the mainly donor funded Roads 2000 Programme and Nairobi – Mombasa Road Rehabilitation Project (NMRRP). These aim at sustaining basic accessibility on a network basis while supporting Government efforts in other economic sectors.

1.2 World Bank Cooperation In The Roads Sector

a) Past World Bank Assistance

1. Between 1963 and 1976, the World Bank (WB) under International Development Association (IDA) had lent a total of US\$ 124.3 million to the Government of Kenya (GOK) for the construction of about 1000 km of trunk roads and about 7,900 km of feeder, special purpose and rural access roads. The special purpose roads included tea roads, sugar roads and settlement roads.
2. Between 1976 and 1978 under the first Highway Sector Loan US\$ 90 million was availed which was utilized for the following:
 - Construction of the Limuru-Uplands Road
 - Strengthening/Reconstruction of Uplands-Longonot, Naivasha-Lanet-Nakuru Highway, Nakuru-Timboroa, Mau Summit-Kisumu and Nairobi-Thika Roads
 - Procurement of equipment for road maintenance, the traffic police and vehicle inspection centres
 - Strengthening of the Ministry's Roads Department operations through technical assistance
 - Development of the Highway Maintenance Management System
3. Between 1984 and 1988 under the Second Highway Sector Loan US\$ 45 million was availed which was utilized for the following:
 - Reconstruction of Machakos Turn Off-Ulu Road,
 - Construction of the Ama'a River-Sotik Road
 - Purchase of Bitumen for maintenance of paved roads.

(b) On-Going Assistance

In 1995 the Government of Kenya negotiated with the World Bank for a US\$ 50 million loan under the credit package CDA 2812 – KE to finance the following ongoing projects:

- Financing of a Pilot Twinning project between the Roads Department and the Main Roads Agency of Western Australia. This is for the transfer of technology, knowledge and experience on Routine Maintenance, Contracting of Maintenance term Contracts, Technical Auditing, Quality Assurance, Consultancy and Training.

- Financing and technical assistance for Road Concession and Road Condition Inventory Survey Studies:
 - (i) The World Bank, through the Public- Private Infrastructure Advisory Facility (PPIAF) has approved a grant aid to assist in the study and development of a framework for Road Concessions in Kenya to cover the following areas:
 - Ascertain economic viability considering the aspects of equity, efficiency, full cost recovery and claims settlement.
 - Recommend modalities of implementation including definition of network, incorporation of contracting principles of Build Operate and Transfer (BOT) or Build Operate and Own (BOO), legislation, technical and administrative framework or capacity
 - Comparison of the Road Maintenance Fuel Levy Fund (RMFLF) and Road Toll characteristics; planning, monitoring and evaluation criteria.
 - (ii) The Road Inventory Condition Survey Study is financed through the Nairobi – Mombasa Road Rehabilitation Project (NMRRP) with 20% and 80% portions from the GOK (RMFLF) and WB (IDA) respectively. This study by the WB approved Consultant – Roy Jorgensen Associates (RJA) is updating the inventory information on the entire classified road network and providing Counterpart training in accordance with the 1995 strategic plan for the Roads Sector.

Using the Global Positioning System (GPS) to locate the coordinates of the road network and the Global Information System (GIS) to capture the geographical features of the network on digital format, the consultant shall produce outputs for maintenance management and road planning purposes.

These outputs shall include manuals, maps, program schedules and other hard copies related to the execution of the required services by the Roads Department.

c) Planned Assistance

The following conditions that were stipulated by the World Bank in 1997 before any further loans become effective have been fulfilled:

- Establishment of the Roads Works Inspectorate (RWI).
- Government approval of the 1995 Strategic Plan for the Roads Sector.

Subsequently the under listed plans are being implemented:

1. Roads 2000

In early 1997, the World Bank accepted to support the Government of Kenya in implementing the Roads 2000 maintenance strategy in 16 districts through an IDA credit. These districts are namely; Kisumu, Nyando, Muranga, Maragwa, Nyandarua, Baringo, Koibatek, Samburu, Laikipia, Kisii, Gucha, Homa Bay, Migori, Kuria, Rachuonyo and Suba.

The total project cost is US\$ 36 Million (with IDA providing US\$ 30 million and the Government of Kenya providing the balance of US\$ 6 million) over a period of 4 years.

Before their undertaking, the G.O.K confirmed in writing as required to the World Bank that the Roads 2000 maintenance programme within the World Bank lending programme was a top priority for Kenya's Road sector.

The three districts of Muranga, Maragwa and Nyandarua are to be taken over by the French Development Agency.

2. The Third Highway Sector Project

The Government of Kenya has also requested the World Bank for financial assistance to support the Third Highway Sector Project as part of the Implementation of the Strategic Plan for the roads sector.

This Third Highway Sector Project will have two components. The first component will cover rehabilitation and strengthening projects, which do not require much preparation and can therefore be implemented in the first two years.

The second component will cover Technical and financial proposals for the design of the following projects which had been evaluated by the Ministry with most being put in abeyance even though no agreement has been signed.

Road Sections Length (Km)

(i) Lanet Molo River (A104)	37.0
(ii) Molo River- Mau Summit (A104)	20.0
(iii) Mau Summit- Makutano (A104)	20.0
(iv) Makutano – Timboroa (A104)	20.0
(v) Nakuru - Mogotio (B4)	38.0
(vi) Mau Summit – Ahero (B1)	112.0
(vii) Ahero - Kisumu (A1)	27.2
(viii) Kisumu – Yala (A1)	43.6
(ix) Kisati Bridge (Kisumu) – Airport	7.4

(x) Machokos Turn Off-Ulu (A109)	30.0
(xi) Ulu-Sultan Hamud (A109)	24.0
(xii) Nairobi – Limuru – Kamandura	31.0
(xiii) Thika – Kamae - Magumu	70.0
(xiv) Mutwot - Chavakali	77.8
(xv) Leseru - Kitale (B2)	54.5
(xvi) Kisumu – Kakamega - Kaburegu (A1)	93.7
(xvii) Makutano - Samson's Corner (B6)	69.4
(xviii) Karatina - Kutus (C74)	28.8
(xix) Kutus - Kirinyaga (C73)	8.8
Total	813.2

Design consultancy activities on the following projects are ongoing under World Bank credit package CDA 2812 – KE.

<u>Project Name</u> <u>Remarks</u>	<u>Consultant</u>
(i) Lanet-Nakuru-Timboroa Ongoing Nakuru-Mogotio	Gibbi (E.A)
(ii) Machakos Turn off-Ulu-	Nor Consult
(iii) Mau Summit-Awasi Ongoing Kisati Bridge (Kisumu)- Airport	Geoprogetti/ MECE

3. Strategic Choices for Commercialization of Plant and Equipment Pool:

A request for financing of proposals to undertake a planned study to provide clear recommendations on the options which are likely to achieve the objectives of the Government for the provision of plant and equipment services to the road sector through restructuring of the Mechanical and Transport Department has been presented to the World Bank for financing.

4. Supplementary Credit and two-year extension of credit package CDA 2812-KE

The Ministry through the Treasury formally requested for the existing credit to be extended by two years by the IDA and for a supplementary credit of about US\$ 10 million of the credit package CDA 2812 – KE to be used for the Reconstruction of the 35 Km Maji ya Chumvi-Miritini section of the Nairobi-Mombasa Road. The

section was extensively damaged by the El Nino induced rains in 1998.

Treasury has also requested IDA to consider providing funding for the Design Review, Supervision Consultancy and Rehabilitation by Contract for other critical sections of the Nairobi-Mombasa Road: -

- (i) Bachuma Gate - Maji ya Chumvi
- (ii) Miritini-Saba Saba
- (iii) Nairobi Airport Turn Off- Machakos Turn off

However some intervention measures are ongoing in the first two sections with funding from the local RMFLF.

1.3 Donor Support

Donor representatives from various agencies including CIDA, DANIDA, DGIS, EC, KFW, SDC, SIDA, USAID, ADB and the World Bank are currently supporting several activities in the Kenyan roads sector in line with the 1995 Strategic Plan.

The Donors provide support in the following areas:

- Rehabilitation of high priority feeder roads in the districts
- Rehabilitation of Priority Trunk roads within the Northern Corridor particularly the Trans -Africa Highway
- Updating of the Road Condition Inventory
- Training of MORPW technical staff and labour based contractors (for spot improvements and routine maintenance)
- Consultancies for training and support to the districts and headquarters in supervision and management of the works
- Purchase of important vehicles, tools and equipment to enable implementation of the projects
- Mobilisation towards sustainable Road Concessions

1.4 Funding Agency

The project is to be jointly funded by the Government of Kenya (GOK) – 20 % and the World Bank (WB) – 80% of this 60% will be Foreign and 20% will be Local.

The WB has showed a positive response towards availing supplementary credit for the Reconstruction and Rehabilitation of the 35 Km Maji ya Chumvi-Miritini section of the Nairobi-Mombasa Road.

The WB also indicated that the following framework would act as an incentive to their expedience of this initiative:

- (a) Demonstration by the MOR&PW that the overlay of the 54 Km Bachuma Gate – Maji ya Chumvi and Miritini – Saba Saba sections would have residual strengths designed to provide 15 year and 10 year minimal design life respectively.
- (b) Provision by the MOR&PW of an implementation programme for approval.
- (c) Procurement of Consultancy services by the MOR&PW to develop an Aids Awareness/Prevention Program for the Nairobi – Mombasa Road as a Supplement to the in-house efforts within the Ministry and through special provisions in its standard Contracts to disseminate information on the same.
- (d) In addition, the GOK is expected to provide adequate funds for subsequent routine and periodic maintenance.

1.5 The Environmental Impact Assessment Need

Section 58 of the Environmental Management and Coordination Act of 1999 requires that all projects listed under the second schedule be subjected to Environmental Impact Assessment. Roads maintenance and rehabilitation activities are categorised under the transportation thematic area hence the need for the Environmental Impact Assessment (EIA)

Environmental Impact Assessment refers to the critical examination of the likely effects of a project on a particular environment and subsequent identification of mitigation measures required to ensure sound and sustainable development.

The EIA for the Reconstruction and Rehabilitation of the Maji ya Chumvi-Miritini section of the Nairobi-Mombasa Road will capture all generic environmental impacts and propose effective mitigation measures.

1.5.1 WB Requirement

Before the WB can facilitate the Project the following Pre-Appraisal studies are required to be carried out:

- **Economic Feasibility Study**

The Preliminary Economic Evaluation report has been done and is now under review.

- **Environmental Impact Assessment Study**

In accordance with the WB's environmental guidelines, this project falls in category B. The 1999 Kenyan Environmental Management and Coordination Act require that an EIA should be carried. The findings of this study will be integrated in the project appraisal to control the adverse environmental effects and ensure sustainability.

The Preliminary Environmental Impact Assessment report has been done, review by the Bank and, their comments incorporated. The composition of team of experts involved in the EAI is contained in Appendix 7 this report.

- **Pre-Contract Engineering Services**

A Pre-contract Preliminary Engineering Design and Tender Documentation has been done and is being reviewed. This incorporated the following: -

1. Road condition inventory
2. Materials investigation
3. Present and historical traffic flow analysis
4. Topographical survey
5. Computer aided design and plotting of the existing and proposed road alignments
6. Determination of a tentative bills of quantities
7. Estimation of the contract cost

1.5.2 Objectives of the Environmental Impact Assessment

The EIA study address the following objectives:

- To collect baseline information from the proposed rehabilitation road project
- To assess the negative environmental and social impacts likely to be caused by the project activities.
- To develop and suggest the necessary mitigation measures to address the negative environmental impacts.
- To develop a workable Environmental Management Plan (EMP) including:
 - Appropriate institutional arrangements to implement and monitor mitigation measures;
 - Cost implications of the mitigation measures and monitoring;
 - Capacity building and creating awareness amongst the target groups in order to effectively implement the project EMP

CHAPTER 2

PROJECT DESCRIPTION

2.1 General

The Nairobi – Mombasa Road Rehabilitation Project aims to improve this major link of our classified roads. This will enhance the performance of our road infrastructure thus promoting economic growth through improved transportation and access. The Project will also create employment opportunities to the local population making a contribution to the national poverty eradication strategy. The routine road maintenance as emphasised by the 1995 Strategy Plan for the Roads Sector is crucial for the general improvement of the road network to maintainable status. It is more cost effective to maintain the roads on a regular basis than to construct/reconstruct. There is therefore need to prevent the concentration or accumulation of water on the roads which is usually the main problem causing serious damage to the road surface and erosion to the off-road environment. Thus the maintenance of drainage infrastructure such as side drains, culverts, drifts, mitre drains and artificial waterways is of paramount importance in protecting both the road and its surrounding environment.

2.2 Scope of the Project

The main scope of the project comprises the following:

- A technically sound and economically viable design and tender documentation for the Reconstruction and Rehabilitation of the Maji ya Chumvi – Miritini section of the Nairobi – Mombasa Road, to cover:
 - b) Review of the existing data on the proposed road
 - c) Collection of physical, social, economic, environmental and operational data necessary in the design of the project
 - d) Preliminary engineering survey, materials sourcing and design work for the optimal alignment in accordance with local standards including preliminary cost estimates
- Procurement of Consultancy services for design review and supervision of works
- Procurement of Contracting Services through open tenders.
- Project audit.
- Institutional strengthening through correlated training of Roads Department Staff

2.3 Project Justification

The East and Central African region as a whole will benefit from the WB funded Nairobi – Mombasa Road Rehabilitation Project which is being implemented in Kenya. The WB through the IDA has committed financial support for this project.

Kenya being a country of diverse geographical regions requires access and improved roads between high agricultural potential areas and the low potential areas. This will be very important in the redistribution of surplus food products to markets in other regions of the country experiencing deficit.

In addition, tourism is another important economic activity in this region. The neighbouring Taita – Taveta district houses the Tsavo National Park, one of the most important National Parks in Kenya with rich wildlife resources. Wildlife-based and Beach tourism are key foreign exchange earners in this country and hence the maintenance of an efficient road network is critical for improved access and communication. The long overdue reconstruction of the Maji ya Chumvi – Miritini section of Nairobi – Mombasa Road Rehabilitation Project is to be implemented at this crucial time when the country is adopting aggressive strategies of economic recovery and growth. It will also make a positive impact on the current Government poverty eradication strategy.

The World Bank has already supported the strategy with positive achievements such as in the newly opened Mtito Andei – Bachiama Gate section. EU is financing the Mtito Andei – Sultan Hamud Section currently under rehabilitation. Other donors who have either agreed, supported or are considering to support the strategy include the NDF Norwegian Development Fund.

2.4 Project Objectives

The proposed Nairobi – Mombasa Road (Part of A109) Project will address the following:

- rehabilitate and strengthen Kenya's main road network
- improve the efficiency of the transport system in order to support economic and social development through effective market integration
- enhance the effective maintenance of classified road network to an economic level of serviceability and increase mobility through reduced vehicle operating costs and travel time and/or costs.
- safeguard the only feasible road connection between the Port of Mombasa and other parts of Kenya thus ensuring all weather accessibility with high potential agricultural areas and creating an integrated road network
- provide employment opportunities to the local population and alleviate poverty during the implementation and maintenance
- enhance Kenya's export-oriented growth strategy and external trade relations

2.5 Road Maintenance and Rehabilitation Activities

Road Maintenance can be divided into routine and periodic activities. Routine Maintenance involves activities such as grading, grass cutting, drain clearing, shoulder repairing and pothole patching. These activities are executed annually depending on weather conditions.

Periodic maintenance are activities typically scheduled over periods of several years and include resurfacing, bridge repairs, flood damage repairs, emergency maintenance after major failures associated with rains as well as regular upkeep of road signs and safety features.

- (vii) Miritini – Saba Saba
Its periodic maintenance is ongoing using finances from the local RMFLF.

2.7 Merits and Demerits of the Project Implementation Strategy

The NMRRP shall adopt a combination of both equipment-oriented and labour-based techniques with various merits and demerits.

2.7.1 Merits

The merits shall be as follows:

- Cost effectiveness and road safety
- Employment opportunities
- Shorter task completion time frames
- Local capacity building in improved skills
- Community ownership of the project as instigated by the stakeholders' meetings.
- Improved accessibility and communication
- Enhanced access to social amenities
- Improved linkages between market/business centres/agricultural areas and the network as a whole.
- Efficient utilization of local resources and foreign aid.
- Minimal ecological disturbance.
- Better quality of works due to more efficient drainage controls.
- Easier handling of difficult terrain, reduced vehicle operating costs and travel time and/or costs.
- Less stringent supervision during maintenance or defects liability period.
- Ability or versatility to utilize either manpower or equipment as and where necessary.

2.7.2 Demerits

The demerits shall be as follows:

- Minimal ecological degradation
- Accidental spillage of fuel and lubricants
- Minimal Soil Erosion
- Habitat Disturbance in the re-alignment
- Time loss due to inevitable mechanical breakdowns

Road Rehabilitation is different from maintenance in that it involves more substantial intervention to strengthen a road, repair structural defects and restore the road to its initial condition. Rehabilitation is usually applicable when a road has deteriorated to an unmanageable state, as is the case with the Maji ya Chumvi – Miritini section of Nairobi – Mombasa Road.

2.6 Overall Plan and Prioritization Criteria for the Rehabilitation of Nairobi – Mombasa Road (A109)

The MOR&PW has drawn an overall plan for the improvement of the Northern Corridor and adjoining road sections including Nairobi – Mombasa road. This plan which was submitted to the International Development Association through the World Bank is highly dependent upon donor funding. Its priorities include the maintenance of the maintainable road network, reconstruction of the deteriorated network and construction of links where their absence poses an impediment to development.

