The Federal Democratic Republic of Ethiopia
Ethiopian Roads Authority
International Development Association

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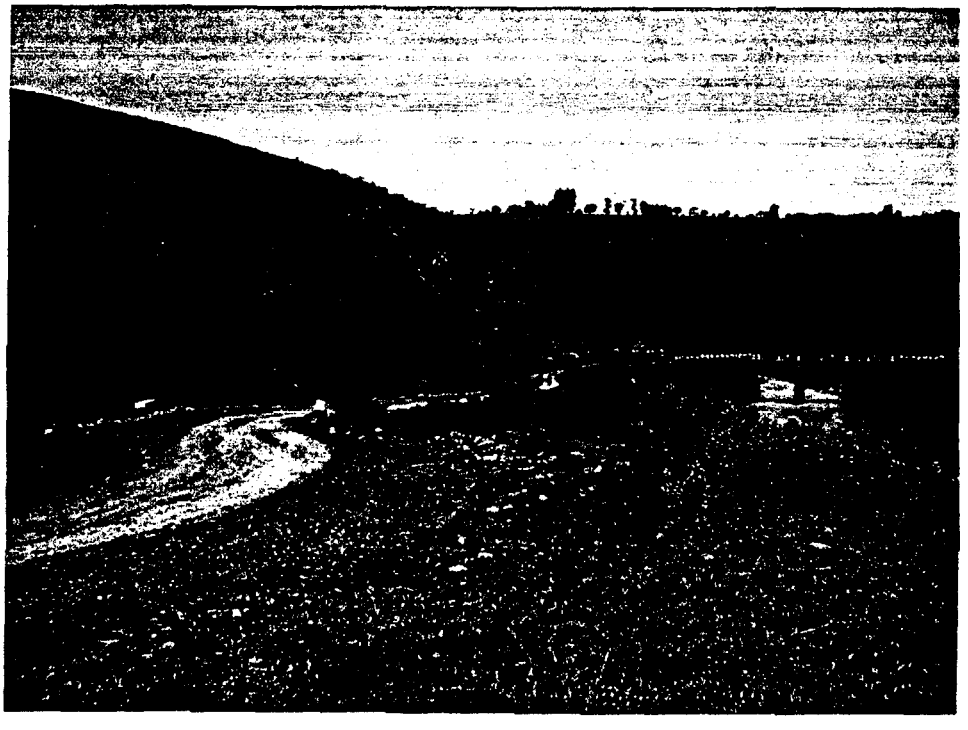
ENVIRONMENTAL IMPACT ANALYSIS OF THE FIVE ROADS SELECTED FOR REHABILITATION AND/OR UPGRADING

DEBRE MARKOS-GONDAR ROAD



Final Report
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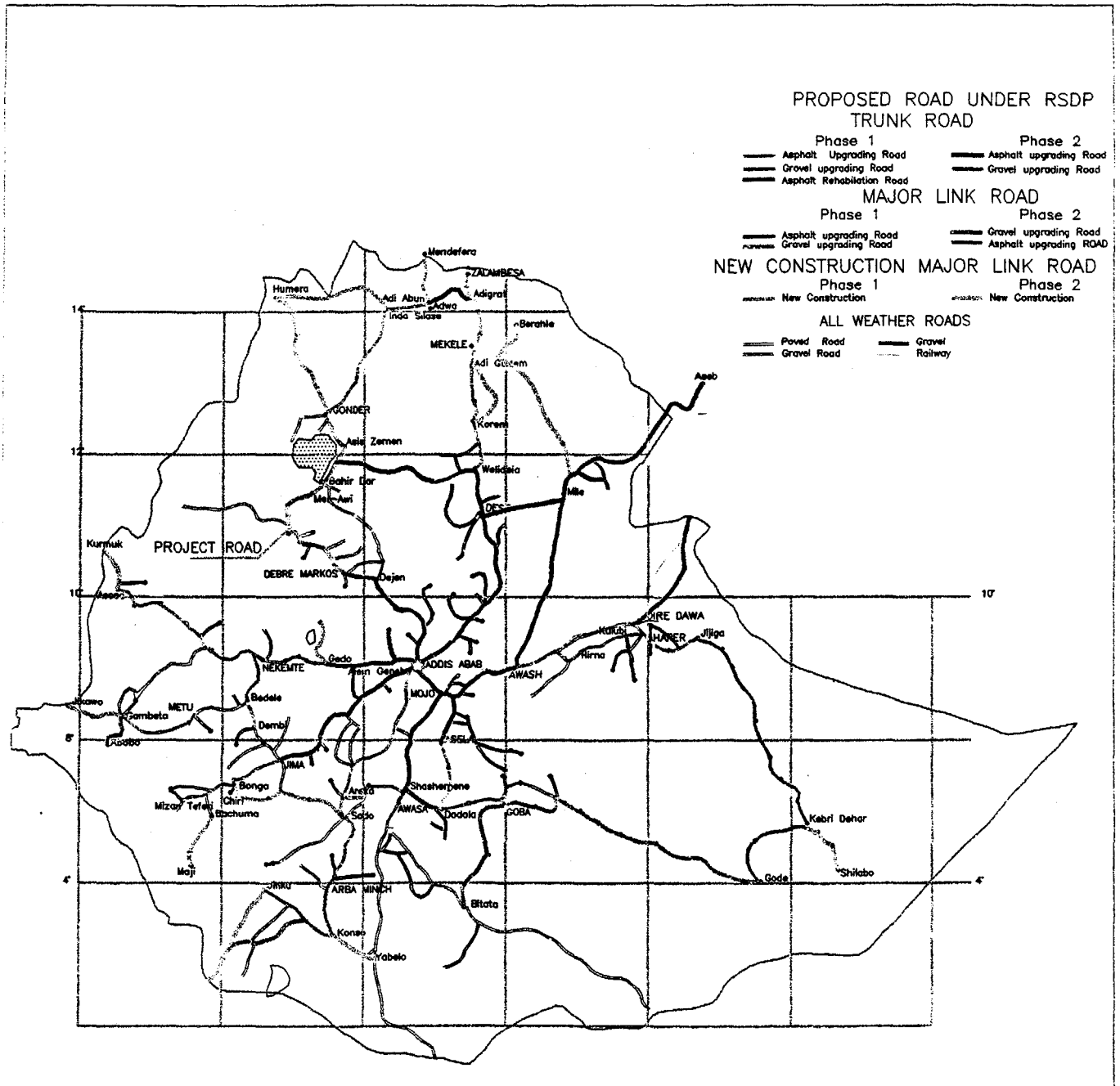
TABLE OF CONTENTS

APPENDICES

ABBREVIATIONS AND ACRONYMS

ADLI	Agricultural-Development-Led-Industrialization
DGM	Deputy General Manager
EA	Environmental Assessment
EELPA	Ethiopian Electric and Power Authority
EIA	Environmental Impact Assessment
EIRR	Economical Internal Rate of Return
EPA	Environmental Protection Authority
EPE	Environmental Protection of Ethiopia (Proclamation 1/1995)
ERA	Ethiopian Roads Authority
ETCA	Transport Construction Authority
EU	European Union
FA	Farmers Association
FDRE	Federal Democratic Republic of Ethiopia
m.a.s.l.	meters above sea level
MEDAC	Ministry of Economic Development and Cooperation
NGO	Non-governmental Organization
NPV	Net Present Value
PA	Peasants Association
RGRRO	Regional Government Rural Road Organization
RSDP	Road Sector Development Program
TCDE	Transport Construction Design Enterprise
TOR	Terms of Reference
TFR	Total Fertility Rate
TGE	Transitional Government of Ethiopia



FEDERAL GOVERNMENT OF ETHIOPIA ETHIOPIAN ROAD AUTHORITY	
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE ROAD SECTOR	
PLANCENTER Ltd. FINLAND	
LOCATION MAP	
Figure	Date

EXECUTIVE SUMMARY

Background

An Environmental Analysis of the Five Road Projects chosen for rehabilitation and/or upgrading as well as an Environmental Analysis of the Road Sector of Ethiopia, was commenced in May 1997. The Five Roads include Alemgena-Hossaina-SodoRoad, Woldiya-Adigrat-Zalambessa Road, Debre Markos-Gondar Road, Awash-Kulubi-Dire Dawa-Harar Road as well as Mojo-Awash-MilleRoad. This report includes the environmental analysis of upgrading of the Debre Markos-Gondar Road.

The environmental analysis study was carried out by an expert team of Plancenter Ltd (Finland) consisting of Finnish and Ethiopian experts representing various expertise including environmental impact assessment (EIA) methodology, road engineering, environmental and natural sciences, sociology and hydrogeology. The consultant team was complemented by a counterpart person from the Ethiopian Roads Authority (ERA)

The objective of this EA study has been to identify and quantify - to the extent possible -the likely negative and positive physical, natural, human and social environmental impacts of the proposed road work as presently designed and suggest and produce cost estimates regarding the required mitigating measures to be implemented to avoid or minimize these negative impacts.

The methodology used for carrying out the work include (1) collection and review of baseline data and relevant documents, including relevant World Bank directives, guidelines and other documents; relevant legislation, policy papers and guidelines of the Ethiopian road and environmental sector, as well as other relevant sectors; designs for the proposed road improvements; maps and literature; (2) interviewing organizations, institutions and persons relevant to the work; (3) site visits; the whole road section was studied by the team; and (4) carrying out a public consultation involving different governmental and non-governmental organizations relevant to the road section, interviews in various offices along the road as well as informal road side interviews during the above site visit. A questionnaire for NGO's was also prepared, although most of the information from NGO's was received during the public consultations.

Description of the Road

The project road starts in Debre Markos town, 305 kilometers from Addis Ababa. The 442 km road from Debre Markos to Gondar lies in the North Western Corridor and serves a fertile area with reported arable and livestock surpluses. The road is trafficked with about 60 percent of medium to heavy (mainly rigid) commercial vehicles or large buses.

The whole survey area is very densely populated. In the rural areas individual farm houses are separated from each others by their compounds and fields, while in the urban areas the attached housing units form lines along the road. There are 23 towns along the road in the survey area. The biggest towns along the road are Gondar with more than hundred thousand inhabitants and Bahir Dar a little less, according to the 1994 Census. However, Bahir Dar is the fastest growing town and population at the present might be even bigger than in Gondar. In Debre Markos the population counts to fifty thousand.

There are many valuable cultural and historical monuments and sites in the vicinity of the road, and in the towns through which the road goes. However, none of these monuments, places or sites will be directly affected by the upgrading project.

The road was widened to full width gravel standard approximately 20 years ago. The last 13 kilometers of road from Azezo into Gondar were upgraded to bitumen standard about 10 years later. Although some of the road traverses hilly and mountainous terrain it is mainly on the flat to rolling plateau. From Debre Markos to Azezo, the road is surfaced with a thin gravel layer and in many places the original hand packed stone foundation is the only pavement layer remaining. The riding quality of the road is often poor even though the road appears to have a sound foundation. There are a number of locations near Bahir Dar where the embankment requires raising to avoid inundation. In places these are associated with expansive materials in the road subgrade which combine to create serious problems. Rock debris from land slides have frequently been deposited on the edge of the carriageway hindering drainage. From Azezo to Gondar the road has been surface dressed and the condition is poor and, in places, bad being heavily patched and with numerous potholes and cracked areas.

Policy Framework

The overall economic policy objective of the Federal Democratic Republic of Ethiopia (FDRE) rests on promoting economic growth through a market-based economy with greater private sector participation in the economy and the Government's role limited to providing the necessary services through a decentralized system.

The declared policy of Agricultural-Development-Led-Industrialization (ADLI) has the main objective of improving agricultural productivity of small holder agriculture and related industrialization based on increased provision of domestic raw materials to the industrial sector. These objectives are in conformity to the Road Sector Development Program (RSDP) of the Ethiopian Roads Authority (ERA).

The major policy framework document with respect to environmental management of Ethiopia is the Environmental Policy of the FDRE prepared by the Environmental Protection Authority (EPA). Among the major policy issues contained in the policy document is the requirement of Environmental Impact Assessment (EIA) of programmes and projects carried out both by the public and private sectors.

The most important step in setting up the legal framework for the environment in Ethiopia has been the establishment of the Environmental Protection Authority (EPA) by Proclamation 9/1995. EPA has already prepared regulations for EIA of development projects and a framework environmental legislation (to be issued in very near future). They have also drafted guidelines for EIA procedure in development projects and EIA for Transport Sector Projects.

Institutional Setting

The Ethiopian Roads Authority, ERA, has the responsibility for overall planning of the national network development and maintenance and construction of trunk and major link roads while the responsibility of rural roads construction and maintenance has been

decentralized and given to the regional states having their own Regional Government Rural Roads Organizations (RGRRO).

Previous practice shows that apart from routine engineering requirements little attention has been given to incorporate environmental considerations in road sector activities. However, the RSDP has given due attention to the environmental impacts that may arise under the programme and the need for capacity building within the sector both at federal and regional levels has been remarked. In line with this, the new organizational structure of ERA has incorporated an environmental branch which is expected to be responsible for the carrying out of EAs of road sector activities.

Major Environmental Impacts

The adverse impacts of the proposed road improvement are mainly related to the construction period and therefore temporary. These impacts are small compared to the positive economic and environmental benefits of the road upgrading. Even the impacts would be minimized by including the technical, operational and phasing procedures in the tender document for the contractor.

Physical environment

The major adverse impacts during construction stages are erosion, stability of slopes, material use, change in surface water hydrology and quality and sedimentation/siltation.

Erosion will most probably be enhanced especially on hilly terrain due to cuts in soil and rock and construction of embankment (widening of the road), borrow pits and quarries if they are located along a river bank, excavation of foundation for replacement and/or additional drainage's bridges and culverts. However, upgrading and/or rehabilitation of the road shall decrease the erosion rate along the road compared to the existing road condition. Implying that upgrading and/or rehabilitation of the road has a positive impact on erosion.

Clearing and grabbing by earth equipment destabilise slope stability of the road section especially on hilly terrain. Blasting of rocks for widening and quarries shall destabilise the steep slopes of the area.

Pollution of hazards which may occur if oily products from engines are spilled along the road sides and at compounds or due to improper disposal of used oils and lubricants. Upgrading and/or rehabilitation of the road will increase the traffic on the road.

Natural environment

The impact on natural vegetation would be associated with operating the quarry and borrow areas, and constructing detour and access road to the borrow material pits and quarry sites.

Construction of the road will not significantly affect areas which support conservation worthy terrestrial ecosystem or natural or semi-natural forest all along the project area. The project component will not involve in any encroachment into known and designated ecologically sensitive areas and nature reserves.

Human and Social Environment

The major human and social impacts of road construction are those related to social acceptability, resettlement, change of way of life, impacts on indigenous peoples, induced development and conflicts between locals and immigrants.

Social acceptability of the project to upgrade the present road is very high. All people and organizations interviewed gave a clear acceptance to the project. The only concerns are related to the construction period.

There will be temporary losses of agricultural and grazing land (for detours, construction camps, storage sites, asphalt plants etc.). Although ERA has the right to occupy any sites needed for the road construction, it has also the responsibility to compensate all lost property. The land is not considered as a property, but the crop or trees growing on it are considered to be property when with commercial value. In this case the compensation is based on the value of the lost crop for one or two years depending on the time detour is used. With the grain crops the estimation can be based on yearly value, but in the case of coffee the estimation should be based on many years' production.

There will be no permanent losses of the agricultural or grazing land due to this project; only temporary losses due to the detours, quarry and storage sites.

There will be few places where the trees would be affected. The compensation will be estimated using market value.

There will be no resettlement needs along this road.

The construction camps will have both short and long lasting impacts on the local communities. Although the construction camps/sites are planned to be temporary, the experience show that many camps turn out to be permanent settlement places after the construction period is over; many ERA camps have developed with time into real towns. The arrival of 150-250 workers, mainly men, to the construction camps will have several impacts to the local communities.

The improved road make it easier to the tourists to reach the cultural and historical monuments and sites near the road. Even if the money they bring is valued, there should be plans already from the beginning to handle the tourist business with the controlled manner.The potential impact of the project upon cultural, religious and historical sites was assessed and there are no sites to be directly impacted by project construction and operation.

Road Safety

The better pavement and road shoulders will make road safer for both pedestrians and transitory traffic, especially in the towns. The better pavement without potholes will also increase the speed of traffic increasing the risk of accidents. There are no traffic signs to warn drivers about animal crossing places. The present truck drivers are more or less aware of them due to the familiarity with the road. However, anticipated new drivers on the road are not aware of these places.

Analysis of Alternatives

The upgrading of this road to the proposed standard compared to the "zero alternative" (no project) is environmentally more sound solution. The benefits can be justified by the following environmental and safety points: (i) through upgrading, the erosion problems due to the low standard of the present road will be mitigated; (ii) the new pavements will tremendously reduce the dust and thereby the amount of accidents caused by dust which blocks the visibility from drivers and pedestrians alike will be diminished; reduced dust problem improves the living standards and health status especially in the towns; (iii) during the rainy season the paved road will not be as slippery as the present gravel road; (iv) it is environmentally friendly that vehicles stay in better condition due to improved road surface; and (v) in the Fogera Plain between Hamusit and Addis Zemen where the road has a damming effect the situtation will be improved by the present designs through culverts (which help the water to recede on time for the farmers to proceed on their jobs).