The Nairobi – Mombasa Road plays such a crucial role in Kenya's overall transport and economic system that its rehabilitation and/or strengthening should be of the highest priority in Kenya's roads sector strategy. The Nairobi – Mombasa Road Rehabilitation Project (NMRRF) is envisaged as a coordinated approach to improving the northern corridor and can be divided into the following homogenous links:

- (i) **Nairobi Airport – Machakos Turn Off**
This section is heavily trafficked and is in dire need of urgent intervention to check its rapid deterioration.
- (ii) **Machakos Turn Off – Ulu**
Though the design of its rehabilitation is part of the WB funded Package 3 Design studies (Third Highway Sector Loan), eminent rutting and pavement cracking is now evident on some sections. This section was reconstructed under the WB Second highway Sector Project in the early 1990's.
- (iii) **Ulu – Sultan Hamud**
The reconstruction of this section still in a serviceable condition was funded by the GOK in the mid 1990's and its rehabilitation is also part of the WB funded Package 3 Design studies (Third Highway Sector Loan).
- (iv) **Mtito Andei – Bachuma Gate**
Its rehabilitation has just been completed using finances from the World Bank through the IDA.
- (v) **Bachuma Gate – Maji ya Chumvi**
Its periodic maintenance is ongoing using finances from the local RMFLB.
- (vi) **Maji ya Chumvi – Miritini**
This is still a major primary constraint on this route since the works here have not been committed. The design for its rehabilitation and tendering process for consultancy services for the design review and supervision are ongoing. Finances for the rehabilitation contract are expected from the World Bank.

CHAPTER 3

3.0 PROJECT SETTING

3.1 Natural Environment

3.1.1 Location and Extent

The project road is a 35.3 Km section of the international trunk road A109 located in the Coast Province of Kenya. This is on the Trans African Highway and forms part of Kenya's principal arterial highway connecting the Port of Mombasa with the Capital of Nairobi and major national and international centres. In East and Central Africa, the road forms part of one of the two corridors serving Northern Tanzania and the landlocked countries of Sudan, Rwanda, Burundi, Democratic Republic of Congo and Uganda amongst others. Its improvement is therefore of both international and national significance.

It starts on the boundary of Kwale and Kilifi Districts at the Maji ya Chumvi River Bridge running in a South easterly direction through the urban centres of Mariakani and Mazaras to end at Miritini about 3.5 km beyond the boundary of Kilifi and Mombasa Districts. The Maji ya Chumvi Bridge and the Miritini end of the project are about 48 Km and 12 Km respectively from the Saba Saba Junction of Roads A109 and B8 within Mombasa Town. It lies between Latitudes 00° 50' and 02° 05' South and Longitudes 35° 58' and 36° 05' East, traversing through Kaloleni and Bahari divisions of Kilifi district and Changamwe division of Mombasa District.

A Copy of the location map highlighting the prioritised road section is attached as Appendix 2.

3.1.2 Climate

The Project area lies within the tropics and experiences sunshine throughout the year. It is generally hot and humid with an average relative humidity of 60%. The minimum temperatures range between 22°C and 25°C in the coolest months of June, July and August while the maximum temperatures range between 26°C and 33°C in the hottest months of December, January and February.

The rainfall has a distinct bimodal pattern. The long rains occur between April and June with a peak in May while the short rains fall from October to December. The average annual rainfall varies from 500mm around Maji ya Chumvi in the Coastal range to 1200mm around Miritini in the Coastal belt or plain.

3.1.3 Topography and Geology

The setting here is diversified and can be divided into three major physical features. These are the coastal range, the foot plateau and the coastal plain.

Starting at 177m above sea level (a.s.l) at Maji ya Chumvi, road climbs gently to reach its highest elevation of 217m a.s.l at Km 3+300 in the Simba Hills within the *Coastal range* of Sandstone hills.

To the east of this Coastal Range it traverses through the *foot plateau*, which is characterized with slightly undulating terrain upto Km 28. The surface of the foot plateau is traversed by a number of dry water courses and seasonal streams with

underlying Jurassic sediments of shale, sandstones and clays. From Km 28 to Km 33 the terrain rolls towards the beginning of the *Coastal plain or belt*.

Between Km 33 and Km 36 within the Coastal plain, the terrain is generally flat reaching 63m a.s.l at Miritini. Across this plain are several creeks and estuaries resulting in swamps that form part of the Athi catchment area. These swamps are well endowed with mangrove forests presenting great potential for marine culture. Mainly marine and deltaic sediments are found here including coral limestone, marble, clay stones and other alluvial deposits that support agriculture.

3.1.4 Water Resources and Drainage

Most of the project road lies in a zone of arid and semi arid land. Here water is a scarce commodity except near Miritini where perennial fresh water springs provide good quality water for domestic use and irrigation purposes.

The only river that crosses the road is the Seasonal Maji ya Chumvi river. The area abutting the road between Maji ya Chumvi and Mariakani drains westward into the Maji ya Chumvi River while that between Mariakani and Miritini drains eastwards into the Kirumbi River.

3.1.5 Vegetation

This is mainly tropical savannah grassland with scattered acacia trees and other stunted shrub.

However near Miritini are pockets of Mangrove forest and Coconut Trees with natural forests such as the sacred Kaya Forest found further inland.

3.1.6 Wildlife

Various types of wildlife in the Tsavo National Park in the neighbouring Taita-Taveta District are an attraction to tourist locally and internationally.

The nearby Arabuko Sokoke Forest also harbours many rare species of wild animals and birds that attract tourists and researchers to Kilifi District. A unique project by the National Museums of Kenya on butterfly rearing by communities around this forest is a major foreign exchange earner. There is great potential for expansion of this project since these butterflies are reared for export purposes.

3.1.7 Cultural Resources

The cultural entertainment of nine sub-tribes of the local Miji Kenda community is a cultural resource in itself, which can be economically exploited fully for the benefit of the district and the country at large.

3.1.8 Forestry

The pockets of mainly privately owned or trust land forests found here are diminishing rapidly due to the rampant felling of trees for charcoal burning activities that do not incorporate re-forestation. Some of the traditional Kaya forests have now been gazetted to protect them in addition the Environmental Management and Co-ordination Act of 1999 empowers the National Environment Management Authority (NEMA) to prosecute any transgression on the Kaya or any other gazetted forests. The Forestry department and NEMA (Compliance & Enforcement Dept.) are currently closely co-ordinating their activities to ensure such transgressions will not occur, or if they do, will be met with concerted action.

The rehabilitation of the road project is on an existing alignment; hence the potential impacts by the road works will not affect these forests.

The main products of these forests that serve as a source of income for the local community include wood fuel, charcoal, building poles and timber for furniture and boat making. In particular the *Cassuarina* species are in high demand for building and roofing of the famous *Makuti* structures in the beach hotels.

To safeguard these forests from destruction, farmers are being encouraged to practise agro-forestry but the response is poor. In an effort to disseminate information on agro-forestry and provide the necessary tree seedlings to the farmers the Forestry Department has established 8 (eight) forest stations in Kilifi District. Two of these (Gede and Jilore) are mainly for forest development. The department is also encouraging the establishment of private nurseries; intercropping with trees to assist in soil conservation; use of leaves for animal fodder, mangrove bark for leather tanning and roots for medicinal purposes; chemical treatment of gum posts for fencing instead of indigenous trees; use of improved sawing methods and development of improved charcoal kilns.

Currently the forest based industries are meagre which if enhanced can produce enough wood for local consumption, generate employment for the local community, earn foreign exchange, raise the income per capita thus ultimately improving living standards of the locals. As the population increases, there will be need to increase the awareness on the necessity of preserving the scarce indigenous forests and planting more trees for industry support.

3.2 Socio-Economic Environment

3.2.1 Population Trends

Population is a major resource that provides input to industry. The population of Kilifi district where most of the road lies is about 700,000 people. The district has five divisions of Bahari, Kaloleni, Magarini, Maarafa and Ganze. Bahari and Kaloleni Divisions that abut the road cover an area of 21% of the district but jointly comprise of 66% of the population most of which is settled in the agricultural areas and urban centres of Mariakani and Mazaras.

Similarly, the neighbouring Changamwe division at Miritini in Mombasa district has about 25% of its districts' population. This dense population is due to its high agricultural potential. These serve as indicators of the rural-urban migration of the local inhabitants in search of better economic activities.

The Mombasa - Kisumu railway line runs alongside the road to the right hand side. Notably the corridor in between the railway line and the road is uninhabited except in the urban centres.

3.2.2 Economic Activities

Though most of the land here is trust-land, the districts have a rich development potential from which they can develop if optimally exploited.

- **Agriculture and Livestock**

This region is a high agricultural potential zone. Traditional crops grown here are simsim, maize, coconuts, cashew nuts, tomatoes and cassava. The natural grassland provides fodder (which is supplemented with Napier grass) and legume leaves for zero grazing purposes. Other crops grown include Sorghum, cowpeas, sweet potatoes, sunflowers, chillies, vegetables, bananas, bixa, mangoes, paw paws, avocados and sisal.

Animal husbandry particularly goat keeping is practiced especially near the urban centres of Mariakani, Mazaras and Miritini. In the northern semi-arid parts of Kilifi District, Zebu cattle are also kept.

- **Tourism**

The wildlife located in nice undisturbed natural environment of the nearby Tsavo National Park that houses some of the world's famous hotels attracts both local and foreign tourists. Here good quality services of international standards are offered which not only generate employment and high-income levels but also provide a ready market for the locally produced Maasai and Akamba handicrafts and farm produce especially fruits and vegetables.

In the peak seasons more accommodation of similar standards is easily available in the neighbouring historic port of Mombasa and towns of Malindi, Watamu, Kilifi and Kikambala that have several beach hotels. Famous sites in Mombasa include the Fort Jesus, the slave caves along Mama Ngina Drive, old mosques and commercial buildings in the old port and town and the conspicuous elephant tasks on Moi Avenue. The beach hotels not only have beautiful sand beaches but also have exciting facilities for water sports, scuba diving, sailing and deep sea fishing.

Therefore improvement of this crucial link of the communication network in the area, shall not only earn the abutting districts of Mombasa and Kilifi more revenue but also the country at large.

- **Industry**

There are several industrial establishments that are agro-based, chemical or engineering oriented within the road environs. This is as a result of its proximity to Mombasa town and the fairly good communication network between Mombasa, Malindi, Mombasa and Nairobi.

The most notable of the agro-based industrial establishments include the Kenya Cashewnut, Tapioca and Bawazir Fruit Processing factories; Malindi Ginnery, REA Vipingo and Kilifi vegetable oil Millers whose products are exported Europe, U.S.A. and other countries.

There are a number of Industrial Establishments manufacturing chemicals such products as caustic soda, hydrochloric acid, and dry cells around Mariakani, rubber products in Kikambala and purified mineral water such as Alka Clear and Kilimanjaro Mineral water from the local fresh water springs. Women's groups locally produce the much sought after *Neem* natural beauty

soap laced with sap from the medicinal *Mwaribaini (Neem)* seed and coconut oil.

The Engineering establishments include the Mabati Rolling Mills, Kalu Works Ltd. and Steel Makers Ltd. The Mabati Rolling Mills produce cold rolled steel as raw material for manufacture of roofing iron sheets and furniture while the Kalu Works and Steel Makers Ltd. manufacture aluminium and steel products respectively. All these firms depend on imported raw materials brought in via the port of Mombasa and require a good communication network for the success of their operations.

Other industrial sub-sector activities include textile and fish processing, tanning, baking and confectioneries and cement production. Paints, cosmetics, glass, plastics, tiles, iron sheets, aluminium circles, bolts, coil springs, steel, sheets, wire nails and petroleum products amongst others are also manufactured for local consumption.

In line with the stringent policies of the Structural Adjustment Programmes, the scarce public resources are being expended on infrastructure and related services in a bid to provide a conducive environment for the efficient and effective operations of the private sector. This is vividly depicted in this coastal region where this has resulted into the creation of the Export Processing zone, Improvement of the Kenya Ports Authority and price decontrol on many industrial products.

- **Mining**

The active mineral and quarrying in this region are, lead mining at Kinagoni Hills; lead and barium mining at Vitengen; salt at Gongoni and Fundissa; ferrous sand at Ras Ngomeni; dimensional stones at Pangani, Ziani and Kisusu Hills; building stones, both Coral and Ballasts, at Kilifi, Roka, Bofu, Mtondia and Kokotoni; sand and limestone in various locations; shales at Nguu Tatu and Clays for tiles and bricks at Miritini.

Some of the mineral extraction such as mercury in the Arabuko Sokoke has been stopped because of the open cast method being used which is detrimental to the environment. In addition sand exploitation has been constrained by the detrimental effect of collection such as endangering indigenous forests, destroying sand beaches and disturbing the ecosystem.

3.3 Current Environmental Status of the Prioritized section as at the visit of the team of Experts

During the visual inspection of the road, a general assessment of the road operating conditions was done. The road has failed, as it now appears to be beyond economic routine maintenance and requires reconstruction.

3.3.1 The Existing Cross Section

The ditch-to-ditch distance is approximately 10m, with the average carriageway width of 5.8m with 2m shoulders. The shoulders are not clearly defined and

have uneven gravel or earth surfaces with a vegetation cover in some sections. Similarly there are no clearly demarcated bus bays.

However around Mariakani the shoulders have been widened to about 3.0 m over a cumulative length of about 1.5 Km between the town and the junction to Mariakani barracks. These act as temporary parking or waiting bays for the Mariakani weigh bridge with clouds of dust being normal here.

3.3.2 The Vertical and Horizontal alignments

Whereas the first 28 Kms has mainly horizontal straights and gentle curves that can be easily realigned should the need arise, the last 7km of the road traverses an area of restrictive terrain. In the latter section the carriageway runs through alternate cut and fill embankments demarcated by several horizontal curves and subsequently has limited sight distances.

The vertical alignment has a flowing sequence of curves and tangents all through. Except for the last 7.0 Kms towards Miritini, most of the road level is below the existing ground level and therefore prone to drainage failure. Other than economic constraints there are no other envisaged limitations to reviewing of the vertical alignment.

3.3.3 The Road Surface Condition

The road has excessive deformations making the routine maintenance attempts by the local resealing unit futile. There are rutting, deep cracks, alligator cracking, massive potholes depicting base failure and loss of camber on most of the pavement area.

There are washouts in areas where the road is submerged and also wherever the water table is high. Here the damage has extended into the sub base.

With exception to the 2km stretch within Mariakani Township where flush kerbs restrain the carriageway pavement, the road edges have all given way.

3.3.4 The Drainage system

The drainage system here appears to be non-functional and has completely failed.

3.3.4.1 The Maji ya Chumvi Bridge

This bridge that measures 35m in length and 6.2m in width is a composite construction of concrete columns that support steel girder beams upon which the concrete deck lies.

The steel girder beams are rusted and the steel reinforcement for the deck is exposed along the underside particularly between the second and third piers. The abutment Maji ya Chumvi towards and the first pier from Maji ya Chumvi side each have a distinct singular crack about 1m below the deck.

There are scanty remains of what were once guardrails as these have been knocked off on both sides of the bridge.

3.3.4.2 Other Minor Structures

Most of the water crossing structures are size 600mm diameter concrete pipes and a few size 2.4m x 1.2m box culverts. These are inadequate as is evident by siltation, overtopping, severe and deep cracks at joints, broken outlet and inlet structures and disintegration into potholes at these locations.

This situation is worsened by the existence of several junctions without access culverts to new developments. There is therefore dire need for additional cross and access culverts.

3.3.4.3 Drains

All the side, mitre, catch water and culvert outlet drains are silted and covered entirely in vegetation. The numerous marshy tracts adjacent to the road between Km 13 (Mariakani town) and Km29 (Mazeras town) compound this problem further.

3.3.5 Road Furniture

Except for the Mariakani Weighbridge and Police Station sign and a few privately installed signs, the entire road is completely devoid of traffic signs, marker posts and road markings.

Guardrails are non-existent due to not being initially provided for or having been knocked down by vehicles over the years.

3.3.6 Traffic flow

A climbing lane is needed between Km 26+800 and Km 30+800 where the long steep longitudinal gradient causes a considerable increase in vehicular speed differences.

The normal flow of traffic is interfered with between 3.00 P.M and 12.00 A.M when the queue of heavy trucks occupies up to 2 Km length of road near the Mariakani Weighbridge. This leaves only one lane for both the Mombasa bound and Nairobi bound traffic hence the need for a parking lane here.

CHAPTER 4

4.0 LEGISLATION, POLICY AND INSTITUTIONAL FRAME WORK

The policy, legal and institutional framework listed in this chapter specifically relates to the road sector.

4.1 International Conventions and Treaties

The applicable international conventions and treaties are as listed below:

- The Ramsar Convention on wetlands (1971) of international importance is reminiscent as the road network traverses through wetland areas within the study area. It emphasised that storm water drainages at stream crossings should be well planned to reduce frequency of flooding and to enhance surface flow and groundwater recharges.
- The Convention on Biological Diversity (1992) is important because the programme activities impact on flora and fauna. It mandated that routing of roads be done in accordance with physical plans that had been prepared taking into account the uniqueness of various ecological zones while avoiding the environmentally sensitive and geologically unstable areas.
- The Cites convention on Trade of Endangered Species (1973) is important because the roads sector facilitates movement of the animals and plants species or their product prohibited under this convention.
- The Basel Convention on the control of trans-boundary movement of hazardous wastes and their disposal (1989).

4.2 World Bank Policy

As part of the implementation of the strategic plan for the roads sector, the World Bank in line with its IDA policy agreed to give financial support to the Third Highway Sector Project. Under the World Bank CDA 2812 KE credit for the recently completed Bachuma Gate-Voi-Mutito Andei section, the Government of Kenya has requested for supplementary credit to rehabilitate the Maji ya Chumvi-Miritini section of Road A109.

4.3 National Legislation Policies

- The Traffic Act CAP 403 of the Laws of Kenya – Section 91 of this Act declares it illegal to erect any structure or interfere with road reserves.
- The Wildlife Conservation and Management Act, CAP 376 – Improvement of the road network within the proposed Rift Valley Province is likely to endanger animals crossing the road. This is due to the fact that districts such as Narok, Kajiado and Trans Mara are major wildlife areas. Improvement of the road network will positively enhance tourism and improve the local economy around and within the network

- The Forest Act, CAP 385 of 1989).
- The Water Act CAP 372.
- Agriculture Act CAP – the road sector once improved will enhance accessibility and marketing of Agricultural produce
- Public Health Act, CAP 242 road rehabilitation and maintenance works are likely to pollute the drinking water sources resulting from oil spillages but will facilitate speedy movement to the health facilities.
- The Kenya Roads Board Act, 1999. This Act encourages participation of all stakeholders in the road sector during planning, design, construction and maintenance. Once the provisions of main Act are adequately implemented. Ownership and sustainability will be ensured.
- Environmental Management and Co-ordination Act 1999. National Environmental Management Authority (NEMA) as an institution was established by the Act to supervise and coordinate Environmental Management in Kenya. Its main responsibilities should hinge on monitoring the state of the Environment; advising the National Environment Committee and the Government on issues of Environmental Policy and Legislation; Coordination and harmonizing environmental Sectoral interests; promoting the integration of environmental concerns in development, planning, overseeing compliance with environmental laws, regulation, impact assessments and standards; and promoting environmental education and awareness. This Act empowers stakeholder participation for sustainable management of the natural resources. It calls for Environmental Impact assessment (EIA) (under section 58) to guide the implementation of environmentally sound decisions. It is under this section that the current study is being undertaken.

4.4 National Development Strategy

The National Development Strategy was formulated on realisation that Development was taking place in Urban Centres alone leading to rural-urban migration. This led to the situation where the old and sickly people were left in the villages while the young people went to Urban Centres in search of employment for better facilities and living standards.

To reverse the trend, District Focus for Rural Development Strategy was formulated so as to take development closer to the rural areas and enable people at the grass roots make decisions to govern their livelihoods and also participate in decision making.

Currently the approach in force is a combination of the above two strategies.

4.5 Institutional Framework

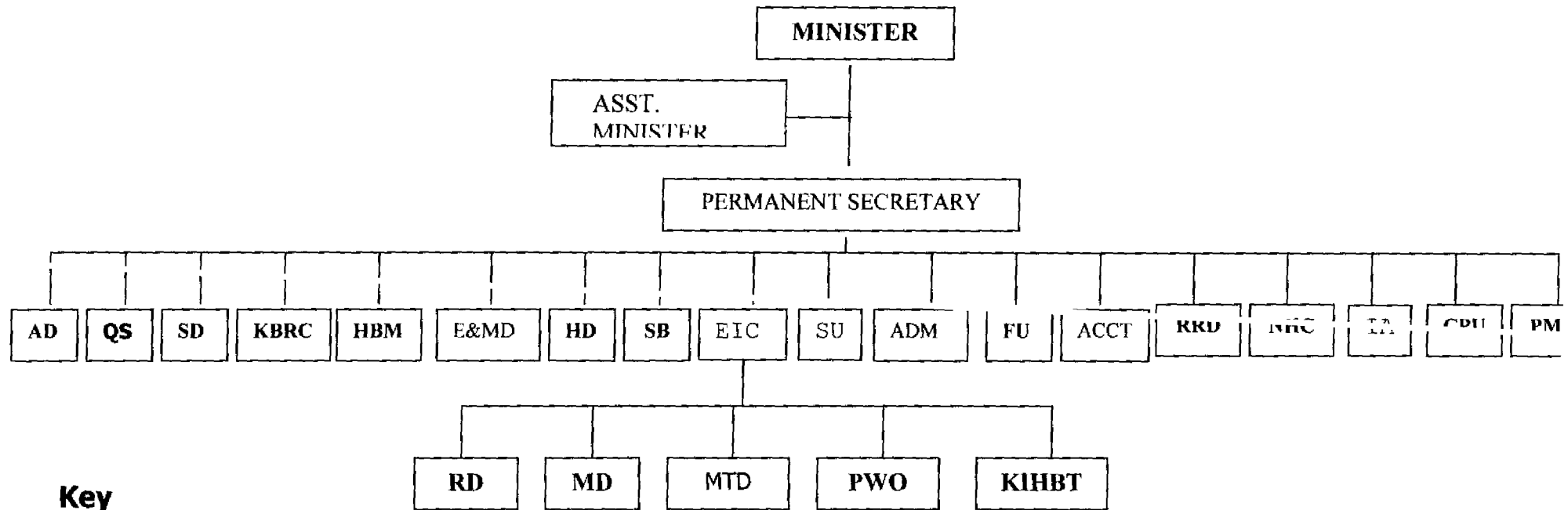
The Ministry of Roads and Public Works consists of several departments. However, the Roads Department is the key player in the implementation of road works activities. The Organogram given in Table 4.1 on subsequent pages

illustrates the institutional framework of the Ministry of Road Public Works & Housing and Road Department in particular.

4.5.1 Project Implementation Strategy

Kenya Roads Board Act, 1999 established the Kenya Roads Board whose purpose was to manage the Road Maintenance Levy Road Fund (RMLF), oversee the road network in Kenya and thereby co-ordinate its development, rehabilitation and maintenance. The Board is also the principal advisor to the Government on all matters related thereto. The Act provides for the participation of all stakeholders.

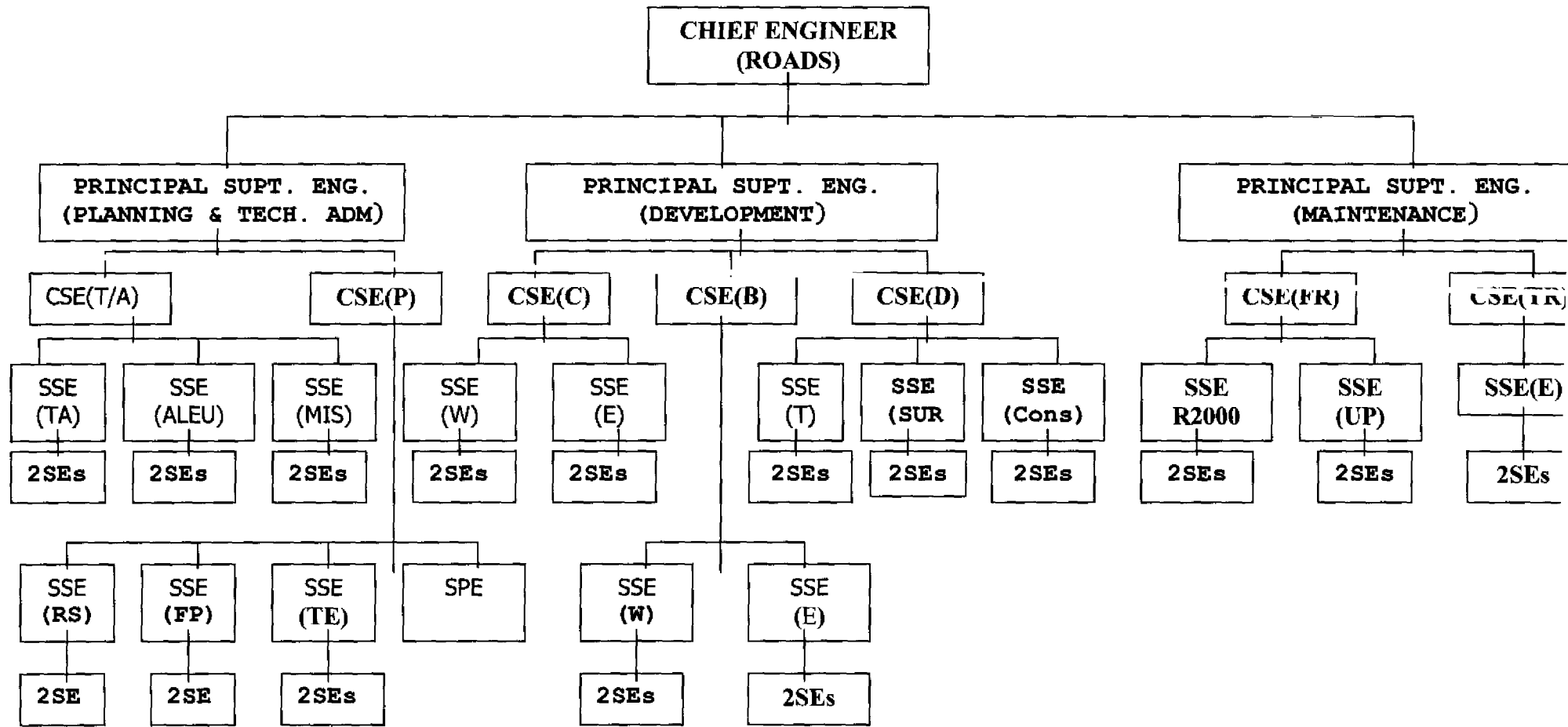
FIGURE 4.1: MINISTRY OF ROADS, PUBLIC WORKS AND HOUSING ORGANOGRAM



Key

- | | | | |
|-------|---|-------|--|
| Acct. | Accounts | KIHBT | Kenya Institute of Highways & Buildings Technology |
| AD | Architectural Department | MD | Materials Department |
| ADM | Administration Department | MTD | Mechanical & Transport Department |
| CPU | Central Planning Unit | NHC | National Housing Unit |
| E&MD | Electrical & Mechanical Department | PMD | Personnel Management Department |
| EIC | Engineer in Chief | PWO | Provincial Works Officer |
| FU | Finance Unit | Q&S | Quantities & Contracts Department |
| HBM | Housing Building Maintenance Department | RD | Roads Department |
| HD | Housing Department | RRD | Rent Restriction Department |
| IA | Internal Audit | SB | Supplies Branch |
| KBRC | Kenya Building Research Centre | SD | Structural Department |
| | | SU | Supplies Unit |

FIGURE 4.2 ROADS DEPARTMENT ORGANOGRAM



NB. Under the SE there 2E/AE

KEY: -

SSE	-Senior Superintending Engineer	SPE	-Special Programme and Environment
SE	-Superintending Engineer	AE	-Assistant Engineer
ALEU	-Axle Load Enforcement Unit		
CMTE	-Chief Mechanical & Transport Engineer		
CSE	-Chief Superintending Engineer	CSE	-Chief Structural Engineer
CEE	-Chief Electrical Engineer	CA	-Chief Architect
TA	-Technical Administration	TEU	-Traffic Engineering Unit
RS	-Road Safety Unit	B	-Bridges
C	-Construction	D	-Design
P	-Planning	M	-Maintenance
E	-Engineer	TR	-Trunk Roads
FR	- Feeder Roads	UP	- Unpaved Roads
R2000-	Roads 2000	CME	-Chief Materials Engineer

4.5.2 Staffing Levels of the Roads Department

The current staffing level of the entire Roads Department is sufficient to coordinate and oversee the relevant Consultancy Services and Contracted Civil works for smooth implementation of the Project. However, there is need to built capacity, equip and fund the newly formed Special Programme Environmental and Social Unit of its Planning Branch to enhance performance.

A senior Environmentalist has been seconded from National Environment Management Authority (NEMA) to the Ministry of Roads, Public Works & Housing, Department of Roads to offer Technical Guidance to the Implementing Engineers. This expert is working with Roads Engineers to incorporate environmental aspects in to roads activities and operations. However, this unit needs to broaden its mandate to address both environmental and social aspects resulting from road sector activities. It is proposed that the unit be named as the Environmental and Social Unit.

CHAPTER 5

5.0 ENVIRONMENTAL IMPACT ASSESSMENT

5.1 General

Environmental Impact Assessment (EIA) is becoming increasingly important in guiding environmentally sustainable decisions. Since environmental impacts from road developments are quite common, such projects should be subjected to EIAs.

This chapter analyses the potential impacts of the proposed road rehabilitation and maintenance of the Maji ya Chumvi section of Road A109 in the Coast Province of Kenya. The Potential Impacts are derived from the roads rehabilitation and maintenance activities discussed in chapter 2 and the baseline information contained in chapter 3.

5.2 Impact Assessment Process

The Impact Assessment Process which was participatory in nature involved stakeholders including amongst others: the Coast Provincial Roads Engineer, Materials Officer, the Mombasa District Work Office and Roads Officers, the Kwale and Kilifi District Roads Engineers, the Officer in Charge – Mariakani (A109) Resealing Unit, the Danida Project Coordinator and Equipment Advisor, the Likoni Constituency Member of Parliament, the Mariakani Location Chief farmers, businessmen and transporters.

5.3 Identification of Environmental Impacts

In order to identify the potential positive and negative impacts, the study team ensured that many stakeholders were involved in the exercise. Scoping discussions were held with the various interested and affected parties within the road environs during the fieldwork. In these discussions held at the Provincial Works Offices – Mombasa and the Mariakani Chief's office key environmental concerns relating to road maintenance and rehabilitation activities were raised.

A questionnaire whose copies were circulated to the stakeholders was used to obtain further information from the stakeholders. The responses here were very positive with samples of these attached as Appendix 4 and the predominant responses attached as Appendix 5. The study team verified the scoping information by driving along the Maji ya Chumvi – Miritini section of Road A109 and making physical observations.

The potential impacts of the Maji ya Chumvi – Miritini Road Rehabilitation Project fall under two broad categories of Bio-Physical (Natural) and Socio-Economic environments. The experts used the matrix in Table 5.1 below to analyse these impacts. Project activities are listed in the columns while the environmental parameters are reflected in the rows. Through brainstorming sessions and use of the road sector checklist contained in the Kenyan EIA draft guidelines and administrative procedures, potential impacts were identified.

The identified potential impacts were rated as positive or negative. These were further subjectively quantified as low (*), medium (**) and high (***) respectively.

5.4 Road Rehabilitation and Maintenance Potential Impacts

5.4.1 Negative Impacts

- Soil Erosion
- Disturbance of water flows
- Water pollution by oil spillages and contamination from raw concrete and fragments of demolished structures
- Traffic disruption
- Noise, Gaseous and Dust Pollution
- Pollution by waste materials from drain clearing and pavement reconstruction discharged into rivers.
- Operational hazards of road workers such as danger posed by motorists
- Encroachment by upcoming generated infrastructures such as markets and other business premises.
- Landscape disturbance.
- Displacement of human settlement.
- Haphazard movement of livestock to relocated watering points.
- Disturbance of flora and fauna in the natural ecosystem.
- Increased litter.
- Negative cultural influence (Resultant increase in promiscuity in the local community).

5.4.2 Positive Impacts

- Increased Commerce.
- Enhanced accessibility.
- Generated Employment opportunities.
- Positive foreign cultural values.
- Enhanced non-motorist traffic safety (Wider Pedestrian and cyclist Paths).
- Heavy vehicle parking bays at the Weighbridge and in abutting urban centres.
- Reduced Vehicle Operating Costs, Commuter travel time and costs.
- Easier access to social amenities.
- Enhanced security.
- Improved level of serviceability of the Road.
- Landscaped Road Environment.

5.5 Proposed Environmental Mitigation Measures

The proposed environmental mitigation measures to minimize negative potential impacts resulting from the project activities are tabulated in Table 5.2.

TABLE 5.2: ENVIRONMENTAL MITIGATION MEASURES

PROJECT ACTIVITY	POTENTIAL IMPACTS	MITIGATION MEASURES
A. REHABILITATION		
1. Site Clearance of the road reserve	Destruction of terrestrial wildlife habitats	Routine maintenance to discourage habitation of plant and animal species.
2. Earthworks	Local dust and noise emanating from the activities.	Routine watering of diversions and installation of mufflers on equipment. Roadside tree planting for future physical barriers to noise. Provide ear and nose masks for the workers.
	Landslide, slumps, slips, and other mass movement. Alteration of Surface drainage and subsoil drainage.	Provide Drainage Works as needed to reduce risks. Design of adequate drainage works. Install subsurface runoff filter drains.
	Destruction of terrestrial wildlife habitats.	Discourage site clearance beyond the road reserve during both routine and periodic maintenance. Create awareness on important of bio-diversity amongst the road maintenance workers.
	Alteration of Hydrological regimes of wetlands.	Realignment to avoid wetlands where these were not considered important during the initial road planning and construction. Rehabilitation of the access road to acceptable standards.
	Secondary impacts caused by access roads to materials sites such as damage to farms.	
3. Reshaping	Local dust and noise emanating from the activities.	Routine watering of diversions installation of mufflers on equipment. Roadside tree planting for future physical barriers to noise. Provide Drainage Works as needed to reduce risks.
4. Excavation of Material Sites	Open and devegetated sites.	Reshape the quarry and replant.
	Local dust and noise.	Routine watering off diversion roads.
	Landscape disfiguration, deep cuts, fills and quarries.	Use and architectural design to blend landscape.
	Landslides, slumps, slips, and other mass movement.	Provide Drainage Works as need to reduce risks.
	Creation of temporary breeding sites for transmission vectors of water borne diseases such as malaria, typhoid and bilharzias.	Avoid materials extraction in human settlement areas where possible. Avoid use of stagnant water for drinking by provision of wells. Recycle material sites into cattle watering points where possible.
Destruction of terrestrial wildlife habitats.	Routine maintenance to discourage habitation of plant and animal species.	
5 Major Drainage Structure (Bridges, Box Culverts & Drifts)	Increase sediment in streams affected by erosion during rehabilitation.	Protect susceptible surfaces with mulch or fabric, and plant vegetation on erodible.
	Erosion of Lands below the road bed receiving concentrated outflow from covered or open drains.	Increased number of drain outlets or mitre drains so as to avoid cascade effect.
	Water logging where the water table in high.	Incorporate filter sub drains below the sub-base or at the formation level.