Mitigation and Monitoring Measures

Mitigation Measures/Physical and Natural Environment

The bidding document for construction should include technical specifications for the prevention of environmental hazards and pollution related for example to borrow material sites and soil contamination by spills of hazardous material.

Construction activities in and around perennial rivers should be conducted during dry season to minimize sediment loading. In order to prevent accident spillage of pollutants to water sources or leakage to the ground, all temporary and permanent storage facilities should be located away from these sites and in a bounded enclosure with an impermeable liners.

Once the construction of the project is complete, the contractor is required to remove all equipment from the site and clear the site from potentially hazardous materials. Reclamation of sites exposed during construction will include re-grading and re-vegetation.

There shall be also some mitigation measures to avoid excessive noise during construction and to avoid excessive air pollution due to emissions from heavy vehicles, although these are not considered major problems by people. Dust is generally felt a nuisance, and is already now a major problem on this road.

For preserving the natural environment, the locations of mature trees during route selection for the detour should be considered to minimize destruction of trees. Rehabilitation plans should also be provided every quarry and borrow pit area.

Mitigation Measures/Human and Social Environment

The good information before the construction should be available to all stakeholders. The Public Consultations kept along the road would be the best way to do that. Clear information about the compensation system should be given to those who might be affected. According to the previous practice ERA Compensation Committee has always been established for all road projects. The main role of the Committee is to set compensations. It should minimize the temporary losses of agricultural and grazing lands.

The needed areas for construction should be planned as to minimize the effects on the growing crop, and trees. The value of the lost crop should be estimated according to market prizes.

The information to the drivers of the transitory traffic should be increased in order to mitigate the problems in case of accidents. There should also be speed limits in the traditional crossing places of cattle.

To induce planned development, the construction camps should be selected in a way which take into consideration the available natural resources (such as availability of water, fuel etc.) for potential permanent settlement after the construction camps are removed.

The local religious places, graves and funeral places as well as holy trees or springs must be taken into consideration when the detours, quarry and other construction sites are designed.

Monitoring

It is recommended that an environmental inspector would be assigned to this project. The inspector should have a number of short term inputs from the commencement of the construction through to its completion and until cleanup has been finalized. After finalizing the cleanup, the responsibilities of the environmental inspector will be to ensure that the mitigation and monitoring requirements outlined in the report are carried out effectively and that good construction practices are followed to minimize impacts to the environment.

Monitoring is carried out to assess any disturbance to the environment and to protect both ERA and the affected parties from false charges. It is recommended that ERA would take a pictorial record of the critical sites before any construction commences. This can be used to ensure that preconstruction conditions have been restored after clean up, specially at quarry and borrow sites, detours and temporary access roads and construction camp sites.

1. INTRODUCTION

1.1 Background

The need to include environment impact consideration during the planning and implementation phases of road works has become a pressing issue to reduce the adverse effects on the environment. According to the strategic objectives of the Road Sector Development Program (RSDP) of Ethiopia, prepared by the Ethiopian Roads Authority (ERA) for the years 1997-2001, the reduction of adverse effects of road works on the physical, natural, human and social environment is encouraged.

In the RSDP ERA has reviewed the current status of the road network of Ethiopia identifying the key issues of Road Sector and the set strategic objectives for the sector. As the major policy the RSDP proposed that the environmental effects of road infrastructure will be addressed by taking measures to ensure conformity of design standards with environmental protection requirements, in addition to facilitating promotion of vegetation coverages (e.g. for borrow pits) and other measures to reduce adverse impacts of existing and earlier road works.

On the line of the above mentioned recommendations of the RSDP, an Environmental Analysis of the Five Road Projects chosen for rehabilitation and/or upgrading as well as an Environmental Analysis of the Road Sector of Ethiopia, was commenced in May 1997. The Five Roads include Alemgena-Hossaina-Sodo Road, Woldiya-Adigrat-Zalambessa Road, Debre Markos-Gondar Road, Awash-Kulubi-Dire Dawa-Harar Road as well as Mojo-Awash-Mille Road.

The environmental analysis study was carried out by an expert team of Plancenter Ltd (Finland) consisting of Finnish and Ethiopian experts representing various expertise including environmental impact assessment (EIA) methodology, road engineering, environmental and natural sciences, sociology and hydrogeology. The consultant team was complemented by a counterpart person from the Ethiopian Roads Authority (ERA). The composition of the team is presented in Appendix 1.

This report is the environmental analysis of the Debre Markos - Gondar Road.

1.2 Location of the Study Area

The project road starts in Debre Markos town, 305 kilometers north from Addis Ababa. The 442 km road from Debre Markos to Gondar lies in the North Western Corridor and serves a fertile area with reported arable and livestock surpluses. The road is trafficked with about 60 percent of medium to heavy (mainly rigid) commercial vehicles or large buses. Although some of the road traverses hilly and mountainous terrain it is mainly on the flat to rolling plateau.

1.3 Objective of the Study

The objective of an Environmental Assessment of an individual road as stipulated in the Terms of Reference prepared by ERA in September 1996 for this study is to identify and quantify - to the extent possible - the likely negative and positive environmental impacts of the proposed road work as presently designed and suggest and produce cost estimates regarding the required mitigating measures to be implemented to avoid these negative impacts.

1.4 Approach and Methodology of the Study

It has been the approach of the consultant to fulfill the ambitious requirements of the Terms of Reference as well as possible within the relatively limited time given to the study. The EAs for the five roads have been carried out in three months, during June-August 1997. In addition to identifying the potential impacts of the road construction to the physical and natural environment, a special emphasis has been given to the potential human and social impacts. The intention has been to provide some insights to people's perceptions of road improvement plans as well as the impacts of these types of projects to their economic and social life. Mitigation and monitoring measures for the identified adverse impacts have also been developed.

The methodology used for carrying out the work include:

- collection and review of baseline data and relevant documents, including relevant World Bank directives, guidelines and other documents; relevant legislation, policy papers and guidelines of the Ethiopian road and environmental sector, as well as other relevant sectors; designs for the proposed road improvements; maps; other literature (listed in Appendix 2)

- interviewing organizations, institutions and persons relevant to the work (listed in Appendix 3)

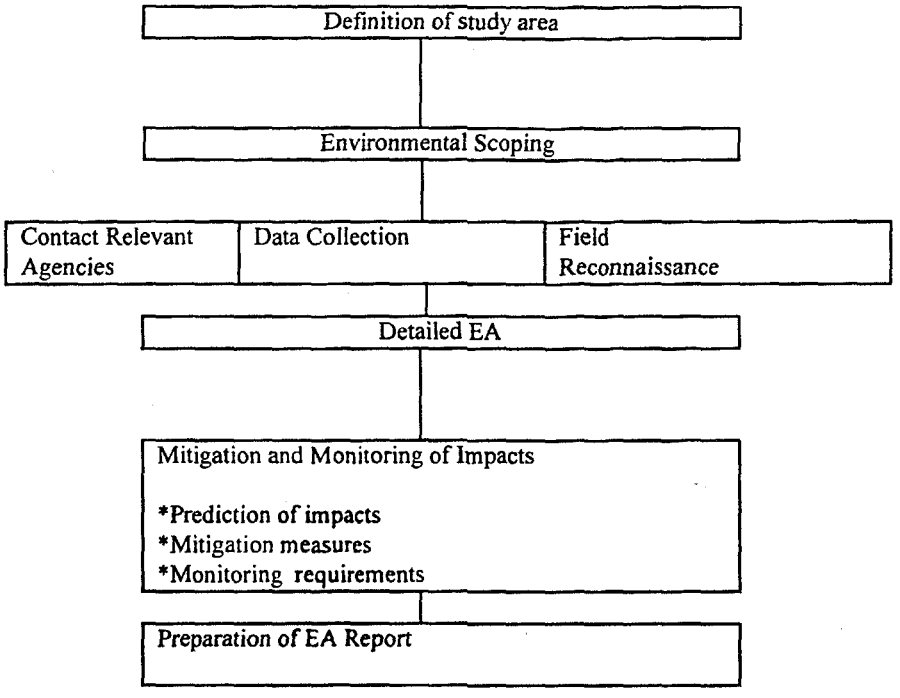
- site visits; the whole road section was studied by the team (see site visit programme; Appendix 4)

- interviewing different governmental and non-governmental organizations relevant to the road section, interviews in various offices along the road as well as informal road side interviews during the above site visit

- a questionnaire for NGO's was also prepared, although most of the information from NGO's was received during the public consultations (questionnaire in Appendix 6)

The process of the work is illustrated by the following figure. The first step was delineation of the study area. The scoping was done together with the Client (ERA) (the list of scoping is presented in Appendix 7). Following this, a field visit was made for the purpose of public hearing, contacting relevant agencies, obtaining data, and carrying out a field reconnaissance of the study area. An environmental analysis of this route was carried out and a detailed impact assessment of the proposed road was carried out.

Figure: Process of the EA Study



1.5 Contents of the Report

This EA report consists, in addition to this introductory chapter, of a description of the existing situation including policy, legal and institutional set up related to the environmental aspects of the road sector in Ethiopia (Chapter 2), description of the proposed road project (Chapter 3) and present status of the road environment both from physical and natural as well as human and social point of view (baseline data, Chapter 4). The description of the present road (Chapter 4.1) and issues/concerns are all related to the planned project to rehabilitate it. The description/issues and concerns include direct observations of the consultants and in the available/relevant literature/statistics on the impact area of this road.

The potential environmental impacts (chapter 5) likely to result from the proposed road project are evaluated based on data collected from field investigations and available information reported in the literature and visits made to different Government offices and in the public consultation. The classification of the impacts in this report does not strictly follow the scoping list prepared in the early stage of the study area presented in Appendix 7.

An analysis of alternatives (proposed improvement vs. no improvement) and recommendations for mitigation measures and monitoring activities are given in Chapters 6, 7 and 8 respectively. Training needs are only briefly discussed in Chapter 9 of this report. They will be handled more thoroughly in a separate EA report for the road sector. The costs for mitigation, monitoring and training are summarized in Chapter 10.

2. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 Policy Framework

Macro Policy Framework

The overall economic policy objective of the Federal Democratic Republic of Ethiopia (FDRE) rests on promoting economic growth through a market-based economy with greater private sector participation in the economy and the Government's role limited to providing the necessary services through a decentralized system.

The declared policy of Agricultural-Development-Led-Industrialization(ADLI) has the main objective of improving agricultural productivity of small holder agriculture and related industrialization based on increased provision of domestic raw materials to the industrial sector. These objectives are in conformity to the Road Sector Development Program(RSDP) of ERA (Chapter II, Second Draft Final Report, pp. 15-17)

The Constitution

As a measure of achieving decentralization, the 1995 Constitution of the FDRE provides for two levels of organs of the State - the Federal Government, and nine Regional States with their respective legislative, executive and judicial powers and responsibilities (Articles 40, 47, 50).

Ownership of land-both rural and urban-as well as other natural resources is vested in the State [Article 40(3)]. Therefore, land is not subject to sale or otherwise transferred and can only create use rights. The issue of security of tenure is also addressed to some extent when the Constitution guarantees Ethiopian peasants against eviction from their possessory rights [Article 40(4)].

The enactment of laws for the utilization and conservation of land and other natural resources, historical sites and objects is also vested in the Federal Government while the regional states are given the responsibility to administer land and other natural resources in accordance with Federal Laws [Articles 51(5)-2(d)]

The development, administration and regulation of major roads linking two or more states is also the responsibility of the Federal Government [Article 51(9)]. It is in line with this provision and the policy of decentralization that ERA is currently responsible mainly for trunk and major link roads while regional (rural) roads are under the jurisdiction of regional states, namely, the Regional Government Rural Road Organizations(RGRRO). The supreme organ of the Federal state is the House of Peoples Representatives and has the power, inter alia to enact specific laws relating to major roads linking two or more states [Article 55(2)(c)].

Of direct relevance to the country's environmental policy, Article 44 of the Constitution provides that "All persons have the right to a clean and healthy environment". It also provides that state programmes which result in displacement of people or adversely affect the livelihood of the local population shall give the right to commensurate monetary or other means of compensation including relocation (resettlement) with adequate state assistance [Article 44(2)].

With regard to participation and consultations of the local community, the Constitution provides that nationals have the right to participate in national development and in particular, to be consulted with respect to policies and projects affecting their community [Article 43(2)].

The rights of women to full consultations in the formulation of national development policies and in designing and execution of projects especially when such projects are likely to affect their interests is also stipulated in the Constitution [Article 35 (6)].

In sum, the Constitution of the FDRE, as the supreme law of the country, provides the basic policy framework showing the Government's commitment to environmental protection and sustainable management of the country's resources. It sets the framework upon which subsequent sectoral and cross sectoral policies, legislation and institutions are to be devised. All stakeholders are also assured to participate and be consulted in any government or private development programmes or projects that are likely to have an impact on them which, of course, include environmental impacts.

Environmental Policy of the FDRE

The major policy framework document with respect to environmental management of Ethiopia is the "Environmental Policy of the FDRE" approved by the Council of Ministers in April, 1997. The policy was prepared by the Environmental Protection Authority(EPA) in collaboration with the Ministry of Economic Development and Cooperation (MEDAC).

The environmental policy is quite comprehensive and provides the overall policy goals, objectives and guiding principles, sectoral environmental policies, cross-sectoral environmental policies and the institutional, legislative, monitoring and evaluation mechanisms for the implementation of the environmental policy.

Among the major policy issues contained in the policy document is the requirement of Environmental Impact Assessment (EIA) of programmes and projects carried out both by the public and private sectors.

The section dealing with Government Policy regarding EIA provides:

- to ensure that EIAs consider not only physical and biological impacts but also address social, socio-economic, political and cultural conditions;
- to ensure that public and private sector development programmes and projects recognize any environmental impacts early and incorporate their containment into the development design process;
- to recognize that public consultation is an integral part of EIA and ensure that EIA procedure make provision for both an independent review and public comment before consideration by decision makers,
- to ensure that an environmental impact statement always includes mitigation plans for environmental management problems and contingency plans in case of accidents;
- to ensure that, at specified intervals during project implementation, environmental audits regarding monitoring, inspection and record keeping take place for activities where these have been required by the Environmental Impact Statement;

- to ensure that preliminary and full EIAs are undertaken by the relevant sectoral ministries or departments, if in the public sector, and by the developer if in the private sector;
- to create by law an EIA process which requires appropriate environmental impact statements and environmental audits for private and state development projects;
- to establish the necessary institutional framework and determine the linkages of its parts for undertaking, coordinating and approving EIAs and the subsequent system of environmental audits required to ensure compliance with conditionalities;
- to develop detailed sectoral technical guidelines in EIAs and environmental audits;
- to ensure that social, socio-economic, political and cultural conditions are considered in EIA procedures and included in sectoral guidelines; and
- to develop EIA and environmental audit capacity and capability in the Environmental Protection Authority, sectoral ministries and agencies as well as in regions;

The above, detailed provisions with respect to Environmental Impact Assessment of programmes and projects show that an adequate policy framework has been put in place at the national level for conducting EAs both by the public and private sectors.

2.2 Legal Framework

It has already been mentioned that the Constitution of the FDRE has laid down basic provisions that provide both the policy and legal foundation upon which appropriate subsidiary laws and regulations for the sustainable environmental management of the country's resources are to be issued.

The most important step in setting up the legal framework for the environment in Ethiopia is the establishment of the Environmental Protection Authority (EPA) by Proclamation 9/1995.

The Authority is an autonomous body responsible to the Council of Ministers of the FDRE. This enables it to act as an independent oversight body to all other development sectors both public and private, and to evaluate and monitor whether the activities undertaken by these sectors are environmentally sound and sustainable and in line with the environmental policies, laws, regulations and guidelines of the country.

Among the powers and duties given to the EPA under the proclamation and relevant to the present study are:

- to prepare environmental protection policy and laws; and upon approval follow-up their implementation;
- to prepare directives and systems necessary for evaluating the impact of social and economic development projects on the environment; follow-up and supervise their implementation;
- to prepare standards that help in the protection of soil, water and air as well as the biological systems they support, and follow up their implementation.

In line with the above cited powers and duties, EPA has already prepared two draft guidelines and a regulations for EIA of development projects and a framework environmental legislation which are currently under review both in-house and by other stakeholders and are expected to be issued in the very near future.

The four draft documents under review are:

- Environmental Impact Considerations for Transport Sector Projects;
- Procedural Guidelines for EIA; and
- Environmental Impact Assessment Regulations;
- Framework Environmental Legislation.

Assessment of the Legal Framework

The legal framework currently being developed in Ethiopia for environmental assessment of development projects shows that a more or less adequate and detailed laws, regulations and guidelines have been drafted and can serve as a framework for conducting EAs in both the public and private sectors once adopted by the Government.