TABLE 5.2: ENVIRONMENTAL MITIGATION MEASURES CONT'D

PROJECT ACTIVITY	POTENTIAL IMPACTS	MITIGATION MEASURES
6. Minor Drainage Structures (Access/cross Culverts & Side/Mitre/cut-off Drains)	Erosion of land below the road bed receiving concentrated outflow from covered or open drains. Creation of temporary breeding habitats for mosquito vectors.	Increase number of drain outlets or minor drains so as to avoid cascade effect. Avoid materials extraction in human settlement areas.
7. Protection Works.	Soil Erosion.	Gabions, stone Pitching, Scour Checks, Grassing and Tree planting.
8. Resurfacing (Pothole Patching, Resealing and Recarpetting)	Human and traffic conflict Local dust, noise and gaseous emission from the operation equipment.	Ensure road safety of the road workers through use of adequate warning signs. Enforce air and noise pollution standards.
9. Site camp	Poor sanitation and solid waste disposal in maintenance camps. Soil and water contamination through accidental spillage of oil, grease and fuel in the mechanical plant workshop and along the road. Possible transmission of communicable diseases from workers to local population and vice versa.	Provide adequately located and well maintained sanitary and solid waste disposal facilities such as VIP latrines Collect, recycle and re-use oils for treating wood e.g Fencing posts. Proper training and sensitisation of mechanical practices and proper storage. Create awareness on HIV/AIDs and other related diseases. Avail health care services.
B. ROUTINE MAINTENANCE		
1. Bush Clearing	Minimal impacts.	None
2. Culvert Cleaning & Headwall Repairs	Minimal impacts.	None.
3. Drain/Ditch De-Siltation	Minimal impacts.	None
4. Installation of Additive Access Culvert	Minimal impacts.	None.
5. Pothole Patching	Air and nose pollution from vehicle operation, in populated areas traversed by the road	None.
6. Encroachment along the road reserve	Encroachment of the road through mushrooming of unplanned structures along the road reserves. Human traffic conflict.	Enforce Section 91 of the Traffic Act, Cap 403 of the Laws of Kenya.
7. Material/Equipment Store	Soil and water contamination by oil, grease and fuel and plant equipment.	Collect and recycle Lubricants avoid accidental spills through good practices.
8. Maintenance Camp	Poor sanitation and solid waste disposal in maintenance camps. Soil and water contamination through accidental spillage of oil, grease and fuel in the mechanical plant workshop and along the road. Possible transmission of communicable diseases from workers to local population and vice versa.	Provide adequately located and maintained latrines. Proper training and sensitisation of mechanical staff. Avoid accidental spillage through good mechanical practices and proper storage. Create awareness on HIV/AIDs and other related diseases. Avail health care services.

TABLE 5.2: ENVIRONMENTAL MITIGATION MEASURES CONT'D

PROJECT ACTIVITY	POTENTIAL IMPACTS	MITIGATION MEASURES
C. ROAD OPERATION		
1. Road Operations	<p>Air pollution from gaseous emissions</p> <p>Roadside litter.</p> <p>Possible transmission of communicable diseases from workers to local population and vice versa.</p> <p>Noise pollution from vehicle operation.</p> <p>Accident risks associated with traffic and transport.</p> <p>Accidental spillage of oil and toxic materials.</p> <p>Disturbance of the river hydraulics and aquatic life under the bridges and box culverts downstream caused by off-road siltation into the river.</p> <p>Erosion of adjacent farms.</p> <p>Wearing of the road surface by cattle, human and vehicular traffic and subsequent use of the side slope and adjacent farms as carriageways for passage of traffic.</p> <p>Facilities of access to protected and gazetted areas leading to poaching and deforestation.</p>	<p>Provide dusk masks to the workers during operation and enforce air pollution Standards.</p> <p>Provide for disposal facilities.</p> <p>Create awareness on HIV/AIDs and other related diseases. Avail Health care services.</p> <p>Promote road side tree planting.</p> <p>Enforce noise pollution Standards.</p> <p>Design and implement road safety measures.</p> <p>Put in place emergency services to control accidental incidences.</p> <p>Ensure proper mitigation measures are instituted uphill to reduce downhill siltation.</p> <p>River training with adequate protection works put in place.</p> <p>Enforce sustainable maintenance of the road and diversions if any.</p> <p>Enforce physical planning regulation of new developments through the Physical Planning and Forest Departments and other relevant agencies like the KWS.</p>

5.5.1 Environmental Mitigation Measures in Road Contractual Agreements

Project Specifications should include clauses on Environmental concerns. In this WB funded Project the environmental clauses amongst others would cover: -

- (i) The contractor shall submit to the Roads Engineer a camp and site office plan defining all facilities to be provided.
- (ii) The Contractor shall limit environmental degradation through minimal oil spillages, reducing dust and gaseous emissions.
- (iii) The contractor to restore all excavated material sites including quarries by: -
 - Preserving trees during materials stockpiling
 - Selectively planting trees and grass and levelling stripped ground to facilitate water percolation and check water ponding
 - Ensuring safety measures for local residents where a quarry has been identified as a watering point for livestock and people
 - Planting trees at project ecologically vulnerable sites and maintaining them for a specified period

To ensure that these mitigation measures are incorporated in the actual works the design Engineer should include them in the Bill of Quantities and subsequent Engineer's estimate. The table below is an illustration of the same and provides the cost estimates of the proposed mitigation measures in accordance with the Standard Specification for Road and Bridge Works (MOTC-1986) itemisation.

Table 5.3 Bill Items Reflecting Environmental Mitigation Measures

**Item No.	Description	Unit	Quantity	Rate (Kshs)	Amount Kshs.
1.18	Provide a prime cost sum of 0.5% for off road Environmental Mitigation measures to be used as directed by the Engineer.	Ls	6,443,000		6,443,000
1.19	Include percentage of item 1.18 for Contractor's overheads and profit.	%	15%		966,450
*5.08	Top soiling of side slopes in fills	M ²	76,362	97	7,407,114
*5.09	Grass over side slopes in fills and cuts	M ²	76,362	166	12,676,092
*5.10	Backfilling of Quarries as directed by the Engineer to the satisfaction of the Quarry owner.	Ls	250,000		250,000
20.22	Provide and erect environmental awareness billboards at urban centres as directed by the	No	6	121,000	726,745
*20.09 (a)	Provide and erect 1.5m chain-link fences upheld with 2m intervals around quarries.	Ls	500,000		500,000
(b)	Fence up road reserves on main roads as directed by the Engineer (Both Sides)	Km	70	40,000	2,800,000
20.10	Provide and erect wooden gates as directed by the Engineer.	No	5	6,000	30,000
20.11	Provide plant, water and tender tree seedlings until firmly established as directed by the	No	800	1,222	977,600
20.12	Provide and place permanent litterbins as specified and directed by the Engineer.	No	8	15,000	120,000
20.13	HIV/AIDS awareness	LS			3,000,000
20.14	Capacity awareness building	LS			3,132,600
	Sub total 1				18,193,395
	15% contingencies				2,729,309
	Sub Total 2				20,922,704
	The monitoring is done during implementation and maintenance period which cost 10% of the total implementation of mitigation measures				2,092,470
	Total				23,015,175

* These items are inbuilt in the main contract.

** Itemized as per Ministry of Transport and Communication's Standard Specification for Road and Bridge construction of 1986.

It is crucial that a record of all mitigation measures implemented be availed by the Contractor through the Supervision Consultant to the Chief Engineer Roads for purposes of future mitigation monitoring and evaluation.

CHAPTER 6

6.0 ENVIRONMENTAL MANAGEMENT PLANS

6.1 General

An Environmental Management Plan (EMP) is the amalgamation of all proposed mitigative and monitoring actions, set to a time-line with specific responsibility assigned and follow up actions defined.

The EMP in the roads sector is one of the most important outputs of the environmental impact assessment, which ensures that the implemented mitigation measures are sustainable. It outlines the monitoring frequency, cost measurable and verifiable indicators as well as individuals/institutions to undertake the required actions. The assumption here is that the proposed mitigation measure will be implemented under the contractual arrangement during rehabilitation and maintenance works.

The EMP outlined in the table 6.1 below is in respect of the environmental concerns, which have been derived from the potential impacts whose mitigation measures are tabulated in Chapter 5. It recognizes similarities in environmental impacts of the roads rehabilitation and maintenance activities within the prioritised Maji ya Chumvi – Miritin road section. The environmental impacts arising here are not unique but similar to those in other sections of Nairobi – Mombasa road. These impacts are mostly due to unstable soils, seasonal rivers, inadequate vegetation cover, flat terrains prone to flooding and hilly terrains that are restrictive to traffic flow especially where optimal engineering design of the alignment is yet to be achieved. These characteristics have led to a reduced level of serviceability in this section of the Nairobi – Mombasa Road (A109).

TABLE 6.1: ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL CONCERNS	MITIGATION MEASURES	RESPONSIBILITY DURING REHABILITATION AND MAINTENANCE	MONITORING MEANS	MONITORING FREQUENCY
1. Soil Erosion	Grassing Scour Checks Gabions Works Cut-water Drains Culver ting	Project Engineer Supervision Consultant Approved Contractor Roads Dept. MoRPW_Env. Unit	During Rehabilitation Routine and Periodic Maintenance.	Four (4) times a year throughout the project life.
2. Air pollution by dust.	Regular watering of the diversion road Encourage use of dust masks	Project Engineer Supervision Consultation Approved Contractor Roads Dept. MoRPW-Env. Unit	Surprise checks during Rehabilitation	Bi-Annually.
3. Noise	Roadside tree planting Enforcement of standards	Roads Dept. MoRPW.Env. Unit Approved contractor Project Engineer Supervision Consultant	During Rehabilitation Maintenance.	Bi-Annually.
4. Conservation and Sanitation	Create awareness on importance of bio-diversity amongst the road maintenance workers. Discourage site clearance beyond the road reserve.	Project Engineer Supervision Consultant Roads Dept. MoRPW-Envi. Unit Provincial Administration Approved Contractor	During routine and periodic Maintenance.	Bi-Annually.
5. Health and Sanitation	Provide adequately located and maintained latrines. Create awareness on HIV/AIDs and other related diseases. Avail health care services. Provide drinking water wells. Control of malaria and Schistomiasis	Project Engineer Supervision Consultant Approved Contractor Roads Dept. MoRPW-Env.Unit Provincial Administration Water Dept. MOE &Local NGOs Public Health Dept.-MOH.	During routing and periodic maintenance.	Bi-Annually.
6. Impedded drainage and or inefficiency of Drainage Structures.	Desiltation Repairs of Drainage Structures.	Project Engineer Approved Contractor Supervision Consultant	During Rehabilitation and Maintenance	Monthly

TABLE 6.1: ENVIRONMENTAL MANAGEMENT PLAN CONT'D

ENVIRONMENTAL CONCERNS	MITIGATION MEASURES	RESPONSIBILITY DURING REHABILITATION AND MAINTENANCE	MONITORING MEANS	MONITORING FREQUENCY
7. Material Sites (a) Unrehabilitated	Rehabilitation of the Material Sites to the satisfaction of the owner by creation of water point, earth dams and farms and controlled fencing and tree planting.	Project Engineer Approved contractor Quarry owner Supervision Consultant Road Dept. MoRPW-Env. Unit Provincial Environmental Officer	During Rehabilitation	Monthly
(b) Rehabilitated	Proper Quarrying Techniques. Uniform training of supervisory personnel.	Project Engineer Road Dept. MoRPW-Env. Unit Approved Contactor Supervision Consultant	During Rehabilitation and Maintenance	Monthly
8. Temporary Mosquito Breeding Sites	Where possible avoid materials extraction in human settlement areas. Create awareness on the dangers posed by stagnant water.	Project Engineer Roads Depr. MoRPW-Env. Unit Approved Contractor Supervision Consultant	During Rehabilitation and Maintenance.	Monthly
9. Traffic Accidents	Provision of proper road safety elements such as adequate, shoulders roads signs and furniture.	Project Engineer Road Dept. MoRPW- Env. Unit Approved Contractor Supervision Consultant Roads Dept. MoRPW- RSu	During Rehabilitation and Maintenance.	Monthly
10. Increased Vehicular traffic	Encourage use of public transport. Driver sensitisation of road safety.	MOTC Road Dept. MoRPW- Env. Unit Traffic Police Dept. The Media.	During Maintenance.	Daily
11. Encroachment along the Classified Road Reserves.	Awareness campaigns. Enforcement of Section 91 of the Traffic Act, Cap 403 of the laws of Kenya.	CR PWOs DWOs Road Dept. MoRPW- RSU. Provision Administration Traffic Police dept. The Media.	During Routine Maintenance	Daily

TABLE 6.1: ENVIRONMENTAL MANAGEMENT PLAN CONT'D

ENVIRONMENTAL CONCERNS	MITIGATION MEASURES	RESPONSIBILITY DURING REHABILITATION AND MAINTENANCE	MONITORING MEANS	MONITORING FREQUENCY
12. Litter along the roadside.	Create awareness on the importance of a clean environment. Install permanent litter bins (concrete) as part of the road furniture at preset intervals to be emptied regularly	Road Dept. MoRPW- Env. Unit Project Engineer Provincial Administration Provincial Environmental Officer The Media Approved Contractor Supervision Approved Contractor Supervision Consultant	During Rehabilitation and Maintenance.	Daily
13. Soil and water contamination through accidental spillage of oil, grease and fuel in the mechanical plant workshop and along the road.	Collect, recycle and re-use oils for treating wood e.g Fencing posts. Avoid accidental spillage through good mechanical practices and proper storage. Proper training and sensitisation of mechanical staff.	Project Engineer Contractor's Mechanical Team Supervision Consultant Road Dept. MoRPW-RSU. Road Dept. MoRPW- Env. Unit	During Rehabilitation.	Four (4) times a year throughout the project life.
14. Possible conclusion of Vehicles with Livestock.	Introduce animal crossing signs and bumps before and after the crossing corridor.	Project Engineer Approved Contractor Road Dept. MoRPW- Env. Unit MOAL – Provincial Livestock Officer	During Rehabilitation.	Four (4) times a year throughout the project life.
15. Traffic impedence at Mariakani due to reduce carriageway as Nairobi bound heavy vehicles wait to be weighed.	Provide suitable adequate parking or bays and install sufficient restriction warning signs.	Project Engineer Approved Contractor Supervision Consultant Road Dept. MoRPW- Env. Unit Road Dept. MoRPW-RSU	During Rehabilitation.	Bi-annually
16. Restrictive sight distances where road traverses hilly terrain.	Use Engineering Design to improve the Existing alignment	Project Engineer Approved Contractor Supervision Consultant Road Design Section - MoRPW	Before and during Rehabilitation	As and when Required
17. Characteristic edge failure along the existing road.	Use Engineering Design and Materials Quality Control to ensure homogeneity of the pavement structure through the shoulders and carriageway.	Project Engineer Approved Contractor Supervision Consultant Road Design Section – MoRPW Materials Dept. MoRPW	Before and during Rehabilitation	As and when Required
18. Lack of Road Signs and other Road Furniture.	Install sufficient and adequate road furniture especially road signs.	Project Engineer Approved Contractor Supervision Consultant Road Dept. MoRPW-RSU	During Rehabilitation	Bi-annually

6.2 Monitoring and Auditing

Environmental monitoring establishes benchmarks to determine the nature and magnitude of anticipated environmental and social impacts. Audits are conducted to ensure that negative potential project impacts are minimised through adequate implementation of mitigation measures while monitoring will provide early warnings on unforeseen impacts.

Some of the key parameters for monitoring and auditing in the Roads Rehabilitation and Maintenance Programmes to cover the following: -

- Erosion
- Oil spillages
- Dust gaseous emissions
- Water quality
- Vegetation
- Traffic accidents

6.3 Programme Decommissioning

Decommissioning refers to the final disposal of the project materials at the expiry of the project life span. In respect to roads, decommissioning is not anticipated. Obsolete equipment and dismantled camp materials will however be salvaged and kept in the nearby Resealing Unit Camps and/or the Central MoRPW Workshop and depot as useful spare parts for the future.

6.4 Establishment of an Environment and Social Unit

The objectives of the Unit are: -

- to achieve a comprehensive policy in terms of environmental management.
- to integrate environmental and social concerns into the road works activities.
- to create awareness within the Roads Department on the importance of environmental management in road construction, rehabilitation, improvement and maintenance.
- to strengthen the capacity within the Ministry of Roads Public Works and Housing to be able to handle environmental and social issues pertaining to the road sub-sector.
- to form a focal point for coordination for both Government and Non-Governmental Organizations of all environmental and social matters concerning roads

Role of the Environmental and Social Unit.

The role of the Environmental and Social Unit will be to: -

- develop environmental road sub-sector standards and guidelines
- ensure compliance With Environmental Management and Coordination Act of 1999, and Environmental Impact Assessment and Audit Regulation of 2003 as it relates to the road sub-sector

- review and update roads department document e.g. Standard Specification and Contract Documents to incorporate environmental concerns
- participate in Inspection for Certificate of Substantial Completion carried out by the Roads Department
- screen proposed road rehabilitation projects to determine Environmental Impact Assessment requirements
- review environmental impact assessment reports that have been prepared
- set up a system for continuous monitoring and periodic surveillance
- audit road rehabilitation, improvement and maintenance activities
- liaise with government, parastatal and non-governmental organizations concerned with environmental issues with a view to addressing common priorities
- create awareness and sensitise the public with regard to proposed road projects, their potential impacts and the need for planning in the event that people are going to be affected
- ensure compliance of the road sub-sector EIA to public consultation and disclose procedures as required by Environmental Management and Coordination Act (EMCA) and World Bank safeguard policies
- set up a computerised environment database relevant to the road works activities.

Strengthening of the Environmental and Social Unit (ESU)

The ESU needs to be formally established and strengthened in order to achieve its objectives and to be fully operational. The Unit would require the following professionals:

- (i) Environmentalist – Head
- (ii) Environmental Impact Assessment Specialist
- (iii) Roads Engineer with EIA experience
- (iv) Sociologist/Gender specialist
- (v) Information Technology expert
- (vi) Two Secretaries
- (vii) Two Drivers
- (viii) One Messenger

6.5 Capacity Building

Introduction

Capacity building and creating awareness is necessary for the effective implementation of the Environmental Management Plan of the project. The Environmental and Social Unit in the MoRP/N&H will ensure capacity building, creating awareness; mitigation measures and monitoring concerns are implemented.

This will be achieved by training the key target groups at all levels. These target groups can be divided into three groups:

Group A Road Workers:

This group consists of Engineers (Resident, Provincial, Project,) Contractors, Supervisors, Site Agents, Site Managers and the Environmental and Social Unit in the MoRPW&H. These are the top management staff concerned with road construction and maintenance.

Group B Road Users: Transport Association:

Examples include the Truck Drivers Association, and Matatu Drivers Association. For this group of people the road is their livelihood.

Group C Project Affected People (PAP), Casual (skilled or unskilled) labourers.

Business people and farmers. These people have businesses (e.g. kiosks, offices, schools, etc.) that can potentially be affected by the road, or they live by the road.

Training Objectives

Training will be based on modules aimed at:

- (a) Developing awareness of the need to consider environmental issues during construction, operation and maintenance of roads
- (b) Creating awareness and understanding of the environmental legal framework pertaining as pertains to roads
- (c) Developing skills for
 - (i) Identification and assessment of environmental impacts of road projects
 - (ii) Incorporation of mitigation measures at all stages of road development
 - (iii) Reviewing EIA reports and incorporating measures during the decision making process

Table 6.2 below presents the recommended topic modules and costs for each of the three target groups necessary to implement the Environmental Management Plan.

Table 6.2 Recommended topic modules and costs for each of the target groups

Topic modules	Target Group	No. of participants	No. of days	Cost per unit (Kshs)	Cost in (Kshs)
<ol style="list-style-type: none"> 1. Understanding of EIA legislation in Kenya 2. Develop awareness of the environmental implications of roads and procedures for assessing them 3. Develop awareness and understanding of the human resource and institutional arrangements for managing environmental impact studies 4. Develop an understanding of how policy can be developed and incorporated into environmental management 5. Importance of incorporating mitigation measures during road planning and design and implementing an environmental monitoring programme 6. Impart skills on environmental auditing and monitoring during road construction and maintenance 	<p>Group A Road Workers</p>	22	33	7,500	495,000
<ol style="list-style-type: none"> 1. General understanding of EIA legislation in Kenya 2. Sensitisation on health (STDs including HIV/AIDS), littering, solid and liquid waste management 	<p>Group B Road Users</p>	26	3	5,500	429,000
<ol style="list-style-type: none"> 1. Brief overview of EIA legislation in Kenya 2. Sensitisation on health (STDs including HIV/AIDS), littering, solid and liquid waste management 3. Implications of encroachment onto the road reserve 	<p>Group C Project Affected People (PAPs)/Casuals/skilled and unskilled</p>	450	2	2,000	1,800,000
				Sub Total	2,724,000
				15% contingency	408,600
				Total	3,132,600

Table 7.2 presents a breakdown of the target groups for training necessary to implement the environmental management plan during construction.

Table 7.2 Breakdown of the target groups for training during the construction phase

	Category	Number of people
Supervision		
Group A	Engineers	3
	Provincial Engineer	1
	Project Engineer	1
	Resident Engineer	1
	Assistant Engineers	6
Group B	Surveyor	2
	Inspector of Works	8
Group C	Project Affected Persons (PAPs)/ Casuals/skilled and unskilled	30
Sub Total		52
Contractor		
Group A	Site Engineer	2
	Site Agent	2
	Site Manager	6
Group B	Foremen	16
Group C	Project Affected Persons (PAPs)/casuals/skilled and unskilled	420
Sub Total		446

Target Group	Cost per day (Kshs)	Days	Number of participants	Cost per target group (Kshs)
Group A	7,500	3	22	495,000
Group B	5,500	3	26	429,000
Group C	2,000	2	450	1,800,000
			*Total	2,724,000

*This cost is included in table 5.2 as item No.20.14.

CHAPTER 7

7.0 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

The improvement of the Maji ya Chumvi – Miritini section of Road A109 under the Nairobi – Mombasa Road Rehabilitation Project will not only enhance economic growth at the local level but also contribute to the national and regional economy.

The integration of environmental concerns in the implementation strategy of the WB funded Maji ya Chumvi– Miritini Road Project better environmental practices amongst all stakeholders. This will ultimately enhance sustainable development in Kenya and the East and Central African Region at large.

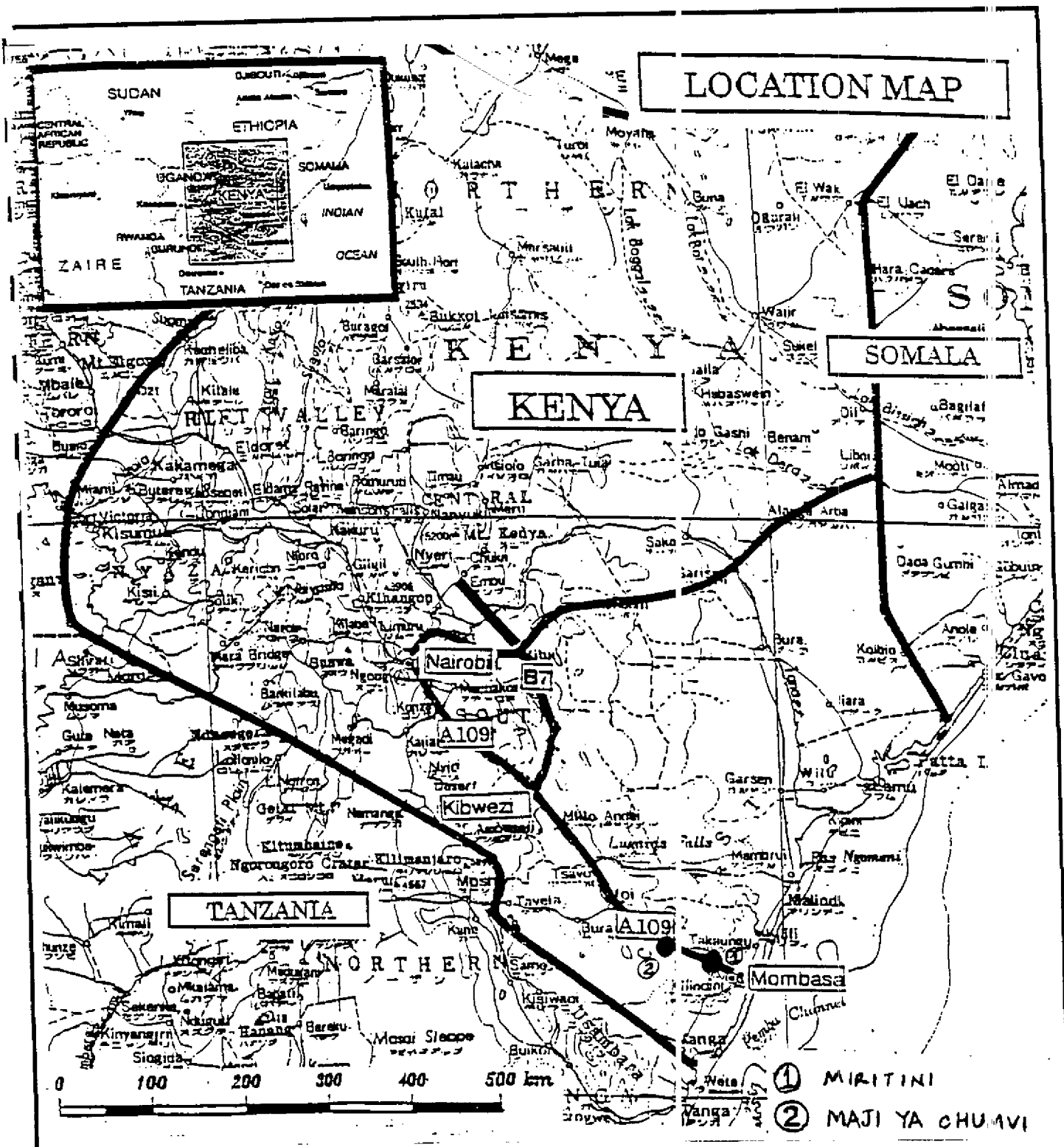
7.2 Recommendations

It is recommended that:

- The implementing agency should address and implement all the proposed mitigation measures.
- During the implementation of the Programme, positive impacts such as labour sourcing from the local community where possible should be enforced to not only improve economic gains and local skills but also alleviate poverty.
- Environmental mitigation measures should be incorporated into the roads sector tender dossiers and contractual agreements.
- The appropriate training needs identified should be implemented.
- The Environment and Social Unit should be formally established and strengthened by capacity building (staffing), training, provision of adequate resources and facilities.
- Capacity building, creating awareness, implementing proposed mitigation measures and monitoring are essential to the effective implementation of the Environmental Management Plan. To achieve this key target groups such as road workers, road users and project-affected people must be trained.

APPENDICES

**APPENDIX 2: LOCATION MAPS OF
THE PROJECT
PRIORITY ROADS**

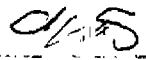

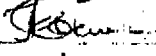

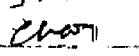
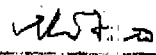

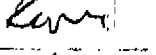

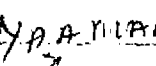
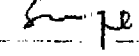
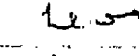
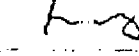
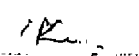
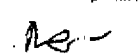
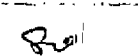
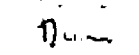

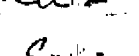

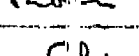
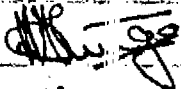


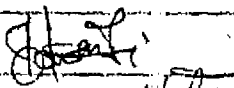



THE PROJECT FOR THE RECONSTRUCTION AND REHABILITATION OF MAJI YA CHUMVI - MIRITINI SECTION OF NAIROBI - MOMBASA ROAD (A109) IN COAST PROVINCE OF THE REPUBLIC OF KENYA

**APPENDIX 3: STAKEHOLDERS
DETAILS**

17/08/2024

STAKEHOLDERS DETAILS

	<u>NAME</u>	<u>OCCUPATION</u>	<u>SIGNATURE</u>
1.	Mwakombe Biya	Farmer	
2.	Sirya Junguwe	-1-	
3.	Karisa Dadu	-4- Farmer	
4.	Chera Kahume	Mason	
5.	Festus Kiboo	Comp. cleaner	
6.	Chera Biya	Business	
7.	Kitcas Zia Nguya	Farmer	
8.	FREDIOL BIYA MUSTADU	Farmer	
9.	Karisa Kazungu	-1-	
10.	KENGA YAA	LOADER	
11.	YAA MANG	YAA MANG	
12.	Kenga Siya	Farmer	
13.	Lewa Bwa	-1-	
14.	Ladenge Hingun	-1-	
15.	Kazungu Kiti	-1-	
16.	Uea Mwangali	-1-	
17.	Sidi Kitcas	-1-	
18.	Dama Ngoma	-1-	
19.	Kamu Sabu	-1-	
20.	Sidi Pola	-1-	
21.	Patricia Kazungu	-1-	
22.	Salama Chai	-1-	
23.	Joseph M. Kooruki	Contractor	
24.	Mary w. Biya	Business	
25.	Mbeye M. James	Typist	
26.	Xcuiindi Ngudi	Numer	
27.	Abdullah Othman	Handic	
28.	ROBERT NATANO KAZUNGU	Farmer	

31. MOHAMED MOSSOP HORISP Mad
32. MOHAMED SUDI TRADER Kadi
33. INI HAMISI ELECTRONICS
34. JAMES KIBWANGA - BUSINESSMAN
35. KATHINDI JOGOLO - FARMER
36. HASSAN SALIM - BUSINESSMAN
37. SAID MBARAK - Driver
38. Beja Tongo - Mzee Kijiji BEOA
39. EX chief Kathindi Kadenge Kalina
40. MARCUS JACCA
41. ZOMO MWINZA MIZUNGU JED
42. MORICE MUTUNGA - FARMER
43. HARRISON KATANA ALCHIEF
44. FAJUMA MOHAMMED FARMER
45. JOHNS BLOYA MZEE FONDO
46. JOSEPH VU Mutinda
47. HAMUS NDUMA S (R) MORPW Hamu
48. JOSEPH MANKETA S (R) MRPW Morcha Ny
49. S. K. GITAH SUPT. ROOS (MORPW)
50. A.O. ODUOR Moleleh S (R) (MORPW) Oduor
51. JOYCE WAKITHI Kombe - Chief Matiraizi

**APPENDIX 4: DULY FILED SAMPLE
QUESTIONNAIRES**

QUESTIONNAIRE RESPONSES DURING INTERVIEWS WITH THE COMMUNITIES ADJACENT TO THE ROADS.

A) VALUE OF THE EXISTING ROADS

1. Do you find the roads useful and if so, how do they benefit you?
Response: Yes, if it is good it facilitates just movement and reduce vehicle operating costs, and transport costs = reduced profit margins.
2. What do the roads deny you?
Response: Time is costly due to delays, extra vehicle operation costs
3. What effect has the deterioration of the road had?
Response: Devastation of our economy.

B) CHANGE IN THE LOCAL ECONOMY

4. In what ways has the existing road affect household income and local trade?
Response: Dust in the degraded sections is tremendous, people do not stop due to time losses and therefore do not trade with locals.
5. In what ways will the improved road with the reconstructed Maji-ya-Chumvi bridge affect household income and local trade?
Response: More efficient movement with better programming of trading activities in definite time and greater trade volume

C) IMPACT OF ROADS VILLAGE/TOWN ENVIRONMENT DUE TO DUST

AND TRAFFIC MANAGEMENT

6. What are your main income regarding the village town environment of the existing road?
Response: Varying from small kiosk vendors of coconuts, kerosene vegetables, mangoes to charcoal burning and small scale farming of maize, cow and pigeon peas.
7. What are your main concerns regarding the planned new roads?
Response: Overspeeding which can be contained by use of road signs and public awareness campaigns.
8. What are your concerns regarding the spillage of fuel (oil/grease) or concrete mixtures and permeation of other generated debris into the river (river ecosystem) and terrestrial areas and the magnitude of the subsequent damage?
Response: This is minimal but these are accidental hazards which are neither planned nor controllable.

D) DEMOGRAPHIC AND SETTLEMENT PATTERNS

9. In what major ways have the existing road affected demographic and settlement patterns in the area?
Response: Resettlement of the locals where the road traverses.
10. In what major ways will the new road affected demographic and settlement patterns in the area?
Response: Generated habitats with more people living outside Mombasa town in cheaper residences if movement time to places of work shall have been reduced and the vehicle operating costs reduced

E) IMPACT ON LAND USE AND LAND PRODUCTIVITY

11. In what ways will the new road affect land use and land productivity in the area?
Response: *Change of land use from subsistence to cash crop and horticultural farming with easier accessibility to the market centres and town.*
12. In what way will the new road affect land and land productivity in the area?
Response:

F) IMPACT OF UNDESIRABLE DEVELOPMENTS ABUTTING THE ROAD

13. What are the main undesirable developments brought about by the present road?
Response: *Adoption of foreign cultures and social behaviour.*
14. How can these undesirable developments be reduced in the reconstruction of the road?
Response: *Introduction of public awareness in schools, and churches and mosques with the local leaders steering the same.*

G) SERVICING OF ROAD CONSTRUCTION WORKFORCE

15. Which locations do you recommend for the road construction work force?
Response: *Near the road, or at places agreeable to both the contractor and local community.*
16. What services should be provided in the road construction workforce camps?
Response: *Water, good sanitation, security and proper/descent residential facilities conducive to the humid climate.*

H) QUARIES AND BORROW PITS FOR THE ROAD CONSTRUCTION

17. Which quarries and borrows were used for constructing the present road?
Response: *-*
18. Have the quarries and borrows pits been rehabilitated to community's satisfaction.
Response: *-*
19. Would you offer new sites for borrow pits for future construction (with compensation)?
Response: *Yes but these should be converted into waterpoints for use by the local community.*

I) DEVELOPMENTS WITHIN THE ROAD RESERVE (30 METRES ON BOTH SIDES OF THE ROAD)

20. Do you know that the road reserve is not your land for developments (buildings and farms)?
Response:

Yes.

21. If the new road demands wider area beyond the existing road reserve (30 metres on both side of the reconstructed road) would you expect: -

a) Compensation

Response: Yes

b) Relocation of family

Response: Not likely

J) PARTICIPATION IN ROAD MAINTENANCE

22. Do you agree to carry out road maintenance works in sections of the road adjacent to your land: -

a) As your own contribution

Response: Yes

b) For small compensation (state expected payments)

Response: Yes

23. Will you agree to serve as member of local road maintenance committee?

Response: Yes

K) SOCIAL IMPACTS

24. What impact will the presence of non-local construction workers have on the local community?

Response: Circulation of money will indirectly improve the local income per capita, induce unwanted social behaviours

25. What should be done to reduce the resultant negative impacts if any?

Response: Create awareness on the risks of resultant diseases like HIV/AIDS etc.

L) STAKEHOLDER DETAILS

Occupation/Designation: Member of Parliament :- LIKONI CONSTITUENT

Date: 18/08/2001. Place: Likoni

Signed: - 

HON. SUNEEMAN R. SHIKOMBO, M.P.

LIKONI

QUESTIONNAIRE RESPONSES DURING INTERVIEWS WITH THE COMMUNITIES ADJACENT TO THE ROADS.

A) VALUE OF THE EXISTING ROADS

1. Do you find the roads useful and if so, how do they benefit you?

Response: YES, TRANSPORT AND COMMUNICATION.

2. What do the roads deny you?

Response: ECONOMY.

3. What effect has the deterioration of the road had?

Response: TOURISM, ~~AND~~ SAFETY AND ECONOMY.

B) CHANGE IN THE LOCAL ECONOMY

4. In what ways has the existing road affect household income and local trade?

Response: DIFFICULT IN TRANSPORTING OUR GOODS FROM MANUFACTURES.

*5. In what ways will the improved road with the reconstructed Maji-ya-Chumvi bridge affect household income and local trade?

Response: IT WILL HELP EASY TRANSPORTING AND COMMUNICATION - IT WILL AFFECT

C) IMPACT OF ROADS VILLAGE/TOWN ENVIRONMENT DUE TO DUST

AND TRAFFIC MANAGEMENT

6. What are your main income regarding the vi lage/town environment of the existing road?

Response: INCOME IS GOING DOWN.

7. What are your main concerns regarding the planned new roads?

Response: SAFETY, ECONOMY, DEVELOPEMENT

8. What are your concerns regarding the spillage of fuel (oil/grease) or concrete mixtures and permeation of other generated debris into the river (river ecosystem) and terrestrial areas and the magnitude of the subsequent damage?