The documents have been subject to discussion or will be discussed by all relevant stakeholders usually in workshops to incorporate the ideas of the stakeholders before they are issued. The regulations and guidelines also seem to have taken due account and incorporated the necessary elements provided in EU guidelines and that of the World Bank requiring EA.

Some issues which might need to be addressed with respect to the guidelines and regulations are:

- the regulations and guidelines need to be reviewed together to create compatibility among themselves;

- a time limit should be provided within which EPA or the competent agency give their decision during the screening of a project or when reviewing the environmental impact study. Otherwise, the screening or review process might hamper the implementation of projects;

- the guidelines prepared by EPA require the approval of the Environmental Council. Since the Environmental Council does not function to date the legal status of the guidelines will be weakened and therefore can serve only as optional guidelines;

- The Ethiopian Roads Authority should adopt the national EA guidelines and regulations but may also define more specific procedural guidelines to its sectoral activities which can be used for inclusion in contractual documents.

- the most important issue to be addressed with respect to the legal framework is how to make it implementable. This involves the building of capacity within ERA so that it will be able to incorporate the EA process in all road sector projects from planning to implementation stage. The Environmental Protection Authority should also increase its capacity of adequately screening, reviewing and monitoring EAs conducted by sector agencies once the regulations and guidelines are issued because it may be burdened with demands from sector agencies both at the federal and regional level.

2.3 Institutional Framework

General

ERA, as the organ of the federal government, has the responsibility for overall planning of the national network development and maintenance and construction of trunk and major link roads while the responsibility of rural roads construction and maintenance has been decentralized and given to the regional states having their own RGRROS. For the specific road under consideration, ERA has the responsibility to conduct or commission the carrying out of EAs. ERA's relationship with the regional agencies is mainly in giving advice and technical assistance. For this purpose it has a Rural Roads Division within its current organizational structure.

In order to adequately address the possible environmental impacts that are likely to arise as a result of the project and meet national requirement, ERA has to strengthen its environmental capability in carrying out environmental assessment from project planning to implementation and monitoring stage. Previous practice shows that apart from routine engineering requirements little attention has been given to incorporate environmental considerations in road sector activities. However, the RSDP has given due attention to the environmental impacts that may arise under the programme and the need for capacity building within the sector both at federal and regional level. In line with this, the new organizational structure of ERA has incorporated an environmental unit which is expected to be responsible for the carrying out of EA of road sector activities.

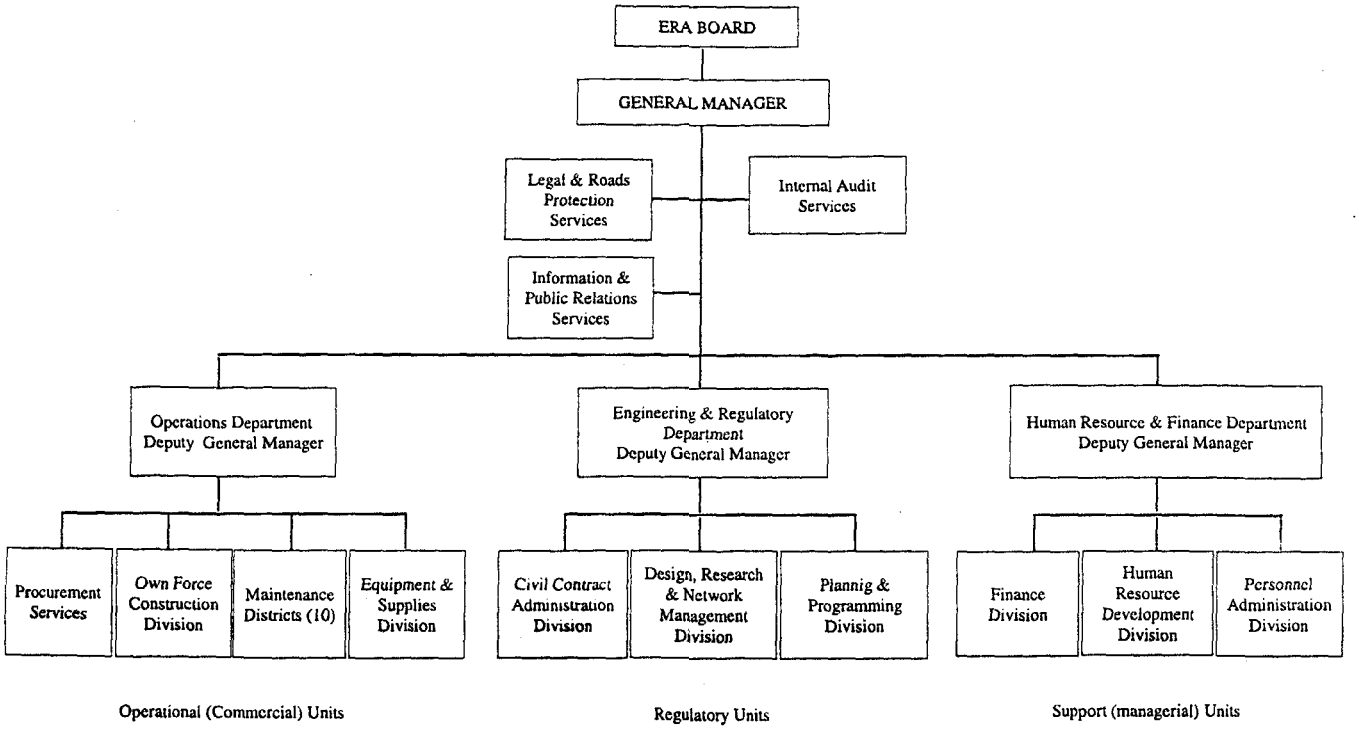
ERA's Institutional Setup

The Ethiopian Roads Authority has undergone several re-establishing and renaming since its first establishment in 1951 as Imperial Highway Authority. As of the latest re-establishment of the authority it retains the name ERA and its power and duties are stipulated in proclamation No. 63/1993 and further amended by proclamation No. 122/1995. The changes in the authority are initiated due to the fact that its coherent with the government's policy and strengthening the performance of the authority at large. As per the latest proclamation, the power and duties of ERA in general could be summarized as an authority vested with responsibilities for the construction, improvement, maintenance of the country's roads and the registration, licensing and regulation of construction machinery without prejudice to the powers vested in the National/Regional self Governments by law.

The present ERA organization chart (see following page) has three distinct units according to the functionality of each body. These are operational (commercial) unit, regulatory unit and support (managerial) unit. These units are led by deputy general managers accountable to the General Manager. The highest body of ERA is the Board. Under the operation department which is led by DGM, own force maintenance districts operate and have authority over all services, sections and other units which are under the district office. There are ten district offices in Ethiopia.

The Debre Markos - Gonder upgrading road project falls under the Debre Markos and Gonder District offices. Within the road project there are sections namely Debre Markos and Injibara under Debre Markos District and Addis Zemen and Azezo sections under the Gonder District.

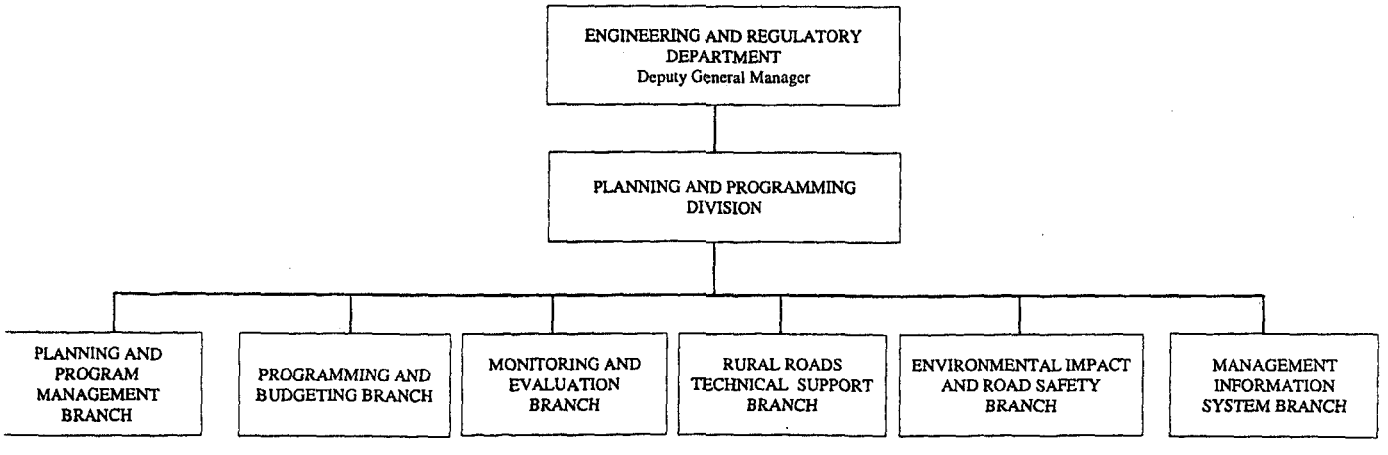
ETHIOPIAN ROADS AUTHORITY
ORGANIZATIONAL CHART



Source: ERA-REFORM STUDY REPORT, REVISED SUMMARY- MAY 1997

ETHIOPIAN ROADS AUTHORITY
ORGANIZATION CHART

Planning and Programming Division



Source: ERA - REFORM STUDY REPORT, REVISED SUMMARY - MAY, 1997

The Environmental Unit of ERA

As mentioned above, the new organizational structure of ERA has an environmental unit placed under the planning and programming division of the engineering and regulatory department headed by a deputy general manager.

The need for having an environmental unit within ERA is justified because of the huge task facing it as the programme coordinator of the RSDP and also its responsibility for the overall planning of the national road network development. As such, its role for overall environmental management of road sector activities and for carrying out or commissioning the carrying out of EAs and ensuring the incorporation of EA findings into design and mitigation plans and for supervision of same call for the establishment and adequate staffing of an environmental unit.

There are three main tasks envisaged for the environmental unit. Firstly, the environmental unit should have an advisory role to the top management thereby assisting the latter in decision making on all environmental and institutional issues within the road sector. Secondly, it should have a coordinating role by ensuring the incorporation of environmental issues in activities of all other departments and divisions within ERA. It could also play the role of a focal point for coordinating cross-sectoral environmental issues and ensuring their incorporation in the EA process. Thirdly, the environmental unit will be responsible for carrying out or supervising the carrying out of actual EAs.

In light of the above overall responsibilities envisaged for the environmental unit, having it under the planning and programming division which itself is accountable to the DGM of the engineering and regulatory department seems well placed. The DGM is close to the top management and therefore has access to report and play an advisory role to the General Manager on all environmental issues. More importantly, the environmental unit is placed directly under the planning and programming division which is responsible to oversee all road sector programmes and plans and overall supervision and follow up. Consequently, the environmental unit would have adequate opportunity to participate, evaluate and follow-up each activities in all phases of the planning process and ensure the requirement of EA has been incorporated in the project under consideration.

The environmental unit will have at its disposal the laws, regulations, and procedural and sectoral guidelines once they are finalized by EPA and will serve it to meet the national requirements in the road sector development programmes. More specific guidelines can be developed within the national requirements and will be dealt with in a later part of this study.

Cross-Sectoral Coordination

At the federal level, EPA is the responsible body for ensuring that all sectors, both public and private, engaged in development activities adequately consider that environmental concerns are incorporated throughout their planning, project development, implementation, monitoring and enforcement activities.

For this purpose it has already been mentioned that EPA has the mandate to prepare environmental policies, laws, regulations and guidelines that have to be followed by all sectoral agencies.

EPA should also be in a position to deal with cross-sectoral environmental issues and coordination so that all sectoral programmes and sub-projects are integrated and incorporated at all stages of the EA process. It will also assist it in monitoring and follow-up of all sectoral activities.

To deal with cross-sectoral issues and coordination, EPA has an Environmental Council composed of:

- An official to be designated by the Government - Chairperson
- The Minister of Agriculture
- The Minister of Trade and Industry
- The Minister of Health
- The Minister of Mines and Energy
- The Minister of Water Resources
- The Commissioner of Science and Technology Commission, and
- The General Manager of EPA

The mandate of the Council is to deliberate upon policy matters concerning environmental protection and to make recommendations and evaluate and approve directives and standards to be issued by EPA.

Although most of the relevant sector agencies are represented in the Environmental Council, there is no representation of the Transport sector. It is suggested here that in order to deal with the overall environmental issues of the transport sector, a member of the Board of ERA be represented in EPA's Environmental Council.

Currently, ERA board is composed of the Minister of Economic Development and Cooperation (Chairperson), Ministers of Works and Urban Development, Transport and Communications, two representatives from the Prime Minister's Office and the General Manager of ERA.

However, it would also be necessary that cross sectoral cooperation be made at the technical level in the form of a technical committee in which experts from each sector can be represented and cross-sectoral environmental issues and activities can be discussed. The focal points for this type of technical committee can be the environmental units established within sectoral agencies where these are already established or are going to be established such as in ERA and participation can also be extended to representatives of the private sectors and the relevant public.

At the regional level, there are already Regional Environmental Coordinating Committees chaired by the Vice President of the regional state and represented by relevant bureaus which can serve as a coordinating committee and liaison with EPA at the federal level.

In the EA-process, ERA can coordinate its activities with the environmental coordinating committees at the regional, woreda and local levels so that the environmental concerns at all levels can be incorporated. Moreover, public consultations which is an important part of the EA process can also be organized by the coordinating committee with which ERA, can make the necessary contacts.

2.4 Compensation and Resettlement

Right of Way

Since the 1951 Law ERA has had total displacement rights for people, houses or any other property in the case of construction or maintenance of roads. The law is still from that year but there have been several proclamations after that stating the same right. According to that law ERA can occupy any site for quarries or camps for road construction and maintenance purposes.

The area reserved or Right of Way for roads is 30 meters wide. In case of the new road or new road alignments any property within this area can be removed/demolished by ERA. After road construction nobody is allowed to build houses or shops within this area. The ERA maintenance section is responsible to see that nobody builds anything within this area.

Compensation

Compensation for the lost property is paid if new lands are occupied in the places where no road existed earlier or if the upgrading of the existing road requires new lands from outside the previous Right of Way. The property on these sites/lands is compensated. Compensation is paid for the property lost permanently, and/or for temporary losses as the case might be.

The owners of these houses (legally or illegally built) are allowed to remove their property before the construction activities start. Usually the owners whose property will be removed/demolished receive this information about one or two months before the construction work starts.

Property to be compensated

The land is not considered to be property which can or need to be compensated. All land belongs to the government and it can not be sold or bought. The present tenure system gives people the right to use land but no individual ownership.

Residential or any other type of buildings are considered as property and will be compensated according to their market value. In case of the demolished residential house ERA will compensate the old property not based on its present market value but according to the cost of constructing a similar new house. In case of the wood and mud houses, it is recommended by the consultants, that the compensation price would be that of the hollow block house due to the environmental reason. The block houses are not very much more expensive and would save the decreasing resources of trees and forests.

The costs created by removing transmission/distribution lines or removing//breaking water pipes, drainage systems, telephone lines etc. are compensated by ERA to the owner of these utilities.

Trees with commercial value are considered as property and are compensated according to their market price.

In case of the detours or other temporary occupations of agricultural lands, the growing crops so lost, are compensated according to their market value. In the case where crops are lost for

several years due to non-cultivation the average value of the lost crops is estimated at the project level by the compensation committee coordinated by ERA.

Compensation is paid only for any physical property, no compensation is paid for lost economic activities in case of shops and bars or, in case tenants live in a house, the owner is not compensated for lost rents.

Owner receiving compensation

Compensation is paid to owner of the property, private or public.

The lost crop is paid to the cultivator who can be a private farmer, a cooperative, a state farm etc. The trees with commercial value are compensated by their market value to the owners which can be private persons, the Ministry of Agriculture or Municipality/Peasant Association.

The costs caused to the public utilities, the concerned authority/entity gets the compensation, in case of electric lines compensation is paid to the Ethiopian Electric and Power Authority (EELPA), telephone lines to the Ethiopian Telecommunication Corporation, sewage systems to the concerned Municipal Authorities etc.

Compensation is paid to the owner of the house not depending if owner lives in a house or not. In a case a kebele owns a house it will receive compensation. The tenants have no rights to any type of compensation.

ERA Compensation Committee

When the road construction works are decided to start in a certain area, ERA sets a Committee at the project level. The Committee is mainly established for compensation and resettlement purposes. There is no law that require to set any Committee, but this is a permanent practice. The members of the Committee get no money compensation for their work.

Committee includes representatives from

- ERA as a coordinator
- Woreda administration to represent the concerned region
- Bureau of Agriculture mainly to estimate value of lost crops or trees
- Bureau of Urban Development & Public Works in case of the concerned Municipality
- Kebele or Peasant Association represented by local elders

The people affected by the road construction do not belong to the committee, but are informed and consulted about the compensation. The consent of all stakeholders must be received. If the consent does not come or the owner is not happy with compensation, the property will be removed anyway and compensation decided by the committee is paid by ERA.