Response: POLLUTION

D) DEMOGRAPHIC AND SETTLEMENT PATTERNS

9. In what major ways have the existing road affected demographic and settlement patterns in the area?

Response: NO.

10. In what major ways will the new road affected demographic and settlement patterns in the area

Response: NO.

E) IMPACT ON LAND USE AND LAND PRODUCTIVITY

11. In what ways ~~will the new road affect~~ ^{has existing affected} land use and land productivity in the area?

Response:

12. In what way will the new road affect land and land productivity in the area?

Response: **NO AFFECT.**

F) IMPACT OF UNDESIRABLE DEVELOPMENTS ABUTTING THE ROAD

13. What are the main undesirable developments brought about by the present road?

Response:

14. How can these undesirable developments be reduced in the reconstruction of the road?

Response:

G) SERVICING OF ROAD CONSTRUCTION WORKFORCE

15. Which locations do you recommend for the road construction work force?

Response: **MIRITINI TO KOKOTENI,**

16. What services should be provided in the road construction workforce camps?

Response: **ROAD SIGNS.**

H) QUARIES AND BORROW PITS FOR THE ROAD CONSTRUCTION

17. Which quarries and borrows were used for constructing the present road?

Response: **K. V. PATEL, DHANJAG BROS.**

18. Have the quarries and borrow pits been rehabilitated to community's satisfaction.

Response: **YES.**

19. Would you offer new sites for borrow pits for future construction (with compensation)?

Response: **AFTER CONSULTATIONS WITH OTHER INMATES**

I) DEVELOPMENTS WITHIN THE ROAD RESERVE (30 METRES ON BOTH SIDES OF THE ROAD)

20. Do you know that the road reserve is not your land for developments (buildings and farms)?

Response: **YES**

21. If the new road demands wider area beyond the existing road reserve (30 metres on both side of the reconstructed road) would you expect: -

a) Compensation

Response: IT WILL DEPEND ON WHAT IS WITHIN THAT AREA

b) Relocation of family

Response: YES

J) PARTICIPATION IN ROAD MAINTENANCE

22. Do you agree to carry out road maintenance works in sections of the road adjacent to your land: -

a) As your own contribution

Response: YES

b) For small compensation (state expected payments)

Response:

23. Will you agree to serve as member of local road maintenance committee?

Response: YES

K) SOCIAL IMPACTS

24. What impact will the presence of non-local construction workers have on the local community?

Response: IT WILL BE VERY TENCY - LOCAL WORKERS FIRST

25. What should be done to reduce the resultant negative impacts if any?

Response: ~~85%~~ LOCAL AND 15% NON-LOCAL

L) STAKEHOLDER DETAILS

Occupation/Designation: FARMER

Date: AUGUST 17, 2001 Place: RABAI

Signed: [Signature]

Name: MARCUS JACCHI

P.O. BOX 87768

MOYBASA

QUESTIONNAIRE RESPONSES DURING INTERVIEWS WITH THE COMMUNITIES ADJACENT TO THE ROADS.

A) VALUE OF THE EXISTING ROADS

1. Do you find the roads useful and if so, how do they benefit you?

Response: transport.

2. What do the roads deny you?

Response: Nothing

3. What effect has the deterioration of the road by daily use?

Response: - ~~inconvenience~~ ^{inconvenience} in ~~daily~~ ^{daily} ~~use~~ ^{use}.
- High maintenance cost of vehicle
- Road itself

B) CHANGE IN THE LOCAL ECONOMY

4. In what ways has the existing road affect household income and local trade?

Response: increase in market activities in the area

5. In what ways will the improved road with the reconstructed Maji-ya-Chumvi bridge affect household income and local trade?

Response: - efficiency in transport
- increase trade.

C) IMPACT OF ROADS VILLAGE/TOWN ENVIRONMENT DUE TO DUST AND TRAFFIC MANAGEMENT

6. What are your main concerns regarding the village/town environment of the existing road?

Response: /

7. What are your main concerns regarding the planned new roads?

Response: Reduce dust pollution

8. What are your concerns regarding the spillage of fuel (oil/grease) or concrete mixtures and permeation of other generated debris into the river (river ecosystem) and terrestrial areas and the magnitude of the subsequent damage?

Response: Very bad practice

D) DEMOGRAPHIC AND SETTLEMENT PATTERNS

9. In what major ways have the existing road affected demographic and settlement patterns in the area?

Response: /

10. In what major ways will the new road affected demographic and settlement patterns in the area

Response: /

E) IMPACT ON LAND USE AND LAND PRODUCTIVITY

11. In what ways ^{has existing affected} will the new road affect land use and land productivity in the area?

Response: —

12. In what way will the new road affect land and land productivity in the area?

Response: very many ways especially transportation.

F) IMPACT OF UNDESIRABLE DEVELOPMENTS ABUTTING THE ROAD

13. What are the main undesirable developments brought about by the present road?

Response: prostitution and HIV AIDS

14. How can these undesirable developments be reduced in the reconstruction of the road?

Response: Better services to community, i.e health

G) SERVICING OF ROAD CONSTRUCTION WORKFORCE

15. Which locations do you recommend for the road construction work force?

Response: near M.O.P.W Camp site.

16. What services should be provided in the road construction workforce camps?

Response: water, electricity, telephone

H) QUARIES AND BORROW PITS FOR THIS ROAD CONSTRUCTION

17. Which quarries and borrows were used for constructing the present road?

Response: —

18. Have the quarries and borrows pits been rehabilitated to community's satisfaction.

Response: NO.

19. Would you offer new sites for borrow pits for future construction (with compensation)?

Response: —

I) DEVELOPMENTS WITHIN THE ROAD RESERVE (30 METRES ON BOTH SIDES OF THE ROAD)

20. Do you know that the road reserve is not your land for developments (buildings and farms)?

Response: Yes

21. If the new road demands wider area beyond the existing road reserve (30 metres on both side of the reconstructed road) would you expect: -

a) Compensation **Yes**
Response:

b) Relocation of family **Yes**
Response:

J) PARTICIPATION IN ROAD MAINTENANCE

22. Do you agree to carry out road maintenance works in sections of the road adjacent to your land: -

a) As your own contribution
Response:

b) For small compensation (state expected payments)
Response:

23. Will you agree to serve as member of local road maintenance committee?
Response:

K) SOCIAL IMPACTS


24. What impact will the presence of non-local construction workers have on the local community?
Response: **-**

25. What should be done to reduce the resultant negative impacts if any?
Response: **sentseke sentseke**

L) STAKEHOLDER DETAILS

Occupation/Designation: **dic Resealing unit 6 marakoni**

Date: **17/08/2001** Place:

Signed:  **Marakoni Resealing Group**

Name: **S. K. Outehi**

4

QUESTIONNAIRE RESPONSES DURING INTERVIEWS WITH THE COMMUNITIES ADJACENT TO THE ROADS.

A) VALUE OF THE EXISTING ROADS

1. Do you find the roads useful and if so, how do they benefit you?

Response: *transport and easy communi*

2. What do the roads deny you?

Response: *For Development*

3. What effect has the deterioration of the road had?

Response: *poorly BETTER Service*

B) CHANGE IN THE LOCAL ECONOMY

4. In what ways has the existing road affect household income and local trade?

Response: *Poor income and trade has become slow*

5. In what ways will the improved road with the reconstructed Maji-ya-Chumvi bridge affect household income and local trade?

Response: *will raise the income and trade will rise*

C) IMPACT OF ROADS VILLAGE/TOWN ENVIRONMENT DUE TO DUST

AND TRAFFIC MANAGEMENT

6. What are your main income regarding the village/town environment of the existing road?

Response: *Agriculture / business*

7. What are your main concerns regarding the planned new roads?

Response: *Densification*

8. What are your concerns regarding the spillage of fuel (oil/grease) or concrete mixtures and permeation of other generated debris into the river (river ecosystem) and terrestrial areas and the magnitude of the subsequent damage?

Response: *pollution in the drainage*

D) DEMOGRAPHIC AND SETTLEMENT PATTERNS

9. In what major ways have the existing road affected demographic and settlement patterns in the area?

Response: *The old and the economic has fallen a*

10. In what major ways will the new road affected demographic and settlement patterns in the area

Response: *Development*

E) IMPACT ON LAND USE AND LAND PRODUCTIVITY

11. In what ways ^{has existing affected} will the new road affect land use and land productivity in the area?

Response:

12. In what way will the new road affect land and land productivity in the area?

Response: *The area will not be cultivated*

F) IMPACT OF UNDESIRABLE DEVELOPMENTS ABUTTING THE ROAD

13. What are the main undesirable developments brought about by the present road? *poor means of transportation*

Response:

14. How can these undesirable developments be reduced in the reconstruction of the road?

Response: *Communication and development*

G) SERVICING OF ROAD CONSTRUCTION WORKFORCE

15. Which locations do you recommend for the road construction workforce?

Response: *you*

16. What services should be provided in the road construction workforce camps?

Response: *Security*

H) QUARIES AND BORROW PITS FOR THE ROAD CONSTRUCTION

17. Which quarries and borrows were used for constructing the present road?

Response: *Kajole quarry, Bundau*

18. Have the quarries and borrows pits been rehabilitated to community's satisfaction.

Response: *yes*

19. Would you offer new sites for borrow pits for future construction (with compensation)?

Response: *yes*

I) DEVELOPMENTS WITHIN THE ROAD RESERVE (30 METRES ON BOTH SIDES OF THE ROAD)

20. Do you know that the road reserve is not your land for developments (buildings and farms)?

Response: *yes*

21. If the new road demands wider area beyond the existing road reserve (30 metres on both side of the reconstructed road) would you expect: -

a) Compensation *yes*
Response:

b) Relocation of family
Response: *yes*

J) PARTICIPATION IN ROAD MAINTENANCE

22. Do you agree to carry out road maintenance works in sections of the road adjacent to your land: -

a) As your own contribution
Response: *yes*

b) For small compensation (state expected payments)
Response: *yes*

23. Will you agree to serve as member of local road maintenance committee?

Response: *yes*

K) SOCIAL IMPACTS

24. What impact will the presence of non-local construction workers have on the local community?

Response: *to get labour*

25. What should be done to reduce the results of negative impacts if any?

Response: *by*

L) STAKEHOLDER DETAILS

Occupation/Designation: *Trades*

Date: *17-8-2007*

Place:

Signed: *[Signature]*

*MARIKANI
Trades
Kotumbe*

Name: *Harrison*

QUESTIONNAIRE RESPONSES DURING INTERVIEWS WITH THE COMMUNITIES ADJACENT TO THE ROADS.

A) VALUE OF THE EXISTING ROADS

- 1. Do you find the roads useful and if so, how do they benefit you?
Response: Reducing travel time and wear and tire when traveling for business or pleasure.
- 2. What do the roads deny you?
Response: Safety on the roads due to potholes.
- 3. What effect has the deterioration of the road had?
Response: Higher maintenance costs, less travel.

B) CHANGE IN THE LOCAL ECONOMY

- 4. In what ways has the existing road affect household income and local trade?
Response: Produce is now more expensive to transport
- 5. In what ways will the improved road with the reconstructed Maji-ya-Chumvi road bridge affect household income and local trade?
Response: Transport of goods and people will become cheaper and faster.

C) IMPACT OF ROADS VILLAGE/TOWN ENVIRONMENT DUE TO DUST AND TRAFFIC MANAGEMENT

- 6. What are your main income regarding the village/town environment of the existing road?
Response: N/A
- 7. What are your main concerns regarding the planned new roads?
Response: 1) That the road will not be maintained
2) Poor bypasses during construction
- 8. What are your concerns regarding the spillage of fuel (oil/grease) or concrete mixtures and permeation of other generated debris into the river (river ecosystem) and terrestrial areas and the magnitude of the subsequent damage?
Response: Care should be taken to protect the environment.

D) DEMOGRAPHIC AND SETTLEMENT PATTERNS

- 9. In what major ways have the existing road affected demographic and settlement patterns in the area?
Response: Some industries has moved out of Mombasa into the Mazeras - Marikamini Area
- 10. In what major ways will the new road affected demographic and settlement patterns in the area?
Response: Increase the Industrial development in the area

E) IMPACT ON LAND USE AND LAND PRODUCTIVITY

11. In what ways has the existing road affected land use and land productivity in the area?

Response: Increase in Agriculture and charcoal burning

12. In what way will the new road affect land and land productivity in the area?

Response: The same

F) IMPACT OF UNDESIRABLE DEVELOPMENTS ABUTTING THE ROAD

13. What are the main undesirable developments brought about by the present road?

Response: Charcoal Burning, Traffic Accidents

14. How can these undesirable developments be reduced in the reconstruction of the road?

Response: Traffic Safety be included in the design.

G) SERVICING OF ROAD CONSTRUCTION WORKFORCE

15. Which locations do you recommend for the road construction work force?

Response: Marakanda

16. What services should be provided in the road constructions workforce camps?

Response: - Clean Water and good sanitation
- Health services - also AIDS.

H) QUARIES AND BORROW PITS FOR THE ROAD CONSTRUCTION

17. Which quarries and borrows were used for constructing the present road?

Response: Do not know

18. Have the quarries and borrows pits been rehabilitated to community's satisfaction.

Response: Some are visible from the road and they were not rehabilitated

19. Would you offer new sites for borrow pits for future construction (with compensation)?

Response: N/A.

I) DEVELOPMENTS WITHIN THE ROAD RESERVE (30 METRES ON BOTH SIDES OF THE ROAD)

20. Do you know that the road reserve is not your land for developments (buildings and farms)?

Response: Yes

21. If the new road demands wider area beyond the existing road reserve (30 metres on both side of the reconstructed road) would you expect: -

a) Compensation
Response: N/A

b) Relocation of family
Response: N/A

J) PARTICIPATION IN ROAD MAINTENANCE

22. Do you agree to carry out road maintenance works in sections of the road adjacent to your land: -

a) As your own contribution
Response: N/A

b) For small compensation (state expected payments)
Response: N/A

23. Will you agree to serve as member of local road maintenance committee?
Response: N/A

K) SOCIAL IMPACTS

24. What impact will the presence of non-local construction workers have on the local community?

Response: 1) Danger of bringing AIDS and other diseases.
2) Social unrest.

25. What should be done to reduce the resultant negative impacts if any?

Response: 1) Information and health clinics
2) Use local labour force

L) STAKEHOLDER DETAILS

Occupation/Designation: Project Co-ordinator Roads

Date: 17/8-2001

Place: Mombasa 2000

Signed: 

Name: Eric Boss

6

QUESTIONNAIRE RESPONSES DURING INTERVIEWS WITH THE COMMUNITIES ADJACENT TO THE ROADS.

A) VALUE OF THE EXISTING ROADS

1. Do you find the roads useful and if so, how do they benefit you?

Response: yes, transport and communication

2. What do the roads deny you?

Response: It deny me communication and local economy

3. What effect has the deterioration of the road had?

Response: tourism industry

B) CHANGE IN THE LOCAL ECONOMY

4. In what ways has the existing road affect household income and local trade?

Response: Communication is very hard to access

5. In what ways will the improved road with the reconstructed Maji-ya-Chumvi bridge affect household income and local trade?

Response: It will improve transportation industry

C) IMPACT OF ROADS VILLAGE/TOWN ENVIRONMENT DUE TO DUST AND TRAFFIC MANAGEMENT

6. What are your main income regarding the vil age/town environment of the existing road?

Response: the main income is small scale farming and business

7. What are your main concerns regarding the planned new roads?

Response: the main concern is to see the road is maintained well by the local people

8. What are your concerns regarding the spillage of fuel (oil/grease) or concrete mixtures and permeation of other generated debris into the river (river ecosystem) and terrestrial areas and the magnitude of the subsequent damage.

Response:

D) DEMOGRAPHIC AND SETTLEMENT PATTERNS

9. In what major ways have the existing road affected demographic and settlement patterns in the area?

Response: It is if they were houses in the existing road.

10. In what major ways will the new road affected demographic and settlement patterns in the area

Response: ✓

E) IMPACT ON LAND USE AND LAND PRODUCTIVITY

11. In what ways ^{has existing affected} will the new road affect land use and land productivity in the area?

Response: Some people were removed from the road and some people were not affected.

12. In what way will the new road affect land and land productivity in the area?

Response: This will not affect the land.

F) IMPACT OF UNDESIRABLE DEVELOPMENTS ABUTTING THE ROAD

13. What are the main undesirable developments brought about by the present road?

Response: transformation and tourism.

14. How can these undesirable developments be reduced in the reconstruction of the road?

Response:

G) SERVICING OF ROAD CONSTRUCTION WORKFORCE

15. Which locations do you recommend for the road construction work force?

Response:

16. What services should be provided in the road constructions workforce camps?

Response:

H) QUARIES AND BORROW PITS FOR THE ROAD CONSTRUCTION

17. Which quarries and borrows were used for constructing the present road?

Response: They were along side the road.

18. Have the quarries and borrows pits been rehabilitated to community's satisfaction.

Response: yes.

19. Would you offer new sites for borrow pits for future construction (with compensation)?

Response: yes.

I) DEVELOPMENTS WITHIN THE ROAD RESERVE (30 METRES ON BOTH SIDES OF THE ROAD)

20. Do you know that the road reserve is not your land for developments (buildings and farms)?

Response: yes.

21. If the new road demands wider area beyond the existing road reserve (30 metres on both side of the reconstructed road) would you expect: -

a) Compensation *yes*
Response:

b) Relocation of family *yes*
Response:

J) PARTICIPATION IN ROAD MAINTENANCE

22. Do you agree to carry out road maintenance works in sections of the road adjacent to your land: -

a) As your own contribution
Response: *yes*

b) For small compensation (state expected payments)
Response: *This will depend on the development area*

23. Will you agree to serve as member of local road maintenance committee?

Response: *yes*

K) SOCIAL IMPACTS

24. What impact will the presence of non-local construction workers have on the local community?

Response: *no impact*

25. What should be done to reduce the resultant negative impacts if any?

Response: *Local people to help the construction through hard work and faith*

L) STAKEHOLDER DETAILS

Occupation/Designation:

Date: *17/8/2001*

Place:

Signed: *[Signature]*

CONFIDENTIAL

Name: *Joseph M. Kariuki*

QUESTIONNAIRE RESPONSES DURING INTERVIEWS WITH THE COMMUNITIES ADJACENT TO THE ROADS.

A) VALUE OF THE EXISTING ROADS

1. Do you find the roads useful and if so, how do they benefit you?
Response: Yes, they allow us to move freely
2. What do the roads deny you?
Response: Speed and smooth and safe travels.
3. What effect has the deterioration of the road had?
Response: 1. Safety hazards 2. Extra maint. costs on vehicles.

B) CHANGE IN THE LOCAL ECONOMY

4. In what ways has the existing road affect household income and local trade?
Response: Depends on location. Some areas are affected badly since poor road conditions may deny them access to markets.
5. In what ways will the improved road with the reconstructed Maji-ya-Chumvi bridge affect household income and local trade?
Response: Could mean a drop in trade

C) IMPACT OF ROADS VILLAGE/TOWN ENVIRONMENT DUE TO DUST AND TRAFFIC MANAGEMENT

6. What are your main income regarding the village town environment of the existing road?
Response: -
7. What are your main concerns regarding the planned new roads?
Response: -
8. What are your concerns regarding the spillage of fuel (oil/grease) or concrete mixtures and permeation of other generated debris into the river (river ecosystem) and terrestrial areas and the magnitude of the subsequent damage?
Response: Many on behalf of those relying on that river as their sole source of drinking water.

D) DEMOGRAPHIC AND SETTLEMENT PATTERNS

9. In what major ways have the existing road affected demographic and settlement patterns in the area?
Response: Probably that people see business along the road and ~~maybe~~ maybe even settle on roadside.
10. In what major ways will the new road affected demographic and settlement patterns in the area
Response: Same as 9.

E) IMPACT ON LAND USE AND LAND PRODUCTIVITY

11. In what ways has the existing road affected land use and land productivity in the area?

Response: —

12. In what way will the new road affect land and land productivity in the area?

Response: —

F) IMPACT OF UNDESIRABLE DEVELOPMENTS ABUTTING THE ROAD

13. What are the main undesirable developments brought about by the present road?

Response: Structures on shoulder that leads to traffic hazards.

14. How can these undesirable developments be reduced in the reconstruction of the road?

Response: maintain the shoulders cleared and graded after opening of road.

G) SERVICING OF ROAD CONSTRUCTION WORKFORCE

15. Which locations do you recommend for the road construction work force?

Response: ?

16. What services should be provided in the road constructions workforce camps?

Response: ?

H) QUARIES AND BORROW PITS FOR THE ROAD CONSTRUCTION

17. Which quarries and borrows were used for constructing the present road?

Response: ?

18. Have the quarries and borrows pits been rehabilitated to community's satisfaction.

Response: ?

19. Would you offer new sites for borrow pits for future construction (with compensation)?

Response: ?

I) DEVELOPMENTS WITHIN THE ROAD RESERVE (30 METRES ON BOTH SIDES OF THE ROAD)

20. Do you know that the road reserve is not your land for developments (buildings and farms)?

Response: yes

21. If the new road demands wider area beyond the existing road reserve (30 metres on both side of the reconstructed road) would you expect: -

a) Compensation

Response: No

b) Relocation of family

Response: No

J) PARTICIPATION IN ROAD MAINTENANCE

22. Do you agree to carry out road maintenance works in sections of the road adjacent to your land: -

a) As your own contribution

Response: Yes

b) For small compensation (state expected payments)

Response: Yes as per agreed rates (Common rate)

23. Will you agree to serve as member of local road maintenance committee?

Response: Yes, but do not qualify.

K) SOCIAL IMPACTS

24. What impact will the presence of non-local construction workers have on the local community?

Response: Boost to local trade probably both merchants and "human trade".

25. What should be done to reduce the resultant negative impacts if any?

Response: Information to both locals and constr. workers + FREE ROOMS! (For those who don't understand)

L) STAKEHOLDER DETAILS

Occupation/Designation: Equipm. Advisor

Date: 17/8-01

Place: Mombasa

Signed:

Name: PETER ELLERHANN SØRENSEN

QUESTIONNAIRE RESPONSES DURING INTERVIEWS WITH THE COMMUNITIES ADJACENT TO THE ROADS.

A) VALUE OF THE EXISTING ROADS

1. Do you find the roads useful and if so, how do they benefit you?

Response: Transport

2. What do the roads deny you?

Response: NIL

3. What effect has the deterioration of the road had?

Response: VEHICLE BREAKDOWNS ALSO REDUCED TRAFFIC

B) CHANGE IN THE LOCAL ECONOMY

4. In what ways has the existing road affect household income and local trade?

Response: -

5. In what ways will the improved road with the reconstructed Maji-ya-Chumvi bridge affect household income and local trade?

Response: ADEQUATE PARKING FACILITIES TO IMPROVE BUSINESSES - MORE BUSINESS PARTNERS

C) IMPACT OF ROADS VILLAGE/TOWN ENVIRONMENT DUE TO DUST AND TRAFFIC MANAGEMENT

6. What are your main concerns regarding the village/town environment of the existing road?

Response: NO STOPPING SIGNS HAVE DISCOURAGED TRAVELLERS FROM STOPPING EN ROUTE

7. What are your main concerns regarding the planned new roads?

Response: 1. ROAD SHOULD CONSTRUCT BUMPS TO REDUCE SPEED
2. PARKING BAYS TO BE CONSTRUCTED

8. What are your concerns regarding the spillage of fuel (oil/grease) or concrete mixtures and permeation of other generated debris into the river (river ecosystem) and terrestrial areas and the magnitude of the subsequent damage?

Response: CONSTRUCTION OF SEWAGE NECESSARY WHERE POSSIBLE. DRAINAGE PITS ALSO

D) DEMOGRAPHIC AND SETTLEMENT PATTERNS

9. In what major ways have the existing road affected demographic and settlement patterns in the area?

Response: MANY FAMILIES NOW WANT TO SETTLE NEAREST TO THE ROAD. FOR BETTER COMMUNICATION & TRADE

10. In what major ways will the new road affect demographic and settlement patterns in the area?

Response: SO SAME AS 9

E) IMPACT ON LAND USE AND LAND PRODUCTIVITY

11. In what ways ~~will~~ ^{has existing affected} the ~~new road affect~~ land use and land productivity in the area?

Response: DUE TO POOR CONDITION MANY OF WORKING FAMILIES HAVE MOVED TO THE TOWN

12. In what way will the new road affect land and land productivity in the area?

Response: GOOD ROAD WILL ATTRACT MANY PEOPLE SLEEPING AT HOME: THUS THEY WILL WORK MORE ON

F) IMPACT OF UNDESIRABLE DEVELOPMENTS ABUTTING THE HIGHWAY FARMS ROAD

13. What are the main undesirable developments brought about by the present road?

Response: THESE ARE JUST IN FAVOUR OF GOOD TRADE

14. How can these undesirable developments be reduced in the reconstruction of the road?

Response: PROPER PLANNING SHOULD BE DONE AND BUSINESS PLOTS SHOULD BE WELL SURVEYED TO AVOID FUTURE CONGESTION

G) SERVICING OF ROAD CONSTRUCTION WORKFORCE

15. Which locations do you recommend for the road construction work force?

Response: OUTSIDE MAJOR TOWNS

16. What services should be provided in the road construction workforce camps?

Response: WATER

H) QUARIES AND BORROW PITS FOR THE ROAD CONSTRUCTION

17. Which quarries and borrows were used for constructing the present road?

Response: ---

18. Have the quarries and borrows pits been rehabilitated to community's satisfaction.

Response: -

19. Would you offer new sites for borrow pits for future construction (with compensation)?

Response: -

I) DEVELOPMENTS WITHIN THE ROAD RESERVE (30 METRES ON BOTH SIDES OF THE ROAD)

20. Do you know that the road reserve is not your land for developments (buildings and farms)?

Response: YES.

21. If the new road demands wider area beyond the existing road reserve (30 metres on both side of the reconstructed road) would you expect: -

a) Compensation

Response: YES IF NECESSARY

b) Relocation of family

Response: IF DEPENDS

J) PARTICIPATION IN ROAD MAINTENANCE

22. Do you agree to carry out road maintenance works in sections of the road adjacent to your land: -

a) As your own contribution

Response: ✓

b) For small compensation (state expected payments)

Response: ✓

23. Will you agree to serve as member of local road maintenance committee?

Response: NOT READY

K) SOCIAL IMPACTS

24. What impact will the presence of non-local construction workers have on the local community?

Response: LOCAL COMMUNITY FEELS ABANDONED

25. What should be done to reduce the resultant negative impacts if any?

Response: NO NEGATIVE RESPONSE ANYWAY

L) STAKEHOLDER DETAILS

Occupation/Designation: TRANSPORTER

Date: 17/01/2001

Place: MARIAKANI

Signed: [Signature]

TOWNSHIP

Name: RAPHEEL MUNGAM

9

QUESTIONNAIRE RESPONSES DURING INTERVIEWS WITH THE COMMUNITIES ADJACENT TO THE ROADS.

A) VALUE OF THE EXISTING ROADS

1. Do you find the roads useful and if so, how do they benefit you? YES
Response: Easy ~~to~~ means of transport
2. What do the roads deny you? Not in good condition
Response: to be reconstructed
3. What effect has the deterioration of the road had? NO business
Response: Price rise,

B) CHANGE IN THE LOCAL ECONOMY

4. In what ways has the existing road affect household income and local trade?
Response: No business
5. In what ways will the improved road with the reconstructed Maji-ya-Chumvi bridge affect household income and local trade?
Response: Maintenance, drainage system

C) IMPACT OF ROADS VILLAGE/TOWN ENVIRONMENT DUE TO DUST AND TRAFFIC MANAGEMENT

6. What are your main income regarding the village/town environment of the existing road? Small scale businesses
Response:
7. What are your main concerns regarding the planned new roads?
Response: maintenance to continue
8. What are your concerns regarding the spillage of fuel (oil/grease) or concrete mixtures and permeation of other generated debris into the river (river ecosystem) and terrestrial areas and the magnitude of the subsequent damage?
Response: Spoil Environment

D) DEMOGRAPHIC AND SETTLEMENT PATTERNS

9. In what major ways have the existing road affected demographic and settlement patterns in the area? Some were removed
Response: to other places.
10. In what major ways will the new road affected demographic and settlement patterns in the area? Many will be near the road
Response:

E) IMPACT ON LAND USE AND LAND PRODUCTIVITY

11. In what ways ^{has existing affected} will the new road affect land use and land productivity in the area? *changes*
Response:

12. In what way will the new road affect land and land productivity in the area?
Response: *more business*

F) IMPACT OF UNDESIRABLE DEVELOPMENTS ABUTTING THE ROAD

13. What are the main undesirable developments brought about by the present road? *damages*
Response:

14. How can these undesirable developments be reduced in the reconstruction of the road?
Response:

G) SERVICING OF ROAD CONSTRUCTION WORKFORCE

15. Which locations do you recommend for the road construction work force?
Response:

16. What services should be provided in the road constructions workforce camps?
Response: *residents to be employed
dispensary to be built*

H) QUARIES AND BORROW PITS FOR THE ROAD CONSTRUCTION

17. Which quarries and borrows were used for constructing the present road?
Response: *Kaicotok, Mwanika, Chonyi*

18. Have the quarries and borrows pits been rehabilitated to community's satisfaction. *NO*

Response: *They left just open and are dangerous to the community.*

19. Would you offer new sites for borrow pits for future construction (with compensation)? *YES*

Response: *The owner to be compensated*

I) DEVELOPMENTS WITHIN THE ROAD RESERVE (30 METRES ON BOTH SIDES OF THE ROAD)

20. Do you know that the road reserve is not your land for developments (buildings and farms)? *YES*

Response: *People to be educated.*

Wananchi to know there should not complain when demarcated is done

21. If the new road demands wider area beyond the existing road reserve (30 metres on both side of the reconstructed road) would you expect: -

a) Compensation *yes*

Response: *to be compensated*

b) Relocation of family

Response: *to be reallocated*

J) PARTICIPATION IN ROAD MAINTENANCE

22. Do you agree to carry out road maintenance works in sections of the road adjacent to your land: -

a) As your own contribution

Response: *If they will be paid for*

b) For small compensation (state expected payments)

Response: *Yes*

23. Will you agree to serve as member of local road maintenance committee? *YES*

Response:

K) SOCIAL IMPACTS

24. What impact will the presence of non-local construction workers have on the local community? *will benefit on employment*

Response:

25. What should be done to reduce the resultant negative impacts if any?

Response: *Somebody should stand for the locals to be employed.*

L) STAKEHOLDER DETAILS

Occupation/Designation: *CHIEF*

Date: *17/8/2001*

Place: *Mariakani*

Signed: *[Signature]*

Name: *Josua Wacithi Kimbe*

APPENDIX 5: SUMMATION OF RESOLUTIONS OF THE STAKEHOLDERS MEETING

A. Summation of the Resolutions of the Meetings Held on 17th August, 2001 at the DWO's offices, Mombasa and the Mariakani Location Chief's Camp.

- While giving full support of the project, the general view of the public was that roads are beneficial, social- economically.
- About 60 stakeholders participated and gave their unswerving support for the project at the Mariakani Chief's Camp.
- The major cause of the deterioration of the road was the 1997 El Nino rains.
- The problems experienced as a result of the dilapidated state of the Maji ya Chumvi – Miritini Road Section are:
 - Very high vehicular operating costs (VOC).
 - Frequent accidents along the road.
 - High costs of transportation of commuters and their goods in terms of fare and travel time.
 - Reduced economic activities as most of the small-scale traders along the road depend on transportation of goods to and from the main Kongowea market and the Central Business District (CBD) in Mombasa town.
- The benefits envisaged as likely to accrue from the rehabilitation of the Maji ya Chumvi – Miritini Road Section are:
 - Easier transportation of local produce and people to and from Mombasa.
 - Easier access to social amenities in Mombasa such as schools, hospitals and government offices.
 - Reduced commuter travel times and costs.
 - More people out of the work force will opt to live further away from the CBD hence decongesting the residential area within Mombasa town.
 - Income per capita amongst the locals shall increase as a result of their trading in the urban centres along the road.
- The improvement of the road will affect the local demographic patterns with more people settling near the road.
- The Maji ya Chumvi bridge in its present state without guard rails poses a danger to both motorists and pedestrians and an intervention measure of replacing these should be done as the commencement of the rehabilitation is awaited.
- With a new Bridge installed at Maji ya Chumvi the road environment shall be more commuter friendly.
- Oil and diesel spillage is inevitable. It was suggested that the contractors should minimize this as much as possible through good mechanical practices.
- Negotiation should be carried out by the contractor and supervising engineer to ensure that any persons' land including materials' sites that would be affected shall be compensated and rehabilitated to the satisfaction of the owners as this was not the case previously.




- If need be the previously utilised Mariakani Barracks, Kikotoni and Mwanda quarries should also be considered for proposed road works.
- Proper drainage implements and traffic signs should be included in the rehabilitation of the road section.
- The contractor and Consultant and/or Resident Engineer should choose their own camp / office locations and then negotiate with the respective landowners. This shall preferably be at Mariakani which is centrally placed and the construction work force be provided with clean water, good sanitation and health care services.
- Extra road reserve may be obtained where widening or realignment is inevitable with the necessary compensation where applicable.
- Awareness campaigns on the traffic act with regards to the road reserve (30 metres on either side of the road centreline in this case) and the newly enacted environmental act should continue.
- The roads department should revisit the old colonial system that periodically informed offenders and the general public through written communication duly signed by the area maintenance engineers and the local chiefs.
- A dispensary open to the community would suffice to cater for any accidents that may occur. Workers should be provided with first aid and safety gear during working hours.
- Maintenance of the bridge and removal of debris generated by rain and normal usage (litter) will be done by the local community in conjunction with the Roads department (Implementing Agency). They shall also carry out routine road maintenance works in sections of the road adjacent to their homesteads for some wages.
- Gender sensitivity should be encouraged with both women and men being incorporated equally in the works with the help of the local Chief Mrs. Joyce Wakithi Kombe.
- Positive social-cultural exchange be encouraged amongst the non-local working gangers and the local community.
- Recruitment of the rehabilitation work force should give first priority to the local community as a mode of alleviating poverty within this region.

B. Critical Questions addressed to and answers given by the Team of Experts

Q1. How will labour recruitment be done?

Response: The contractor will employ qualified persons.

- | | | |
|-----------------------------|-------------------|--------------|
| 1. Mrs. Joyce Wakithi Kombe | Chief (Mariakani) | Chairman |
| 2. Mrs. Elizabeth C. Mibey | SEO (P) | Coordinator. |
| 3. Ms. Beatrice H. Ogut | E (D) | Rappoteur |




2008.2001

APPENDIX 6: PHOTOGRAPHS
DEPICTING UNIQUE
AREAS OF
ENVIRONMENTAL
CONCERN



1. Consultative forum in the office of the DWO (Mombasa) –Eng. Kairigi on 17.08.2001 where the Likoni Member of Parliament, Mr. Suleiman Shakombi in spectacles was present amongst others to assist the team.