In the public consultations that were held in different parts of the country for the EIA of the five roads, participants wanted to see a committee to be established to handle the cases where the loss of farmland or any other property belonging to the individuals or the community

happens due to the road construction. ERA compensation committee fulfill this requirement. However, the committee appointed should not be "a group of unprepared appointed by the unwilling to do the unnecessary".

The most important thing is to implement the compensation and displacement and resettlement issues with fairness and with transparency to prevent negative issues among the locals. There have been problems in the past, when compensation/resettlement were not implemented as promised at the beginning and the social issues have been relegated to the side and more importance was given to the technical than social issues.

Resettlement

The people who are displaced due to the new roads or new alignments of old roads outside the reserved area, as well as those residing illegally inside it, must find a new place to live.

Although local communities are commonly kept responsible to resettle people, there are no legal regulations requiring them to do so. In practice the local communities resettle people and/or appoint new agricultural lands to the farmers who have lost their lands due to the road construction.

This 'responsibility' is based on the long historical practice on the common idea of justice for an individual right to use agricultural land. In the Abessinya proper (present Amhara and Tigray regions) a person had a right to use land under the *rest/resti* system according to which the agricultural lands were divided at the certain intervals among the families having this (rest/resti) right. This system was based on the ownership of a kinship group, not an individual ownership. The community had the responsibility to redistribute agricultural lands among the families already cultivating land but also to the new families formed by marriage after last redistribution. Redistributions usually happened about every tenth year.

In the southern part of the present Ethiopia rest system never existed. However, land was not 'owned' by individuals in the south either. After these lands were annexed to the present Ethiopia, many big plantations were established in this area, and no communal land distributions existed in this part of the country. Under this system the peasants had more permanent tenure for the land they cultivated. After the monarchic period part of the lands were distributed among the peasants but no communal redistributions happen in this area.

The rest/resti system in itself has presently no legality in the country and the people who have the tenure rights have expanded over the previous rest/resti families also in the north. However, the last redistribution of lands was finalized in Amhara Region last year. If this system will get (regional) legality, the people who should be resettled have to wait resettlement to the next redistribution, maybe up to nine years.

Resettlement is still felt to be the responsibility of the community represented by kebele administration or peasant association. ERA compensation committee with the woreda/kebele administration try to find a satisfactory solution to resettle displaced people. However, no evaluations have been done about compensations or resettlement after consent of the committee and the real practice after it is not known.

The land allocation for residential buildings in urban areas is still relatively easy. The kebele owned houses are rented to the households, in many towns to a half of all households.

In many rural places the scarcity of agricultural land may lead soon to the situation where all people losing farmland will not receive new agricultural land. The big issue in the future will be the mode of resettlement and especially the compensation of the lost agricultural lands.

Already now it seems that different alternative practices are born. For example, the lands needed by EELPA (which also has the same right as ERA to occupy any land) for the Alamata Substation the farmers were compensated for the permanent loss of land in a form of loss of crop. Those who lost more than one hectare were compensated by the average value of the ten years' crop. The minimum compensation was estimated from three years' crop and the rest between these two extremes. The similar experience comes from the construction of Mekele International Airport.

However, farmers who get cash compensation lose also their occupation with lost agricultural lands. If the resettlement to the agricultural lands is impossible, there should be training and/or other employment possibilities to the displaced people. In some cases displaced people have been employed by the projects to construction work.

There should be a clear national policy on this matter to avoid the situations to be biased from case to case. So far there is no law or regulations about resettlement or compensation of the lost agricultural lands. In the national policy also the local circumstances including physical, social and economic environment must be taken into consideration. Also the question about who are responsible to resettle displaced people is not settled by law. The constitution, however, states that the relocation/resettlement could be provided with "adequate state assistance".

2.5 Public Consultation

The Environmental Policy of the FDRE recognizes that public consultation is an integral part of EIA, and that it should be ensured that the EIA procedure includes public comments before consideration by decision makers.

With regard to participation and consultations of the local community, the Constitution provides that nationals have the right to participate in national development and to be consulted with respect to policies and projects affecting the community. Also many donor assisted programs and projects require different consultations to ensure people's participation.

Consultation and communication with various interest groups should be an integral part of the process used for gathering environmental data, understanding community and individual preferences, selecting project alternatives, and designing viable and sustainable mitigation and compensation plans. This means that consultations should be included in the planning and design phases as well as during implementation.

Participation involves a dialogue with interested parties before major project decisions are made. It is also desirable to use several different consultation activities, such as public meetings, expert seminars, interview surveys etc. The ERA compensation committee forms one official consultation channel which, however, has a very limited purpose and does not substitute public consultations.

3 DESCRIPTION OF THE PROPOSED ROAD PROJECT

The Debre Markos - Gondar road proposed for upgrading was partially constructed during the Italian occupation. During its upgrading about 28 years ago, there was major realignment particularly in the section between Addis Zemen and Bahir Dar. The upgrading included the widening of the carriageway and covering the telford with granular material in places where the telford served as the base for the road pavement. The new realignment mostly followed the Tana Lake shore. Later the Gondar - Azezo section was upgraded to double surface about 10 years ago. Azezo town serves as the air strip (presently the air field is under construction) for Gondar town, one of the historical sites of the country.

As part of the appraisal projects for the RSDP, the Debre Markos - Gondar road was evaluated in a feasibility study by TecnEcon Consultants . The Consultant has submitted its draft final findings in a report issued to ERA and the World Bank in May 1997. According to the report, the project is subdivided into five sections, and the recommended treatment and its economic internal rate of return was as follows:

Road Section	Recommended Treatment	EIRR percent
Debre Markos - Bure	Reconstructed 50mm. AC surface + 500mm granular base &sub base	11.90
Bure - Bahir Dar	Reconstructed 50mm. AC surface + 500mm granular base &sub base	12.40
Bahir Dar - Werota	Reconstructed 50mm. AC surface + 500mm granular base &sub base	16.00
Werota - Azezo	Reconstructed 50mm. AC surface + 500mm granular base &sub base	27.30
Azezo - Gondar	Reconstructed 50mm. AC surface + 200mm granular base &sub base using existing pavement as sub base	14.90

Presently, a German Consultant, DIWI, is engaged in the detail design of the road and the preparation of the tender document. The contract was awarded to the consultant in July 1996, and the expected completion time was February 1997. The consultant expects to complete the geometric design will be competed in the near future, and some findings are already available. No major realignment is anticipated in the project, except for the smoothening of the sharp curves that will improve visibility and the maneuvering of long vehicles. In addition to the four meter widening of the road cross section, the pavement will be treated with 300mm thick asphalt overlay on top of the granular material. Most of the existing bridges and culverts were found to be sound, but an additional two or three bridges of about 16m. span will be required.

Traffic frequency

The road serves a substantial area of rich agricultural land which feeds a densely populated rural community consisting of many villages and small towns.

The 442 km road from Debre Markos to Gondar lies in the North Western Corridor and serves a fertile area with reported arable and livestock surpluses. The traffic consists of about 60 percent of medium to heavy (mainly rigid) commercial vehicles or large buses. The road was widened to full width gravel standard approximately 20 years ago. The last 13 kilometers of road from Azezo into Gondar were upgraded to bitumen standard about 10 years later.

Although some of the road traverses hilly and mountainous terrain, it is mainly on the flat to rolling plateau.

Condition of the Road

From Debre Markos to Azezo, the road is surfaced with a thin gravel layer and in many places the original hand packed stone foundation is the only pavement layer remaining. The surface of the road is often poor, even though the road appears to have a sound foundation. There are a number of locations near Bahir Dar where the embankment requires raising to avoid inundation. In places these are associated with expansive materials in the road subgrade, which combine to create serious problems. Rock debris from land slides have frequently been deposited on the edge of the carriageway hindering drainage. From Azezo to Gondar the road has been surface-dressed and the condition is poor, and in places bad, being heavily patched and with numerous potholes and cracked areas.

Proposed Activities

Apart from minor work to ease curves and realign straight stretches, no improvements to the existing alignment are planned. It means that the future rehabilitation and upgrading consists mainly of putting new layers of gravel or crushed stone, and a new asphalt layer, on top of the old road.

There are 46 bridges, 13 of which have spans in excess of 30 meters. It is anticipated that eight of these bridges, all located between Debre Markos and Bahir Dar, will require replacement as part of an upgraded road. There are 747 culverts, almost two per kilometer, and 12 major retaining walls.

4 BASELINE DATA

4.1 Description of the Road Environment

The project road starts in Debre Markos town, 305 kilometers from Addis Ababa. Debre Markos is the capital of the Misrak Gojam Zone in the Amhara Regional State, which starts already some 70 kilometers earlier from the Abay/ Nile River Gorge. Debre Markos is two thousand and five hundred meters above sea level, and was originally called Mankorar which means 'cold place' in Geez. It is also one of the old capitals of Ethiopia. In Debre Markos there is also an air field for regular passenger flights.

From Debre Marcos the road goes to the west and after Sentera plain turns north-west by the Adebe plain to Yewla, where it turns to the north through Amanuel town to Dembecha. Between these two towns the road leaves the Misrak Gojam Zone and enters the Mirab Gojam Zone. The road from Dembecha goes through Yechereka and Jiga to Finote Selam, and crosses several times over small Nile River tributaries. From Jiga to Bure, the road goes to the west through Mankusa town, from where the road goes south to the Bir State Farm where especially maize is grown.

From Bure, the road turns again north and north-west to and through Tilili, Kesa, Kosober, Injibara, Addis Kidame and Dangla towns. All these towns belong to the Agew Awi Zone with Injibara as its capital. Much of the lands from Kesa close to Addis Kidame are subject to inundation; between Debre Markos and Tilili the road crosses 16 perennial tributaries to the Blue Nile. Just after Kesa on the right side of the road there is the round Lake Zengena. From Kosober one important road goes to the west to Bambudi town near the Sudanese border.

After Dangla the road enters again the Mirab Gojam Zone going to north-east towards Durbete, where another road departs to the north going by the Tana Lake along its western cost, to Seraba on the Metema (near the Sudanese border) and Azezo (Gondar) road.

There are Gilgel Abay, Merawi, Meshenti towns before the road enters the Bahir Dar town. Bahir Dar has only one woreda and it forms a Special Zone. Bahir Dar is also the capital of the whole Amhara Region and can be reached by regular flights from Addis Ababa.

Bahir Dar is besides the administrative center, also an important center for economic and commercial activities, as it has been for centuries. The town is one of the popular holiday resorts. It is located by the southernmost tip of Tana Lake, the biggest lake in Ethiopia and the starting point of the Blue Nile. Thirty five kilometers south of Bahir Dar are the Blue Nile Falls - *Tis Isat* or 'Smoke of Fire', what the local name means.

On Lake Tana there are several islands, with some twenty shelter churches and monasteries of significant historical and cultural interest. Most of the buildings date from the sixteenth and early seventeenth century.

Just after the town the road goes over the Blue Nile bridge under which this famous river flows out of Lake Tana. The area by the lake is also rich in bird life. Sometimes it is also possible to see hippopotamus in the river. Two kilometers after the bridge there is one of

the Haile Selassie's palaces on the right side of the road. Figure 4.1 shows tourist sites along the project road.

After Bahir Dar the road goes to the Debub Gondar Zone through Zenzelma, Hamusit, Woreta and Addis Zemen. The road after Hamusit crosses the Gumera River and after Woreta the Rib River and many tributaries to both.

In the area bordered by the two rivers, the road and Tana Lake, is the Fogera Plain which is badly flooded during the rainy seasons. The local people leave the area during flooding and come back when it decreases. The area is very fertile agricultural land. However, local people would not like the road to be moved to any other location.

Just after Woreta one road goes to the east to Debre Tabor which can also be reached from Addis Zemen by another road. Debre Tabor is one of the previous capitals of Ethiopia and it is situated in the spectacular mountainous area.

After Addis Zemen the road leaves the Debub Gondar Zone and enters the Semen Gondar Zone where it goes through Enfranz, Maksegnit and Teda towns before it enters through Azezo to Gondar which can also be reached by air. Also Gondar is one of the old capitals and one of the most popular tourist attractions due to its famous old castles from the seventeenth century when Gondar was the largest settlement in the country.

Traditional transportation means

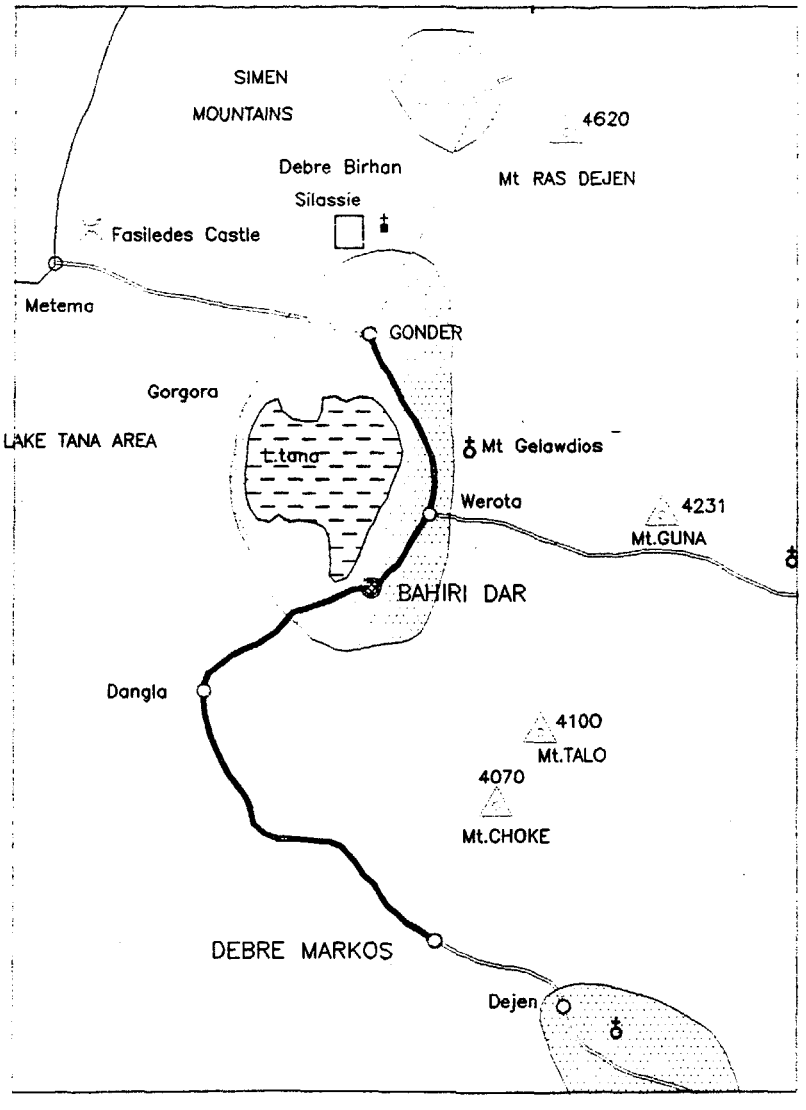
The road has been planned to serve as an important corridor linking different parts of the country for all kind of transportation needs. However, most people using this road, use it only locally. Traditional transportation methods are many and various also on this road.

Local social and economic activities require people to use the road mainly as pedestrians and also the most common way of transportation is people, and especially women, carrying the loads in their back between the home compounds and agricultural fields, water points, market places or any other destination. Along this road there are hundreds of women every morning heading to the nearest town to sell fuel wood for urban households. Due to the absence of other type of local transportation, especially in rural areas, also sick people are carried to the health centers etc.

Different types of wheelbarrows, often with local designs, are used especially in town areas. Barrels of water, or whatever can be rolled, are rolled on the road etc. Many of these traditional means of transportation are not very quick to react to approaching heavy trucks, and/or remove them quickly from the road.

Also different pack animals are plenty on this road; donkeys, mules and horses are used on this road for transportation. Especially on the flat terrain, the horse charts transport both people and products.

Minibuses form a part of public transportation systems on all asphalted roads. However, many people regard the fees too high and many loads (such as fuel wood, animals, water barrels) are too spacey or heavy for minibuses. This means that even after the rehabilitation most of the transportation needs will be met by traditional means. This fact should also be taken into consideration when designing the rehabilitation/upgrading.



LEGEND

- Major Tourist Areas
- Historic Route/Project Road
- Other Roads
- Archeological Site
- Major Batte Site
- Church
- Monastery
- Mountain Peak
- Natural Wonder
- Ruin
- Regional City
- Other Towns

FEDERAL GOVERNMENT OF ETHIOPIA ETHIOPIAN ROAD AUTHORITY	
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FIVE ROADS SELECTED FOR REHABILITATION AND /OR UPGRADING	
DEBRE MARKOS–GONDER	
PLANCENTER Ltd. Finland	
TOURIST SITES	
Figure 4.1	Date

4.2 Physical Environment

The following text provides an overview of the baseline physical environment of the project area and vicinity.

4.2.1 Climate and hydrology

Climate

The climate along the road is humid with monomodal rainfall. The main rainy season is from June to September. Along the road there are numerous rivers, streams and flood paths crossing the road. All rivers and streams have flow all year round. During rainy season they have very high discharges from June to September in some places enhancing swamps and seasonal marshlands.

The mean annual rainfall in the project area ranges between 998mm at Finote Selam and 1070 mm at Jiga to 1180 mm at Bure. The precipitation pattern is unimodal with over 90% of falling during the wet season. Small rains occur sporadically between April and May.

The Table 1 in the Appendix 8 depicts yearly rainfall for selected representative locations within the project area. .

Temperature

The mean annual temperatures ranges between 26.5°C at Bahir Dar to 27.7°C at Werota (see table 2 in Appendix 8).

Water Resources

The primary source of water is rainfall and there are several perennial rivers along the road. The mean monthly flow and the water quality for selected rivers are presented in the Appendix 8 in the Tables 3 and 4 respectively. The hydrogeological features of the project area shows that there is a good groundwater potential.

Ground water

The road crosses extensive fracture aquifers of high to moderate productivity of confined, static water level greater than five meters (Debre Markos - Bahir Dar and Addis Zemen - Gandar). From Bahir Dar to Addis Zemen the road crosses mainly unconsolidated lacustrine and swamp deposits of low productivity with static water level near to the surface. The ground water in this region has a heterogeneous nature controlled by faults and local depressions.

Surface water hydrology and quality

On the Debre Markos - Addis Zemen section of the road, a large section of permanent and seasonal marsh lands were observed. The construction of the present road has enhanced the seasonal swamps due to constriction of surface flows and back water effects at culverts.

4.2.2 Physiography

The road traverses the central lava highlands of the western part of the Ethiopian plateau.

4.2.3 Topography and hydrography

The road is aligned in the Ethiopian high lands traversing plains, rolling and undulating hilly plains and flood plains. The road crosses from hilly terrain (slopes greater than 10%) to flood plains (slope less than 1%). The road is found in the Abbay river basin drainage. The elevation of the terrain crossed by the road varies as following:

- Debre Markos - Finote Selam 2460-1860 m.a.s.l
- Finote Selam - Injibara 1860-2640 m.a.s.l
- Injibara - Bahir Dar 2640 -1800 m.a.s.l
- Bahir Dar - Gondar 1800-2200 m.a.s.l

The road is crossed by numerous perennial rivers which are all tributaries of Abbay river. The major rivers crossed by the road are Birr, Koga, Gilgel Abbay, Rib, Gumera, Megech, etc. They have very high discharge during the main rainy seasons (June to September) and significant discharge during dry period of the year.

4.2.4 Geology

The road crosses different geological formation i.e. from Debre Markos to Dembacha, Birr river to Dangila, Bahir Dar to Hamusit and Addis Zemen to Gondar trap series of Ashangi group composed of dominantly alkaline olivine basalt and tuffs; from Dembecha to Birr river and Dangila to Bahir Dar quaternary basalt of recent lava; and from Hamusit to Addis Zemen recent lacustrine and swampy depositions (see Figure 4.2).

4.2.5 Soils and geomorphology

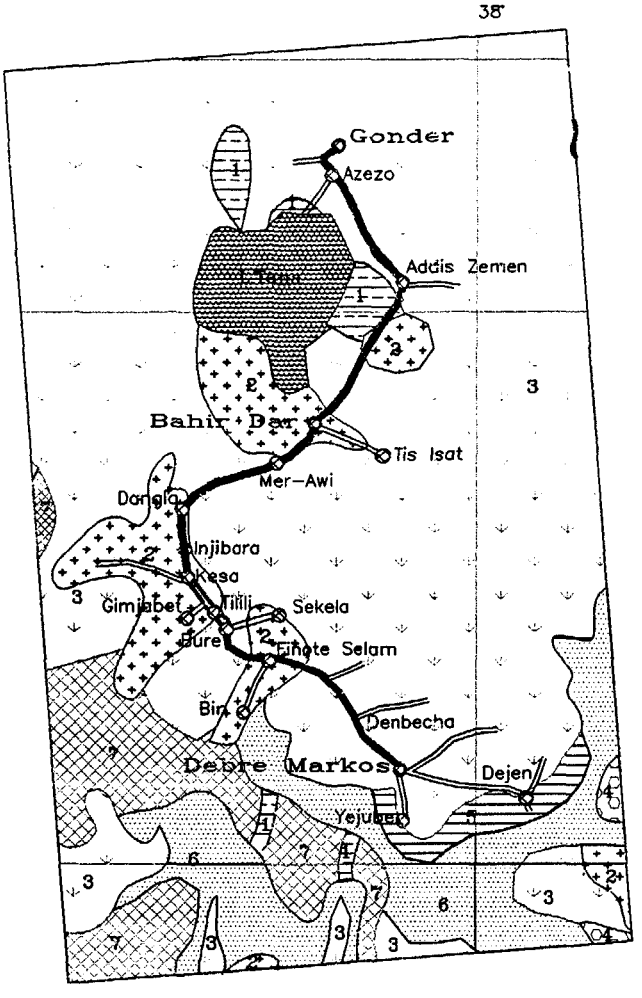
The soil types of the different sections of the road are the following (see Figure 4.3):

- Debre Markos - Jiga and Finote Selam - Hamusit : thick residual soils on moderately side slopes of extinct central volcanoes, high volcanic piedmonts and lava plateaux with substantial areas of alluvial soils of seasonal marsh lands and undulating to rolling hilly high plateaux.
- Hamusit - Addis Zemen: Alluvial soils on lacustrine and fluviolacustrine plains.
- Addis Zemen - Gondar: Thick residual soils on undulating side slopes and hilly terrain low to moderate relief.

Erosion

The most sencitive sections of the road are along Debre Markos - Finote Selam and Addis Zemen - Gondar. On these sections of the road at some places side ditches and culverts scouring are observed.

Soil Stability. Along the existing road slopes are stable.



L E G E N D

1	Quaternary Sediments	QUATERNARY VOLCANICS	CENOZOIC
2	Basaltic flows and related Spatter Cones		
3	Trap Series	TERTIARY VOLCANICS	
4	Amba Aradam Formation		
5	Antalo group	CENTRAL PLATEAU SEDIMENTS	MESOZOIC
6	Adigrat Sandstone		
7	Lower Complex	PRECAMBRIAN	
	Project Road		
	Other Roads		

FEDERAL GOVERNMENT OF ETHIOPIA

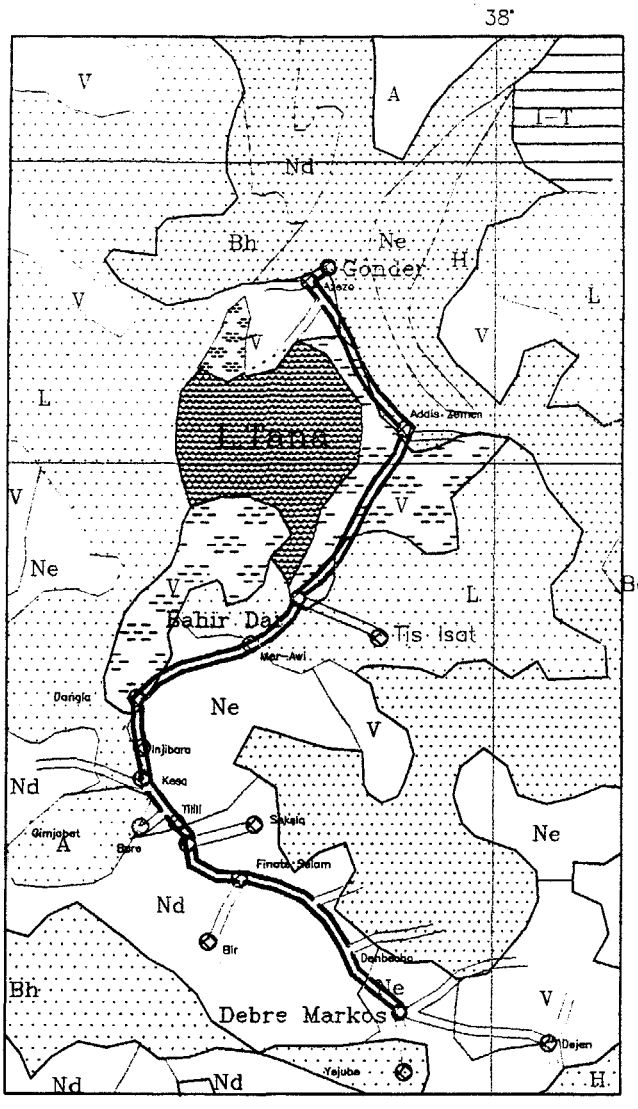
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FIVE ROADS SELECTED FOR REHABILITATION AND/OR UPGRADING

DEBRE MARKOS– BAHIR DAR– GONDER ROAD

PLANCENTER Ltd. Finland

GEOLOGICAL MAP

Figure 4.2 | Date



A	**Orthic Artisols**
Be	**Chromic Eutric and Calcic Cambisols**
Bh	**Dystric and Humic Cambisols**
I	**Lithosols**
L	**Chromic and Orthric Luvisols**

Nd	**Dystric Nitosols**
Ne	**Eutric Nitosols**
T	**Humic,Mollic and Vetric Andosols**
V	**Chromic and Pellic Vetrosols**
	Project Road
	Other Roads

P H A S E S

- **Lithic**
- **Stoney**
- **Flooding**

FEDERAL GOVERNMENT OF ETHIOPIA

THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FIVE ROADS SELECTED FOR REHABILITATION AND/OR UPGRADING

DEBRE MARKOS–BAHIR DAR–GONDER ROAD

PLANCENTER Ltd. Finland

SOIL MAP

Figure 4.3 | Date

4.3 Biological Environment

4.3.1 Land use and land cover

The present land use of the road corridor between Debre Markos-Bahir Dar-Gondar is dominated by intensive traditional rainfed subsistence peasant farming and traditional grazing. Agriculture in the project area is dominated by rainfed cereals pulses and oilseed crops. Teff is the most important crop grown, followed by maize and barley. Other important rainfed crops grown are finger millet, nug, chick peas, coffee and smaller areas of irrigated pepper, onions and potatoes.

Figure 4.4 shows the general land use along the project road.

4.3.2 Flora

The area along the road between Debre Markos and Gondar has suffered considerably from over exploitation of forest resources due to human intervention in the area. Increased demand for agricultural land due to population growth, encroachment for grazing, fuelwood and construction practices has significantly affected the original vegetation cover all along this section of the project area.

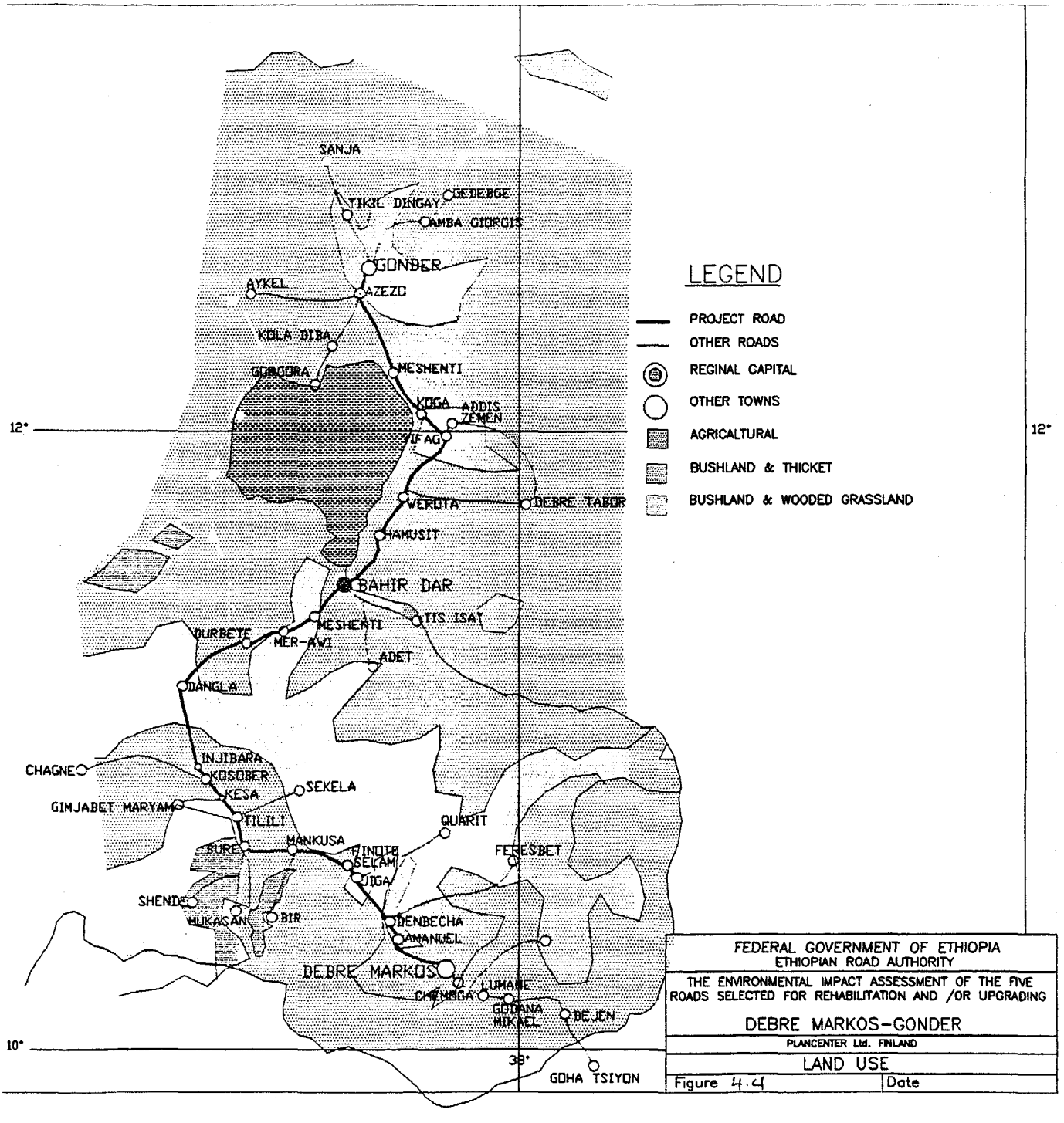
The main remnants of natural forest is found at Tarma Gedam protected area. Between Bahir Dar and Gondar, however, some indigenous tree species have been identified. Natural woodlands are also found in Churches and a limited number of protected community forests. Table 5 in Appendix 8 depicts the dominant tree and shrub species found in the project area.

The main types of climatic climax vegetation along the road is shown in Figure 4.5. The remnants of natural forest in the project area consists of at least four sub-regions of plant communities. Between Debre Markos and Bure and Addis Zemen and Gondar are the Podocarpus forest. The second story trees varies in composition from place to place in general and are dominated by Croton (Bisana, Bakanisa), Ekebergia (Loal, Sombo) and Ayzygium Species, among others. Injibara - Meshenti is covered with Aningaria and Meshenti - Bahir Dar - Werota - Addis Zemen is covered with Olea. The area between Bure and Injibara is the Arundaria (Kerkeha, Leman) forest.

There are plantation forest along the road corridor and the species commonly planted under this programme were identified as Eucalyptus camaldulensis, Eucalyptus globulus, Cupressus lusitanica, Acacia decurrens and Acacia saligna. The natural grasses within the grazing areas are dominated by Andropogan, Cynodo, Digitaria, Typha and Reeds.

4.3.3 Fauna

Wildlife population and native wildlife habitat have been significantly impacted by rapid population growth and subsistence agricultural practices in the project area. A list of occasionally and accidentally seen wildlife species in the area are given in Table 6 in Appendix 8. Figure 4.6 shows protected areas (Simen Mountain and Lake Tana) and Figure 4.7 wildlife conservation areas around the project road. There are six specific wildlife conservation areas; they are for Gelada Baboon, African Fish Eagle, Spot-breasted Plover, Guenther's Dikdik, Abyssinian Long-claw.