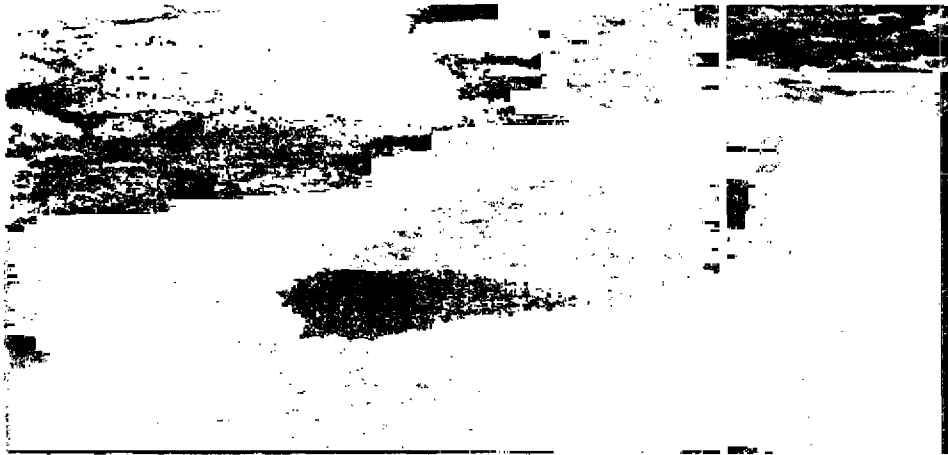
2. Stakeholders raise their hands to show their unswerving support for project at the Mariakani Roads Maintenance Camp.



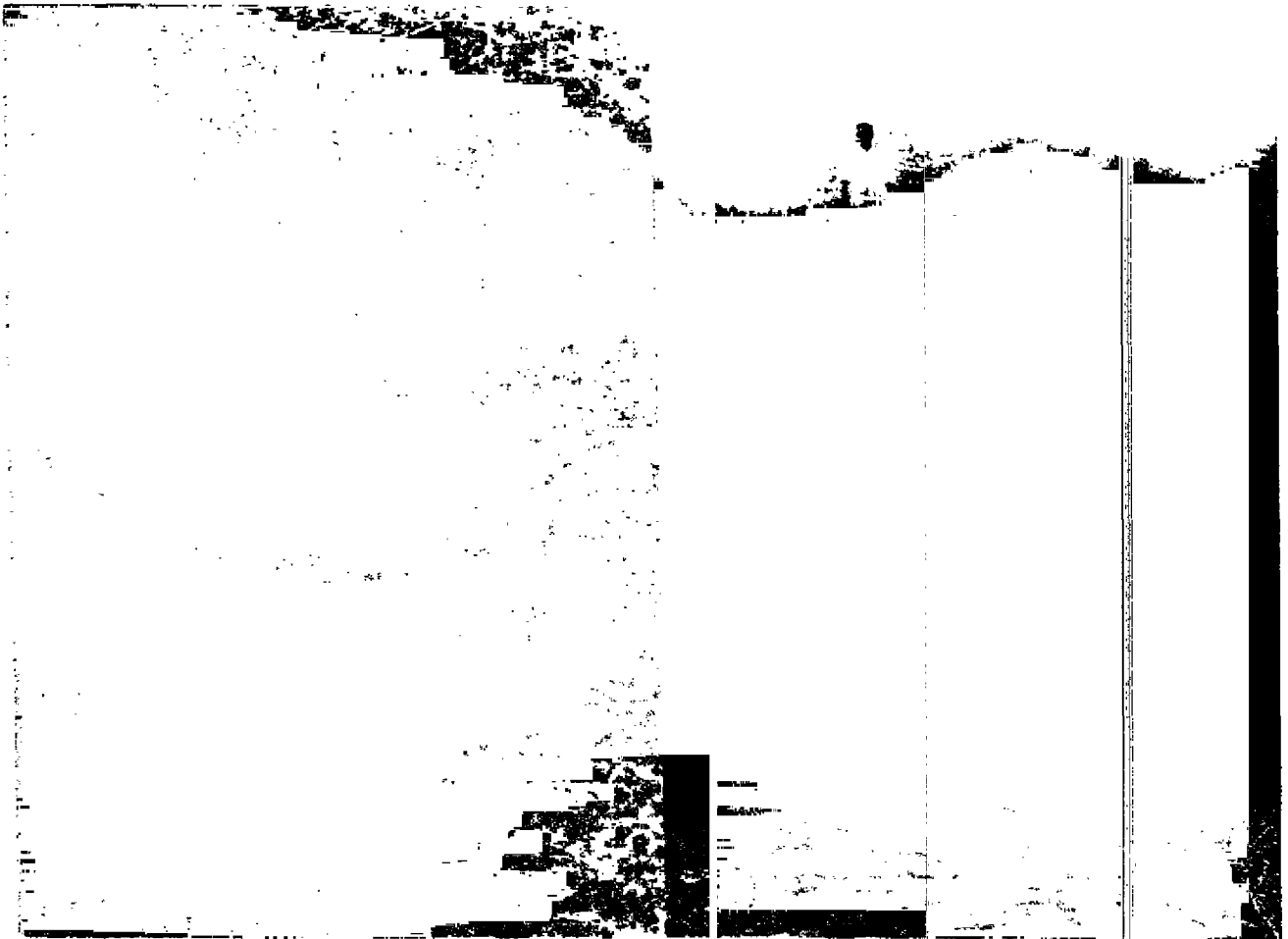
3. **There are scanty remains of what were once guardrails as these have been knocked off on both sides of the Maji ya Chumvi Bridge that now poses a danger to the safety of motorists who are not frequent on this road. .**



4. **Gulleys are starting to develop in the side drains and should be contained using scour checks even before the actual rehabilitation starts. The pedestrian in the forefront explains this to the team's photographer.**



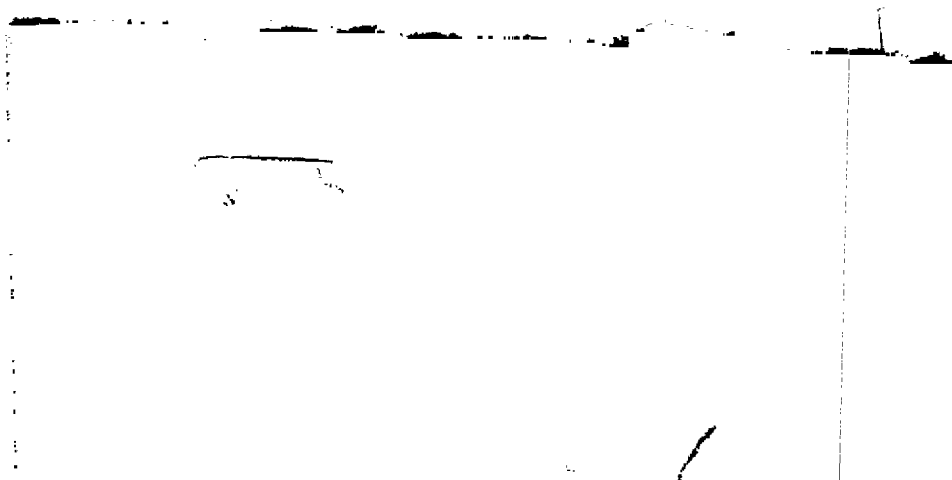
5. **The road seems to have failed upto the base. The type of potholes here indicate a likelihood of the underlying culvert joints being cracked.**



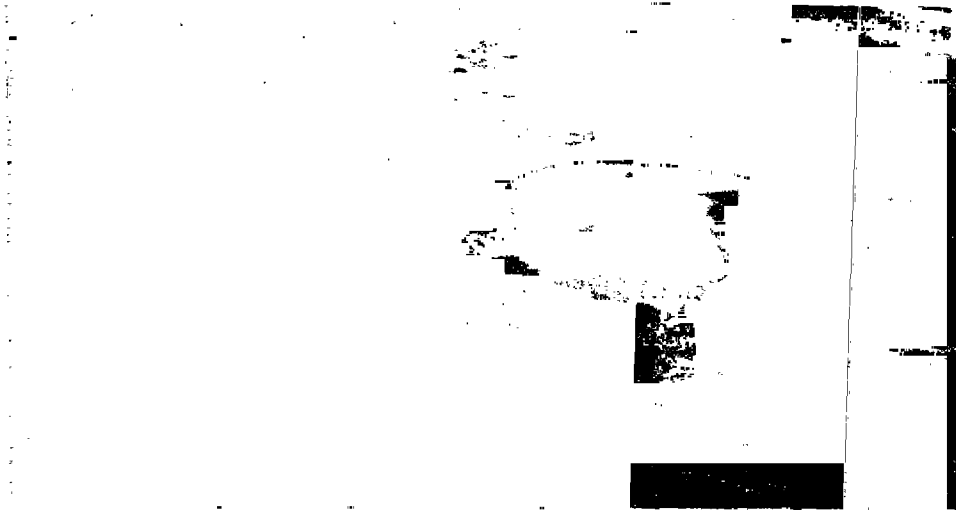
6. **The inlet and outlet of the typical size 2.4m x 1.2m box culvert have been captured. This is inadequate and the roads overseer in the background informed the team that it is normally overtopped during the rainy season.**



7. There is need for a climbing lane at about Km 28 from Maji ya Chumvi.



8. This is area at about Km 27 from Maji ya Chumvi is prone to landslides. Rockfill has been consistently used here to temporarily arrest this situation. (See the location of the van in the picture.)



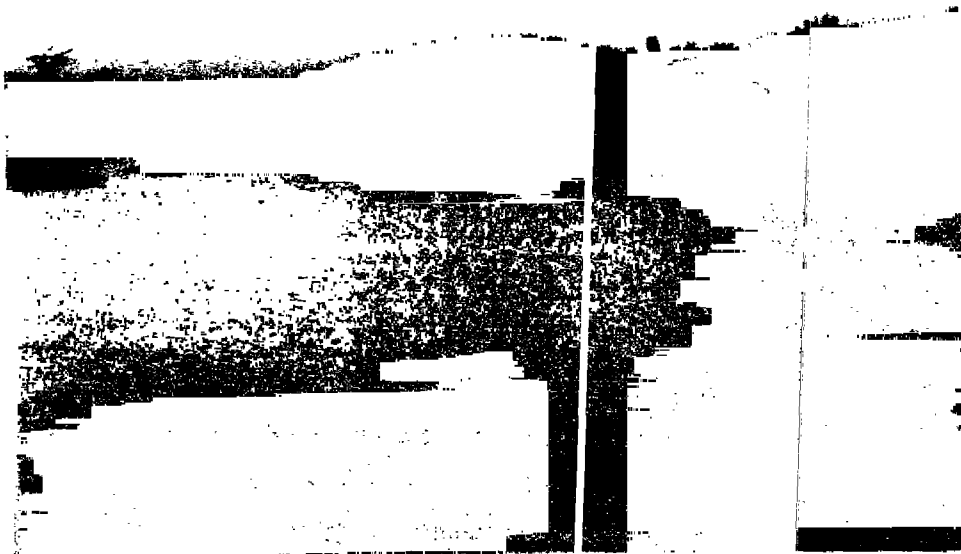
9. Encroachment along the road reserve is a common scene on this road as is seen at the busy Mazeras Urban Centre.



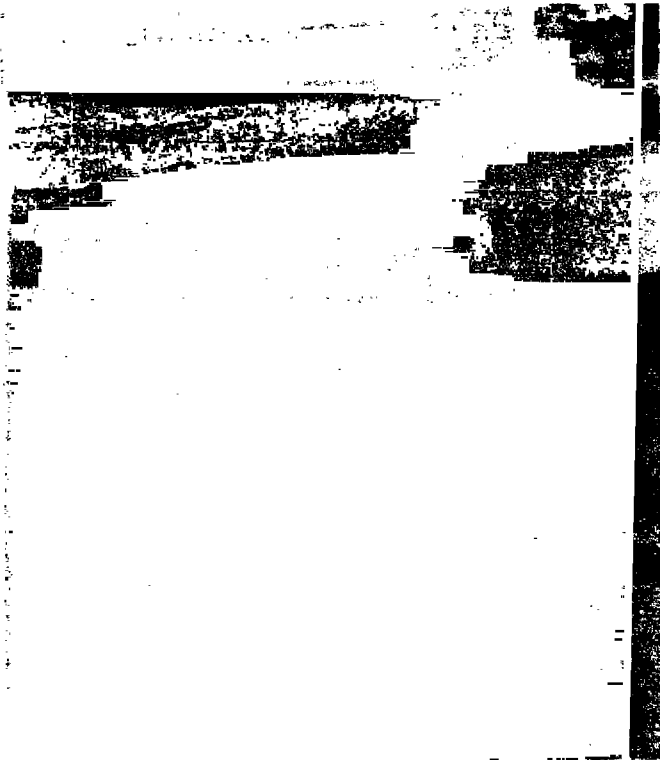
10. The Mabati Steel Rolling Mills between Mazeras and Mariakani is one of the Private sector industries that stand to benefit from the improvement of the road.



11. **Industrial affluent such as this from the Mabati Steel Rolling Mills should not be allowed into the road drainage system .**



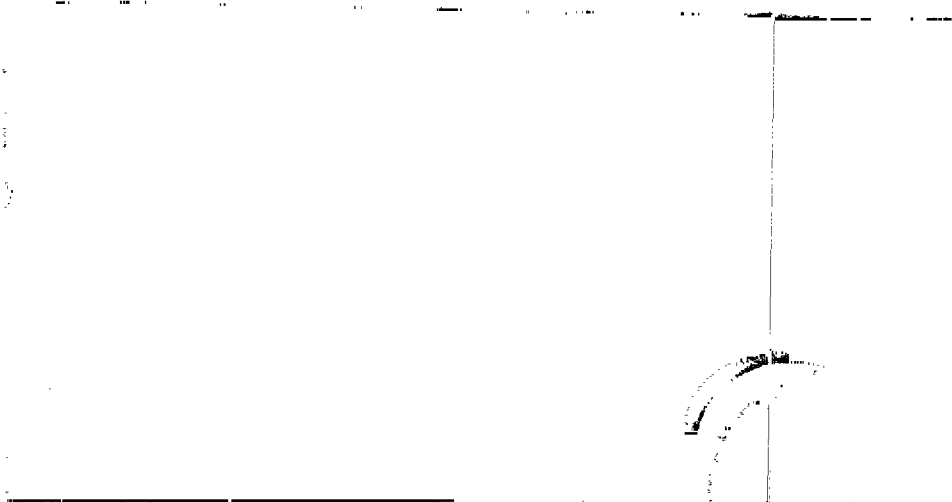
12. **The ongoing activities show that this previous quarry has been turned into a watering point near Mariakani . There appears to be enough material around here for it to be revisited for future use.**



- 13. Lack of homogeneity between the carriage way and shoulder structure in successive intervention measures may have instigated this sort of failure.**



- 14. Heavy trucks at and near the Mariakani Weighbridge not only cause traffic impedence and air pollution (dust and gaseous emissions) but also destroy the road pavement not designed for such static loads at this point. There is need to incorporate the reconstruction of the Weighbridge in this project.**



- 15. Appropriate technology has been applied in the rehabilitation of the materials site to the satisfaction of the owner that is also pleasant to the eye in the newly opened Mtito – Andei – Bichuma Gate section.**



- 16. Road furniture and parking bay show what a properly landscaped road environment should look like in the nearby Mtito – Andei – Bichuma Gate section.**

**APPENDIX 7: TERMS OF
REFERENCE**

APPENDIX 7

Study Team

On 7th August, 2001 a team of experts comprising of the individuals listed below was constituted to review the Preliminary Environmental Mitigation Report for the proposed WB Reconstruction and Rehabilitation of the Maji ya Chumvi – Miritini section of the Nairobi – Mombasa Road in the Coast Province of Kenya:

	<u>NAME</u>	<u>ROLE</u>
1.	Mrs. Elizabeth C. Mibey	-Environmental (Team Leader)
2.	Ms. Beatrice Ogut	-Roads Engineer (Design)
3.	Mr. Joseph W. Wanyama	-Roads Engineer (Planning)
4.	Mr. T. W. Nderitu	-Economist

Terms of Reference (TOR)

The above team of experts was expected to address the following terms of reference: -

1. Give a brief profile of the Maji ya Chumvi – Miritini section of the Nairobi – Mombasa Road with special focus on environmental features within the prioritised road network.
2. Analyse all potential impacts of the Reconstruction and Rehabilitation of the Maji ya Chumvi – Miritini section within the study area.
3. Specify which impacts are positive, negative, irreversible, reversible, direct and indirect.
4. Provide workable mitigation plans for negative impacts and where possible suggest workable implementation schedules and responsibilities. Also include the costs of implementing the recommended mitigation plans.
5. Determine conflicts of interest within the proposed project environs and suggest resolutions based on the proposed programme vis-a-vis short and long - term economic goals.
6. State both short term and long-term contribution of the Reconstruction and Rehabilitation of the Maji ya Chumvi – Miritini section to the overall sustainable development of the Coast Province and country of Kenya at large (biodiversity conservation, tourism, security promotion etc).
7. Provide a critique of the prioritisation criteria by the Ministry of Roads and Public Works based on traffic volume and suggest modifications where possible on the basis of Environmental considerations.
8. Compile an environmental mitigation plan for the Reconstruction and Rehabilitation of the Maji ya Chumvi – Miritini section based on the envisaged negative impacts.

9. Discuss the environmental merits and demerits of the proposed Reconstruction and Rehabilitation of the Maji ya Chumvi – Miritini section implementation strategy.
10. Propose workable monitoring and evaluation (M&E) of the Reconstruction and Rehabilitation of the Maji ya Chumvi – Miritini section operational activities based on predetermined road performance indicators.
11. Identify and recommend auditing and monitoring programmes.
12. Identify the procedure of project decommissioning, considering what factors should be taken into account during decommissioning and disposal of the project materials.
13. Prepare a draft final report.
14. Present the draft final report to selected reviewers.
15. Take into account the comments of the reviewers in the final Report Production.

Experts' Comments on the TOR

The experts noted the following:

- The costs of implementing the mitigation measures are inbuilt within the contractual agreements.
- This prioritised section of the NMRRP has similar environmental characteristics with the neighbouring Mitito Andei – Bachuma Gate and Bachuma Gate – Maji ya Chumvi road sections. Hence the resultant environmental management plan shall have parameters borrowed from these where environmental mitigation has been implemented.

On the basis of the above observations the following amendments were effected:

- (i) The second sentence of TOR No.4 was omitted. (Also work mitigation plans.)
- (ii) In TOR No.10 the portion "based on district performance indicators." was also omitted.
- (iii) TOR No.5 was completely omitted due to the fact that no issues of concern relating to conflicts of interest were identified during the scoping exercise.

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