FEDERAL GOVERNMENT OF ETHIOPIA
ETHIOPIAN ROAD AUTHORITY

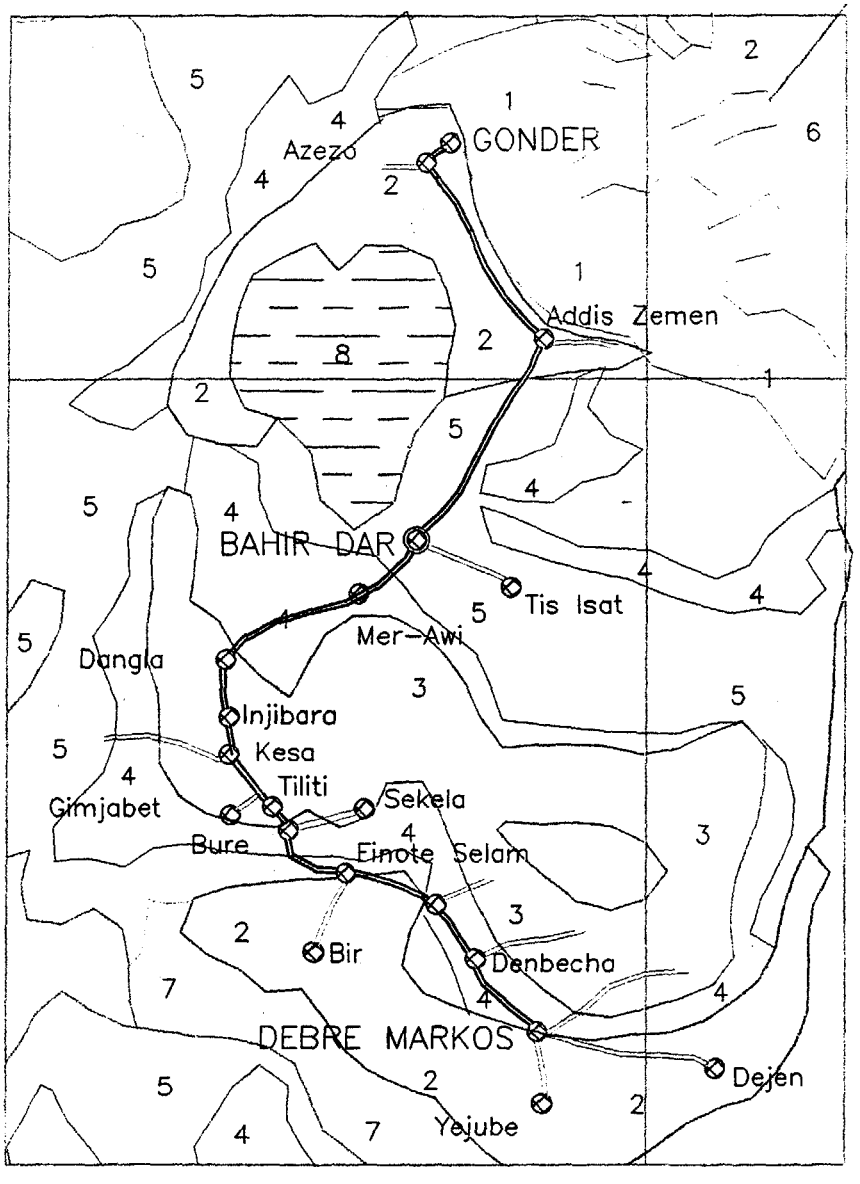
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FIVE ROADS SELECTED FOR REHABILITATION AND /OR UPGRADING

DEBRE MARKOS–GONDER

PLANCENTER Ltd. FINLAND

LAND USE

Figure 4.4 | Date



LEGEND

AFROALPINE AND SUBAFROALPINE

CONIFEROUS FOREST

1 Juniperst

2 Podocarpus

BROADLEAF FOREST

3 Arundinaria

4 Aningeria

5 Olea

WOODLAND & SAVANNAH

6 Juniperus

7 Acacia

GRASSLANDS

8 Hyparrhenia Filipendula

9 Lake

Project Road

Other Roads

FEDERAL GOVERNMENT OF ETHIOPIA
ETHIOPIAN ROAD AUTHORITY

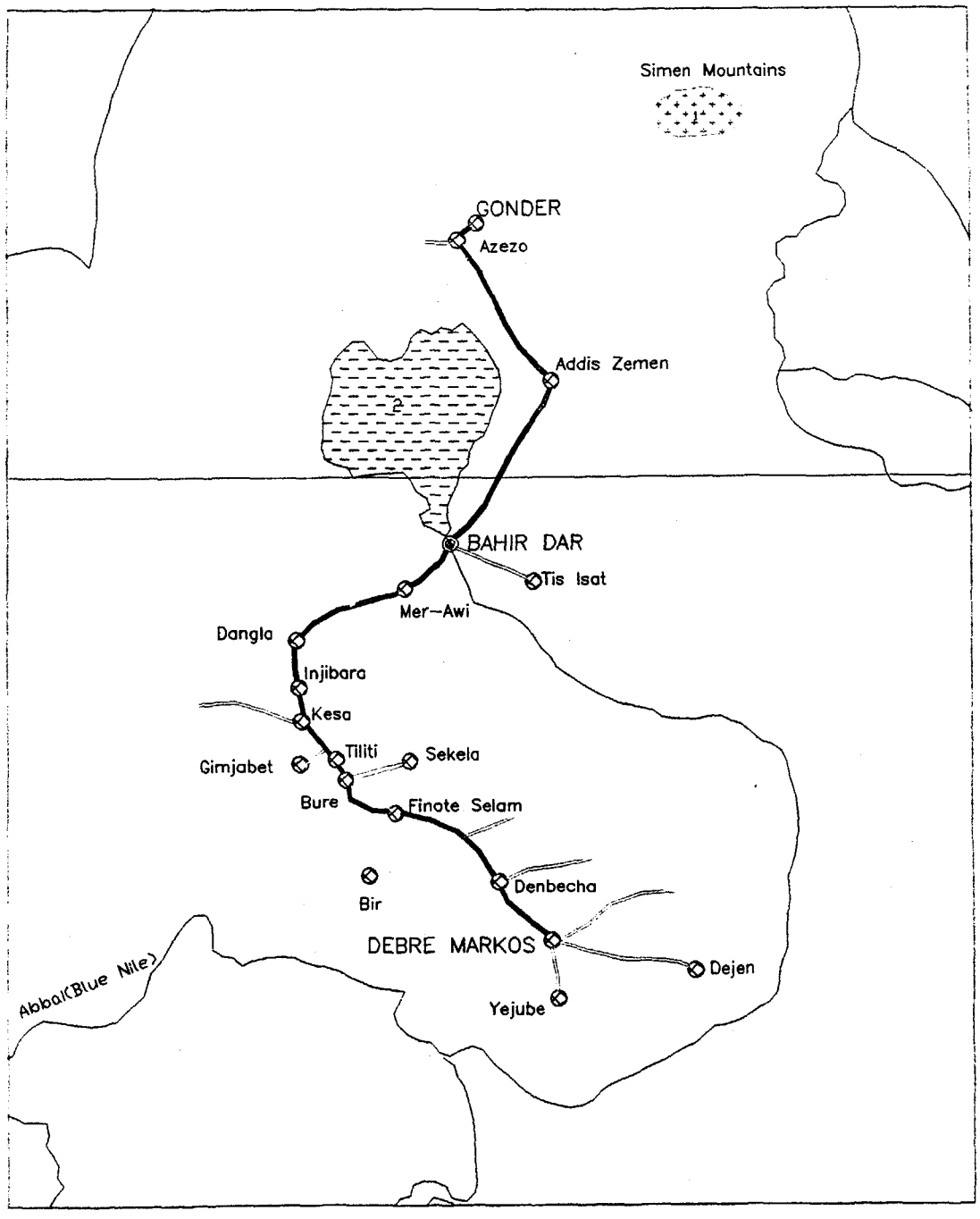
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FIVE ROADS SELECTED FOR REHABILITATION AND /OR UPGRADING

DEBRE MARKOS–GONDER

PLANCENTER Ltd. Finland

CLIMATIC CLIMAX VEGETATION MAP

Figure 4.5 | Date

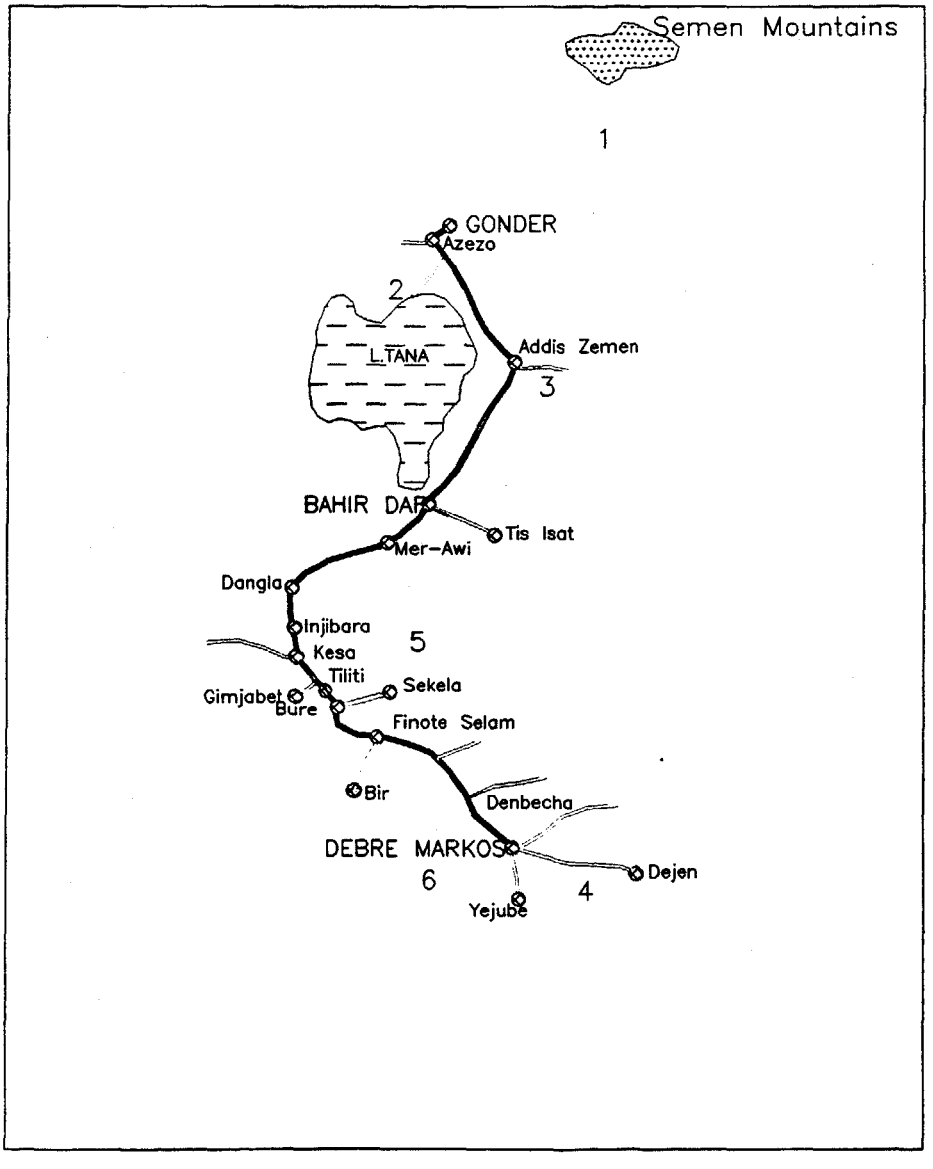


LEGEND

1. Simen Mountains
2. Kake Tana

Regional City
Other Towns

FEDERAL GOVERNMENT OF ETHIOPIA ETHIOPIAN ROAD AUTHORITY	
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FIVE ROADS SELECTED FOR REHABILITATION AND /OR UPGRADING	
DEBRE MARKOS–GONDER	
PLANCENTER Ltd. Finland	
PROTECTED AREAS	
Figure 4.6	Date



LEGEND

1. Gelada Baboon
2. African Fish Eagle
3. Otter (Spotted necked)
4. Spot-breasted Plover
5. Guenther's Dikdik
6. Abyssinian Long-claw

NATIONAL PARKS
PROJECT ROAD
OTHER ROADS

FEDERAL GOVERNMENT OF ETHIOPIA ETHIOPIAN ROAD AUTHORITY
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FIVE ROADS SELECTED FOR REHABILITATION AND /OR UPGRADING
DEBRE MARKOS–GONDER
PLANCENTER Ltd. Finland
WILDLIFE CONSERVATION AREAS
Figure 4.7 | Date

4.4 Human and Social Environment

4.4.1 Characteristics of the population living by/along the road

Settlement pattern

The whole survey area is very densely populated. In the rural areas individual farm houses are separated from each others by their compounds and fields, while in the urban areas the attached housing units form lines along the road. There are 23 towns along the road in the survey area.

Distribution of the population into the rural and urban inhabitants vary among the zones. About 90 percent of population live in rural areas in the Zones through which the road goes. In Misrak Gojam and Semen Gondar Zones urban population exceed more than ten percent of all population, in Agew Awi Zone nine percent are urban while in Mirab Gojam Zone and in Debub Gondar Zone only six percent live in urban areas.

The biggest towns along the road are Gondar with more than hundred thousand inhabitants and Bahir Dar a little less, according to the 1994 Census. However, Bahir Dar is the fastest growing town and population at the present might be even bigger than in Gondar. In Debre Markos the population counts to fifty thousand. Besides these towns there are six towns with more than ten thousand inhabitants: In Mirab Gojam Finote Selam and Bure towns with more than 13 thousand in both. In Agew Awi Zone Dangla town has over 15 thousand inhabitants while the capital of the zone, Injibara has less than eight hundred but is anticipated to grow fast due to its present status as a zonal capital. In Debub Gondar there are two big towns, Woreta and Addis Zemen with the population about 15 thousand each.

The urban population in all woredas is centered to the towns along the road. In some woredas all towns are by the road and in other woredas there are only few small towns away from the road.

Size of Population along the road

The people living in the towns through which the road goes are directly affected by the road. The town population along this road amounts to little over 400,000 persons. Many people living in the rural areas of the woredas along the road are also directly affected in their everyday life. The total population in these woredas is nearly three million (2,737,306) persons. The indirect impacts of the road are felt by more than 4 million (4,271,321) people who live in the zones by the road. (Table 1, Appendix 9).

Sex Ratio Average sex ratio of 54.4 for the Amhara Region shows that there are more women than men in the whole Amhara Region. (Table 1, Appendix9). Only in Gondar Zones the sex ratio is in favour of men, as well as in all the other woredas except in Dangla woreda where it is balanced. In survey area every town has clearly more women than men. The sex ratio for women in smaller towns is bigger than in larger towns; In Teda town 58 percent of population are women while in Bahir Dar, Debre Markos, Amanuel, and Mankusa towns the share is lowest (53%), the mean average being 55-56 percent. The road towns pull especially divorced women, and their daughters, to look livelihood there.

While there would appear to be no restriction on constructing detour on arable land affected communities should have the right to be consulted over the selectio construction material site and routes for access road and detour in these areas to min potential damage.

After the project the contractor is responsible to rehabilitate the used sites to their pr condition.

7.4.2 Loss of grazing land

Consultation with the local cattle owners about the location of camps and other cons sites. After completion of the construction work, the pasture land should be rehabili reseeding immediately to minimize disturbance to grazing land.

Compensation of the lost vegetation estimated by ERA compensation committee i negotiations with cattle owners themselves.

7.4.3 Loss of property

There are no forests by the road but some new cultivated groups of trees, m southern part of the road, where some trees may be affected. The value of lost (grain crops and trees) is estimated by temporary ERA Compensation Committee on market price.

There will be no buildings which should be demolished. However, if this is nee the design changes there must be consultations with the local administration t the removal of houses. In that case also ERA compensation committee should with the resettlement planning.

7.4.4 Employment opportunities

Local administration should have a say on who would be employed by the co The preference should be given to those people who lose their own economic to the project.

7.4.5 Effects on Public and Private Services

The construction camps should provide services which otherways would o local public facilities/utilities. The selection of camp sites should be cooperation with the local administration.

7.5 Human and Social Environment: Other Issues

7.5.1 Cultural, religious and historical areas

The destruction of locally important sites can be avoided in coopera elders/administration. The local religious places, graves and funeral places trees or springs must be taken into consideration when the detours, q construction sites are designed.

found in rural areas in the southern part of the road in Bure Wemberma , but also in Jabi Tehnan and Dembecha woredas before the road enters the Agew Awi Zone.

Agew Awi Zone. Agews can be found in other places in the country as well, but this area is one of the 'traditional' places for them. Their share in this zone is half of the total population. The Amharas number nearly to same (49%) and the second biggest group is the Gumuz with more than seven thousand people (1%). Altogether there are 25 ethnicities living in this zone.

Bahir Dar Special Zone. The share of Amharas is highest (93%) and Tigrawais form the biggest minority being, however, less than 4 percent of total population.

Debub Gondar Zone. Although there are more than thirty ethnicities living in this zone, their share is only less than ten percent of all population. The Tigrawais form the biggest minority group with population less than one thousand and living mainly in urban areas.

Semen Gondar Zone. Also in Semen Gondar Zone the Amharas form 90 percent of the population, but some of the other ethnicities (which amount to 45) such as Kemants (pop. 172286), Tigrawais (19550), Agews (13242), and Gumuz (3602) form clear ethnic minorities. One third of the Tigrawais live in rural areas as well as nearly all of the Kemants and the Gumuz.

Religion

One of the main socio-cultural features is a prevailing religion. In the Amhara Region clear majority (81%) of people are Christian Orthodox and nearly fifth (18%) are Muslims. Protestants form less than one percent. In urban areas the share of Muslims increase to 23 percent and the share of Orthodox people decreases to 76 percent. However, in this part of the region the share of Orthodox is higher than the regional average. In both Gondar zones Muslims form 4-5 percent and in Agew Awi 5.4 percent of population. In Mirab Gojam zone the share of Muslims is smallest 1.6 percent. The share of Muslims vary from woreda to woreda (for example in Dera one third of population are Muslims). In Gondar 16 percent and in Bahir Dar 11 percent of the population are Muslims, and for example in towns such as Hamusit and Enfranz more than half are Muslims.

Literacy rate

Urban literacy rates in the survey area in general are lower than the regional average except in Misrak Gojam, and especially in Bahir Dar where it is clearly higher for both men and women than average. The rates in rural areas are higher for men and a little lower for women than regional average (table 4, Appendix 9).

Migration

In the whole Amhara Region 10 percent of all population are migrants. Women are moving more than men (12.1%, 9.3% among women and men). Among urban population the share of migrants is much bigger, out of urban men 42 percent are migrants, out of women 44 percent.

Over half of the both sexes move within rural areas and more than 20 percent of migrants move from rural areas to the towns, women slightly more than men. Clearly less than ten percent move from urban areas to countryside and 14 percent move between towns (Table 5, Appendix 9).

Women are moving more than men in every zone. Some women change the place of origin due to the marriages (however, for the first marriages women seldom move out from their place of origin) and quite many after divorces (Table 6, Appendix 9).

Every fifth of the migrants have moved within less than two years before the national census (1994) in the whole region and in the zones along the road. In Debub Gondar and both Gojam zones slightly more than in average (Table 7, Appendix 9).

Future growth of the settlement/towns along the road

The population in Amhara region is estimated to grow by two million people by the year 2000 or 2.1 percent annually. However, the fertility rates, the population under 15 years of age are higher than regional average and it can be assumed that also the growth in this area will be bigger than the regional average.

The growth rate for urban areas is assumed to be 3.7 percent annually and in the rural areas 2.1. However, taken into consideration the migration to the towns in the survey area, the urban growth might easily be higher than projected. The new road is also anticipated to benefit the economic activities in the area, the fact that would pull more people to the towns. High fertility rates and high shares of population under 15 years of age in the survey area will put great pressure on the farming lands which will push out more people to the towns.

Urbanization in the survey area has totally depended on the present road and the trend will continue even without the upgrading of the road. However, good road will benefit to the living standards and increase economic activities through better transportation of people and goods.

4.4.2 Housing situation

In Amhara Region there are 2,985,268 housing units according to 1994 Population and Housing Census.

In urban areas of the Amhara Region nearly all houses are permanent (97%) and nearly half of the houses (46%) are attached with two or more housing units. Mainly due to the climatical (and partly ethnic and cultural) reasons the type and construction of houses vary in this region. Most houses/walls are traditionally built from wood and covered by mud/dung/teff mixture or thatch (89%), also stones (especially in the northern part of the road), bricks and blockets are used in urban areas (5%).

Also in the country side the walls are mainly constructed by wood and mud (78%) which is less than in towns while the stone with mud or cement, blockets, bricks are used more (12%). Ten percent of the houses are constructed from reed and bamboo or from wood and thatch.

There are mud floors in more than 90 percent of houses; only in Bahir Dar and Gondar towns other type of floors can be found in every fifth house.

Iron corrugated sheets or tin roofs are common roofing material in the towns, and increasingly used also in the countryside. In towns the houses are rectangular and the sheets easily fit that structure, while in the countryside houses are more often round and the sheets must be adjusted to the structure. The iron sheets are also showing the better economic situation due to its price compared to the traditional thatched roofs.

Most roofs in the survey area are from traditional materials such as thatch, wood and mud, and to a lesser extent of bamboo or reed. The corrugated iron sheets are more common in the southern part of the road and their share is decreasing when travelling the north. In Mirab Gojam half of the housing units but only 18 percent in Semen Gondar have tin roofs. In big towns such as Debre Marcos, Bahir Dar and Gondar most houses are covered by corrugated iron sheets (93, 85, and 92 percent respectively).

About 70 percent of the houses has only one room and 22 percent have two rooms. Average number of persons per room is 2.3 in urban areas and 3.4 in rural areas. In the woredas between Bahir Dar and Gondar in the rural areas one room is shared by from 4.2 to 4.4 persons. The ratio for urban areas is less than for countryside but clearly more than ratio between Debre Markos and Bahir Dar being 2.6 to 3.0.

Bathing facilities

In the urban areas the bathing facilities are available only to 2-3 percent of all housing units. People bathe themselves taking water from the taps where available or by rivers, ponds and lakes.

Toilet facilities

Very few people have any toilet facilities in rural areas. In the towns the share of toilets is decreasing when going towards north. Debre Markos has the highest share of housing units with toilet facilities (65%) the average for Gojams being 38-39 percent, in Agew Awi 47 percent and especially for Dangla woreda 71 percent. In Bahir Dar the percentage is 46 and in southern Gondar 32 and northern Gondar 27 percent of units have these facilities, except in Gondar where facilities are available to half of the units .

Electricity for lighting

By zones the electricity for lighting is available in the towns to from 53 to 55 percent of housing units except in Misrak Gojam Zone where only 42 of housing units can use electricity for lighting. In Debre Markos, however, the share goes up to 80 percent.

In Enjibara town, the capital of Agew Awi Zone, only 15 percent have electricity and respective share for Dangla is 91 percent. In Gondar and Bahir Dar the shares are 88 and 84 percent, respectively.

In many towns there are some street lights and shops and bars might have lights during the night. The increased used of street lighting would make the road safer for pedestrians. The high price of electricity is, however, discouraging even their present use.

Availability of TV, radio and telephone

The availability of television is still very rare in the survey area. Only in Gondar 6 percent and both in Bahir Dar and Debre Markos 4.4 percent of household units have a set. Radio is more common: in the rural areas about five percent of households have a set and in towns about every third household has a radio (Table 8, Appendix 9).

Every Monday morning there is a half an hour long radio program about traffic and traffic safety. The program is prepared by the Ministry of Information and Culture in collaboration with the Road Transport Authority. The program was earlier transmitted between 6.30 -7.00 but now it is sent after the 8.00 news. Due to the change of transmission time many people are now unable to listen it, because they are already working at that time in the offices or children attending school etc. The earlier time reached more people. However, more than a half of housing units in most towns and quite a considerable number of rural people are potential listeners in the survey area.

Now there are no programs in TV concerned about traffic problems/ education/ behaviour.
Ownership and cost of houses. About half of the houses in the towns are owned by the households living in them. With the increasing size of a town the share of owners go down. In Gondar 41 percent and in Bahir Dar 44 percent of households own the house they live in. The share of kebele owned houses is also big in these towns.

The wood and mud houses cost about 800 birr per square meter and the hollow block houses about 1200 birr per square meter. The transportation costs for cement add the costs with about 30 percent. Also the (eucalyptus) poles used to the mud houses are getting more expensive and must be transported sometimes long distances as well.

Rents. The average monthly rent per housing unit for the whole region is Birr 17 per month. The rents, however, varies a lot in the survey area (Appendix 9, Table 9). Highest average monthly rents, 35 birr are paid in Kosober, where there is also the highest share of tenants of private households (45%). Also in Bahir Dar the rents are high, 31 birr, and one third of the houses are rented from the private households. Both these towns are expanding rapidly. The biggest share of kebele owned houses can be found in Injibara, where half of the housing units are such. Injibara is very small town with the population less than one thousand but as a zonal capital will expand (Table 9, Appendix9).

Type of fuel used for cooking

Nearly all households are using more than one type of fuel for cooking (Table 10, Appendix 9). By far the most common fuel is still fire wood and leaves, which are more or less the only fuels in the countryside but also in the urban areas where, however, also some other fuels are used by few households. Urban households prefer charcoal due to its smokelessness; about half of the households use it. The share of electricity (used mainly by electric metads for injera baking) is negligible. Only in Bahir Dar, Debre Marcos and Gondar the share goes over one percent (being 4, 2, 2 percent, respectively). The use of kerosine reaches 2 percent in Bahir Dar, 1.7 in Debre Marcos and 1 in Woreta, in other towns it is less than one per cent. Also dung is used for cooking.

Growing population and increasing urbanization along the road will increase the use of fire wood and will have a clear impact on the natural habitat along the road. The increase in

use of alternative fuels is too slow to slow down the share of fire wood (partly due to the increased price of electricity and now non-subsidised kerosine). However, in general the use of fuel wood increases with the modern fuels which are not substituting wood.

The road is used to fuel wood transportation by different means. Mainly women but also animals carrying the wood loads to the markets or home is a common sight in the survey area. The future construction camps and their need for fuel will put more pressure to the trees and forests in the area.

Drinking water

Majority of people get their drinking water from the unprotected springs, rivers, ponds and lakes. More people in the zones in the survey area are using unprotected water sources than what is the regional average. However, along the road there is no shortage of water due to the many rivers and springs. The possible accidents with the hazardous materials/chemicals on the road/bridges might cause the spoiling of water on which many people might be dependant on.

In most of the towns the drinking water is supplied from boreholes, but is inadequate as in Bahir Dar and Gondar. However, in both places new water supply systems are under way.

4.4.3 Local economic activities by the road

Agriculture In the whole survey area agriculture is the main economic activity. The farm sizes are small and the crop farming is mainly subsistent farming based in the traditional farming methods. There are some irrigated farms such as Birr State farm south of Mankusa where mainly maize is grown and sun flower as a rotation plant. South of Tana Lake is Tana Belez irrigation project about to start.

The main subsistence crops in this area are teff, maize, sorghum, wheat, barley in a higher altitudes, oil seeds including *nug*, peas and beans, *kesho* (short of hops). In the southern part of the road also *ensete* or false banana is cultivated. While in the further south it is an important food crop, here it is grown mainly for its leaves which are sold to be used like "aluminum folio" paper to bake bread.

Animal husbandry

Most cattle in the survey area is needed for the crop farming system in the whole survey area. Also ensete farming requires cattle but less than crop farming. The areas where the fields are very small, over exploited or unsuitable for crops the share of cattle is bigger (especially in Debub Gondar). Goats and sheep are commonly raised also in this area. Animals are walking on the road when they are taken to drinking places or to markets or to the compounds for night. In the survey area more than half (50-77%) of the households keep their livestock inside the house/room where also people sleep. Only in Semen Gondar the share is one third. Partly this is due to thefts and in colder areas due to the cold weather. During the flooding in Fogera Plain all livestock is residing on the road.

Industry

In big towns there are many small industrial enterprises such as garages, different workshops etc. while bigger industry is located in Gondar and Bahir Dar. In Gondar there are a soft drink factory and cotton gin mill and in Bahir Dar there are a textile factory and an edible oil factory. Smaller nug oil pressure enterprises are common along the whole road. Tourist industry is increasing rapidly especially in Bahir Dar and Gondar area. The better road will still increase this growth.

Service sector is considerable especially in the towns where it serves mainly local needs and road is vital in transporting goods to its use. The road is also important to the industrial sector when transporting raw materials to its service and ready made products to other localities.

Big hotels serving tourists can be found in Bahir Dar and Gondar where also international airport is under construction. Small hotels, restaurants and bars exist in every town along the road serving not only local people but also transitory traffic. These activities are extremely important to women who are running these businesses. Since many of these women are sole supporters of their families (over 40 percent of urban families are female headed) many more are dependant on these activities. The towns are also served by many women who are carrying fuel and other necessities to the markets.

Economically active population and unemployment

The activity rate for the whole region is 88 for men and 73 for women. Nearly all rural people are economically active, although mainly engaged in the farming with many subsistence like characters. The economic activity in urban areas is smaller and especially so among women. In Bahir Dar it is as low as 56 for men and 45 for women and exceeds the average only in Debeb Gondar where 91 percent of men and 85 women are economically active (Table 11, Appendix 9).

In rural areas women work mainly as unpaid family workers in farm production while in urban areas the domestic reproductive tasks are not statistically counted as 'productive'.

Unemployment is quite low in the rural areas of the region but higher in the towns. Especially in big towns the rates are higher: in Debre Marcos 19 percent of men and 20 percent of women are unemployed. The respective shares for Bahir Dar and Gondar are 14 (18) and 18 (17) percent (Table 11, Appendix 9).

There will be no problems to hire the unskilled labour to the road construction project.

Status in employment

The information about the status of employment or major industrial divisions are not available separately for the zones. However, it is assumed that the regional shares give some kind of idea about the situation also in the zones which all include also towns with more than ten thousand people (Tables 12 and 13, Appendix 9)..

More than 90 percent of economically active people are either self employed or unpaid family worker which is also most common employment status to women. Although public

sector is very small and less than a percent, the share of women among the employees is quite considerable.

Economically active population ten years and over by sex and major industrial divisions in Amhara Region (total) is shown in Table 14, Appendix 9.

4.4.4 Social acceptability of the project

Social acceptability of the project to rehabilitate/ upgrade the present road is very high. All people and organizations interviewed gave a clear acceptance to the upgrading project. The only concerns are related to the construction period.

Both the people living by the road and those using the road for transportation/ transitory traffic see the road to be vital and beneficial to their communities, local business and national economy. The pavement project is anticipated to increase the benefits. The project will free the people from the present dust problem caused by the present gravel road.

Benefits for the local residents

Although the road is mainly constructed to connect/link the far away places for transportation of goods and people, most road users are pedestrians who use the road very locally. For them the access on many local facilities and services is more important than long distance mobility. Road is extensively used for local social and economic activities as well as for local transportation needs, very often by traditional means.

The road gives better access on health and education facilities and other services and to the administrative centers. The buildings for these institutions are usually by the road due to the accessibility by motor vehicles.

The better road helps especially women because they are the main local users of the road. They take care of many social tasks (such as sickness in their own family or death occurrence in some other), also during the night times and better road is seen to be also safer road. Many women move to the relatives or familiar families who live by the road for better and quicker access to the clinics for delivery. The school attendance by girls is also bigger in towns and by the road, and better road is anticipated to increase enrollment.

The road is important to the local economic activities. The road makes commercial activities possible/profitable for the permanent shops and bars and creating the road side trade and markets. Many people come from the far away villages to the towns and market places or simply to the road side to sell/barter whatever they have. Charcoal, fuel wood, animals, grain, *katikala*, vegetables, *nug*-oil, or whatever people have to sell.

One of the justifications to upgrade the road is the assumption that the agricultural production would increase due to the better marketing outlets. Already now the road is important for agricultural inputs such as fertilizers, pesticides etc. and outputs for transporting the farm products such as grain, etc. to the other areas. Especially the present and future planned irrigation plantations need road to bring their products to the national markets.

The benefits are felt to be much bigger than the problems. For example, people living in the Fogera Plain would not like the road to be removed from its present location although they have to leave their homes and fields during the rainy reason due to flooding.

The proper pavement would bring also minibuses to the road serving local transportation and making the travel fees cheaper.

Benefits for the transitory traffic The acceptance of the present road itself by those who use it for transitory traffic and/or for long distance transportation is natural, and the plan to pave the road was very much welcomed.

The road is important link to the towns such as Humera, Metema and Bumbadi by the Sudanese border and bringing agricultural products from these areas to the towns in the survey area. It is also anticipated that these areas will receive more people from the other parts of the country and the road is vital to their economic activities.

The tourism is increasing in the survey area and it is anticipated to increase if the road is paved.

Problems with the present road

Dust is one the biggest problems for the locals and for the drivers. With the better roads accidents due to the dust are expected to decrease. Flooding in Fogera Plains force people to move out from the area during the rainy season.

4.4.5 Construction camps

Construction camps are one of the characteristic features of any road construction project. Although not yet present on this road, but once established, the camps will have several impacts on the surrounding environment of the camps. Many of the previous camps have with time developed into real towns.

Earlier the camps were simply called 'ERA camps', most construction work done particularly for the last two decades by ERA. According to the FDRE's policy, the construction work is mainly done by private contractors and is open also to foreign tenders. However, no big changes are to be expected in the camp practice; new construction camps follow more or less the previous ERA camp models and practices. Changes may be expected in the (decreased) number of workers residing in the camps.

The camps are situated usually outside the towns and often (sometimes kilometers) away from the existing roads. Although ERA has the right to occupy any site for road construction sites (suitability of place, rents etc) are discussed and agreed together with the local administration.

The first persons to arrive to the site are carpenters, masons etc. who start the construction of the camp. They first stay on perdiem basis in the towns near the camp site. When the offices, residences, ware houses, main workshops, kitchen and mess-hall and all other required buildings are ready, the construction labour move in.

There are normally 150-250 people residing in the main camp. All of them are professional and skilled workers and move from outside to the camp. The personnel include technical as well as clerical staff. The camps themselves turn out to be like small towns which are headed by a Camp Administrator. The rules and habits in the camp are mainly to keep discipline and order. For example, no alcohol is allowed in the camps. Neither are the families of the workers allowed to stay overnight in the camps.

It is also more economical way to lodge all the workers in one place than have dispersed lodging in the surrounding area. The kitchen serves all staff at the fixed times. Most food items such as meat, grain, vegetables, etc. is bought from local markets to the camp kitchen. Sometimes bigger quantities of items either not locally available or due to the increased local prices, are bought and transported with trucks from the nearby bigger towns. Fire wood is sometimes bought from the construction site if the site is situated in bushy land or it is bought from local markets.

The fact that all workers live in the camp makes it also easy to transport them to the construction sites in time and back to the camp. The workers usually stay in the camp one month and every fourth week-end they are taken to the town for *asbesa*/shopping week-end. The local economies benefit from these visits, but social and personal conflicts are also common.

Although the camp administration does not allow temporary huts and houses to come too close to the camp to avoid looting or other misbehaviour, drinking houses and small markets sprout up selling whatever is wanted by the construction workers.

Because of the increased demand on goods and services many people settle down near the camp to do their business. Many of them are without any farmlands and some of them stay even after the camp is demobilized.

The camps have also impacts on the physical environment. The increased need for fire wood and charcoal rises also local prices and more trees are cut down to be sold and even more wood is wasted to produce charcoal with inefficient local methods. The supply area might be considerable especially along this road because of absence of real forests. Not only the camp workers but also other people residing near need fuel wood and other sources. The inflation of prices do temporarily benefit business people while at the same time the poorer sections of the communities will suffer even more.

The people who settle down are also putting some pressure to the local public services. The drinking water situation might be difficult in some places, and the boreholes are needed to construction camps. The location of boreholes should be such that they can later benefit the local people.

Although the camps have their own health units for minor health hazards, the more serious cases or cases not belonging to the camp sanitarians, the workers and migrants put also pressure to the local health services.

These impacts are directly felt only so long as the camp exist. The main camp will stay for one or two years at the same place, while the 'advance camps' will be established maybe after 60-100 kilometers away. Sometimes there are also smaller 'satellite camps' if needed.

The contractor is responsible to see that the living conditions for the camp residents are kept satisfactory. "Labour Proclamation No. 42/1993" covers the conditions of work including aspects such as hours of work, wage, leave, payment due to dismissal, workers health and safety, compensation to victims of employment injury, dismissal because of redundancy, grievance procedures and any other similar matters. It states also that worker or employer shall have the right to establish and form trade unions or employers' associations.

Earlier it was ERA that supervised the conditions in the camps (or in construction), now it will be left mainly to the consultants.

Use of local and foreign labour

The Ministry of Labour and Social Affairs is empowered to ensure that local labour is hired in accordance with the law. The local labour consists about 300-400 workers. Only men were hired earlier for the work, nowadays also women take part also on road construction work.

Since the trunk road construction will be open to the international tender, some foreigners may enter the construction work. In this case the Ministry of Labour issues work permits for foreign workers upon the request by the contracting authority.

Wages and salaries

The level of wages paid by public and private construction enterprises differ significantly. However, the constructor upgrading/rehabilitating the road is required to pay at least the minimum wage to unskilled workers. If the employer is not doing that the workers can complain about this or from other shortcomings to trade unions. For example, unskilled labourers' wage levels vary a lot depending on the locality etc. The wages for unskilled labour vary between 1.3 to 2.5 and for skilled workers between 8.30 to 20.80 Birr.

The permanent workers are legally entitled to paid leave: (i) annual leave not less than fourteen working days during the fist year and added annually by one day. (ii) thirteen days for public holidays annually, (iii) for the family reasons such as marriage or death paid leave for three days (possibility for unpaid leave during serious other events), (iv) sick leave not exceeding six months, (v) maternity leave is granted for a period of thirty days preceding the presumed date of confinement and sixty days after it.

Benefits in kind include accommodation, food transport and expenses related to transfer. These benefits are not considered as wages, according to the labour proclamation. Details of benefits are normally specified in collective agreements.

5. POTENTIAL ENVIRONMENTAL IMPACTS

The construction and operation of the Debre Markos - Bahir Dar - Gondar road project intended with positive impacts on regional as well as national economy may also bring avoidable as well as unavoidable adverse impacts on the environment as well. However some of the adverse effects, associated with the construction of the project, will be short-term and reversible nature and stem from ground disturbance associated with operating the quarry and borrow sites, operation of equipment's and housing of the labour force, but very few that will lead to permanent change. Tables 5-1 and 5-2 summarise some potential constraints identified for the proposed quarry and construction material sites. The locations and quantities are based on the engineering designs and the constraints on the field observations and interviews.

The potential environmental impacts likely to result from the proposed road project are evaluated based on data collected from field investigations and available information reported in the literature and visits made to different Government offices and public consultation.

5.1 Physical Environment

5.1.1 Soil and Erosion

The major adverse impacts during construction stages are erosion, stability of slopes, material use, change in surface water hydrology and quality and sedimentation/siltation.

Erosion

Road side ditches which are constructed to divert surface drainage water to the adjacent lands are major contributors to soil erosion. Erosion can be enhanced due to the following activities especially on hilly terrain due to:

- Cuts in soil and rock and construction of embankment (widening of the road).
- Borrow pits and quarries if they are located along river banks.
- Excavation of foundations for replacement and /or additional deranges bridges and culverts.
- Not compacted embankments and spoiled materials.

Slope stability

Clearing and grabbing by earth equipment and blasting of rocks for road widening will affect the slope stability.

Soil contamination by spills of hazardous material

Soil contamination by spills of oils and fuels from engines , improper disposal of used oil, lubricants and others, and accidental spills of hazardous materials due to accidents caused by increased traffic for construction

Table 5-1 Constraints of the Proposed Quarry Sites

Inspected Borrow Pit Location (km)	Constraints				
	Quantity Available (M^3)	Agricultural land Affected	Vegetation Clearing Required	Private Property Affected	Access
LHS-26+600-27-700	In-exhaustible	Minor effect	bush land and grazing	no effect	not required
LHS-44-700	In-exhaustible	no effect	minor Grazing land but very steep slope	no effect	not required
L&RHS 68+400	35000	no effect	minor Grazing land but very steep slope	no effect	not required
L&RHS81+900-82+700	50000	no effect	minor Grazing and bush land	no effect	not required
LHS 211+700	80000	potential minor effect	no effect	no effect	not required
LHS 260+700	In-exhaustible	no effect	no effect	no effect	not required
L&RHS267+400	50000	major effect due to access road	no effect	no effect	required
RHS 278+100	8000	major effect due to QD and access road	no effect	no effect	required
RHS 288+600	13500	potential effect	minor	300m away from a church	not required
RHS 364+400	28500	potential effect	isolated trees	no effect	not required
RHS 368+600	100000	potential effect	minor	no effect	not required
RHS 374+900	40000	potential minor effect	minor	350 m away a church and houses	not required

Table 5-2 Constraints of the Proposed Subbase Material Sources

Inspected Borrow Pit Location (km)	Constraints				
	Quantity Available (M^3)	Agricultural land Affected	Vegetation Clearing Required	Private Property Affected	Access
LHS16+300^E	54000	no effect	no effect	no effect	0.5km
LHS 44+700^E	In-exhaustible	no effect	minor on grazing land	no effect	Not required
RHS 124+500^E	40000	No Effect	Forest area	No Effect	800m
RHS 129+300^E	19000	No Effect	Grazing area	Close to Residential Houses and a church	250m
LHS 142+500^o	17500	On Agri-land	Grazing land	No Effect	Not required

RHS 145+100 E	71000	No Effect	Grazing land	Close to residential houses	100m
RHS 173+600 E	65600	No Effect	Grazing land	No Effect	200m
LHS 187+900 E	30000	No Effect	No Effect	No Effect	Not required
LHS 253+700 E	15000	No Effect	No Effect	No Effect	Not required
LHS 254+200 E	30000	No Effect	No Effect	No Effect	Not required
RHS 291+100 N	12000	potential	Grazing land	No Effect	100m
RHS 350+200 E	22500	No Effect	No Effect	Church within 200m	
LHS 361+700 E	52000	no effect	Tara gedam Protected forest area	No effect	not required
LHS 382+100 E	13000	No Effect	Grazing land	crh	100m
RHS 384+000 N	45000	moderate	No Effect	6 houses and 200m away from Infranze town	Not required
RHS 394+200 N	22000	moderate	No Effect	residential houses will be affected	Not required
RHS 396+900 N	130000	moderate	Grazing land	No Effect	200m
RHS 399+700 E	80000	No Effect	No Effect	No Effect	Not required
RHS 409+200 N	62000	No Effect	Grazing land	No Effect	Not required
RHS 411+900 N	40000	moderate	No Effect	No Effect	150m
RHS 415+200 N	25000	moderate	No Effect	No Effect	150m
RHS 418+600 E	In-exhaustible	No Effect	bush land	No Effect	50m
LHS 430+200 E	In-exhaustible	No Effect	No Effect	Close to residential houses	Not required

Legend: E - Existing sub-base material sites
N - New sub-base material sites

5.1.2 Hydrological conditions and water quality

Water resources and water quality

Along he road there are numerous perennial rivers with high discharges even in the dry period of the year. Therefore, there would be no problem of water for construction .

Replacement and/or construction of additional drainage will cause the following adverse impact:

- Cement slag , oil spill hazard (especially during dry season minimum flow).
- Temporary cut of flow will cause change in the regime of flow which affects the water quality (increased turbidity), and (increased velocity) or increased scouring.

The principal effects of the construction work will be to increase sediment loading temporarily to the nearby rivers and streams. However, sediment concentrations and loads naturally vary over a large range during the year. As a result, aquatic communities in the rivers are adopted to high sediment loading. The risk of damage to the aquatic ecology is confined only to lake Tana, where there are habitats for potential receptors, but this risk is considered to be not significant and temporary.

Additional risk to the aquatic environment arises from the accidental spillage of pollutants, particularly diesel fuel, lubricants and chemicals, which can cause extensive long term contamination of the Lake Tana and the perennial rivers found along the project road.

5.1.3 Nuisance Noise

Excessive noise levels from operations of construction equipment and vehicles will cause disturbance to local residents living in the vicinity of the construction activity. Noise generated from the quarry and borrow pit sites will be an annoyance to only those few residents living near the sites as well as the construction labor force.

Sub-base material site at chainage 384+000 is only about 200m away from Infranze town, chainage 382+100, 394+200 and 430+200 are located close to a town and a village. The site at chainage 129+300 and 352+200 are also about 200m away from churches.

Noise is generally not considered as a major nuisance by the people. However, noise sensitive areas such as schools, hospitals, residental areas shall be considered during road construction.

Noise disturbance affects wildlife also and should be considered in protected areas.

5.1.4 Air Quality

There is no air quality information available in the project area. The large number of vehicles in towns create health risks through their engine and exhaust emissions. However, traffic emissions are not seen as a problem by local people.

The major effects on air quality during the road construction would be an increase in suspended particles from blasting, excavation and quarrying as well as movement of heavy machinery, trucks and trailers over unpaved roads and the dust caused when all traffic is directed to unpaved detours. Many of these operations will take place in locations away from the towns and settlement areas.

5.2 Natural Environment and Biodiversity

5.2.1 Loss of terrestrial vegetation

The impact on natural vegetation would be associated with operating the quarry and borrow areas, and constructing detour and access road to the borrow material pits and quarry sites.

Except the Tara Gedam Protected Forest Area, there are no other significant areas of natural or semi-natural forest all along the project area. The subbase material source at chainage 361+700 is within this protected area and quarry site at chainage 364+400 and subbase material site at 350+200 have the potential to affect tree plantation. The base material at chainage 124+500 is within a plantation forest area.

5.2.2 Destruction of wildlife habitat and impediment to movement of wildlife

The proposed road upgrading project is on the one that is already exists and there are no major wildlife communities in the project area that will be affected by the construction activities.

5.2.3 Encroachment into ecologically sensitive areas

The project component do not involve any fresh encroachment into terrestrial ecological interest and nature reserves.

5.3 Human and Social Environment: Social Issues

The following issues/concerns are all related to the present road and to the anticipated project to upgrade it. The issues/concerns described here were expressed by interviewed local people by the road. Issues/concerns also include direct observation by the consultants and available/relevant literature on the area and the road project.

5.3.1 Social acceptability

Social acceptability of the project is high among the local people and among all those engaged in transitory traffic. The new project to asphalt the present road was seen minimizing the present problems and increasing the benefits. The only worries were related to the use of road during its construction.

It was also seen and admitted by all that development of the road system entails damages but if mitigation plan is integrated to the planning the problems can be minimized.

5.3.2 Resettlement/displacement of people

There seem to be no need to displace people by the present road due to the road upgrading project. The detours, camp, borrow and quarry sites required for the construction can be selected in a way to avoid displacement. There will not be any need for resettlement.

5.3.3 Demographic changes

There will be no dramatical changes in demography in the project area due to the project. The population growth continue and more people move to the towns. This trend will continue with and without the project.

5.3.4 Change in way of life

The changes due to the upgrading of the present road will not have any dramatical impacts to the people's present life. With better and faster road also services will be improved, more imported, new and cheaper goods will be available raising maybe the standard of living but not the way of living. The electricity often follows the road and change the way of life in many aspects, but also electricity has been introduced to the study area already with the old road.

With the better road public transportation possibilities increase, especially private minibuses and taxis are expected to appear also on this road once asphalted, and the travel costs to decrease. Increased mobility is slightly changing also the way of life.

5.3.5 Impacts on women

Since the road has existed for years the upgrading project will not have any radical impacts on women. However, asphalted road with better shoulders and drainage and without dust will make it easier, more comfortable and safer for the rural people to use the road as pedestrians and/or for local transportation of goods/products. All local people benefit but especially women, who are the main users of the road as pedestrians. The use of better road during night time will be safer especially to women.

The shops and bars along the road are run by women. With the better and safer stopping places for cars/trucks/busses would also increase these income generating activities.

With the better asphalted road small (private) busses appear to these roads. The travel costs are less than what regular (long distance) busses charge. Lots of social travel obligations would be easier by them. However, many women would still walk some hours twice a week to markets to sell their (mainly agricultural) products. The profits are so low, if any, that even 50 cents will make it difficult for many to afford even this. Due to the big volumes such as fuel bundles many women have to continue to walk to the towns and market places.

With the better road the health and educational facilities can be reached quicker and safer. The better road may encourage the parents to send also the daughters to schools. Also the maternity services are reached easier.

During the construction period there will be more women engaged in income-generating activities running the restaurants and bars, or selling fuel wood or other local products to the camp workers. These activities will benefit mainly women who are very often the sole supporters of their families. On the other hand, the increased local prices also affect especially women who are often worse-off than men.

Due to the construction camps women are also posed to increased risk of sexually transmitted diseases and unwanted pregnancies.

5.3.6 Impacts on indigenous peoples

This area is traditional Amhara area and there are many other 'traditional' ethnicities such as the Agews who have their own zone. Many other ethnicities which are not big in number have been living in this area for a long time. The road is not bringing any new or different impacts on these people. They will be served by the road in the same manner as it serves Amharas.

5.3.7 Induced development

Maybe one of the most common example about the induced development due to the Road construction is the fact that ERA camps which are meant for temporary use, turn out to be permanently settled and sometimes they develop into real towns (The similar development can be found with the previous checking points or *kellas*.)

When the ERA camp has been established, 150-250 workers will move in. The camp offers income-generating possibilities to the local people during the construction period which might last from one to two years. Many people settle down near the camp to trade and offer their services: food, talla, katikala or other drinks, chat, fuel wood or whatever is needed and bought by camp workers.

Increased demand inflate the local prices. The people engaged in business by the camp will benefit while those local people who are dependant on the same purchases will suffer in the form of increased prices. Although the impacts will be felt only during the construction period the increased demand of goods and services and higher prices will affect some individuals and families to migrate and settle down near the camp sites for their business. Most of these people are landless and some will stay after the camp has been demobilized.

People who are moving near the camp to do any business may rent land from the local kebeles or PAs and build their own houses. Some of them will settle down illegally without any registration by the local administration.

The camp needs quite a lot of fuel wood which is bought from the local markets or sometimes from the people coming to the camp to sell it.

5.3.8 Conflicts between locals and immigrants

The arrival of 150-250 workers, mainly men, to the construction camps will have several impacts to the local communities. In general the camps are well accepted due to the 300-400 semi-skilled or daily labour employment possibilities to the local people. Skilled labour would come from outside and reside in the camp while locally hired labour will not.

No bad conflicts are to be expected between/among camp workers, local workers and local residents. However, occasional and personal conflicts will be expected due to many reasons, often due to drinking. Also the more cash available among the migrant workers might cause personal conflicts. The more cash might inflate also local prices and cause bad feelings in the local population. Especially already worse-off people would be affected negatively. However, also inflation will be temporary.
Usually the workers stay in the camp for three weeks at a time and during the fourth week-end the whole staff is taken to the near by town for *asbesa/* shopping week-end.

The families are not allowed to stay in the construction camps and the relations between construction workers and local women are common during the construction period. Due to the dislike about condoms among Ethiopian men the occurrence of veneral diseases might increase also among the local population. Many temporary relations result in pregnancies and 'milk payment' court cases increase.

5.4 Economic Issues

5.4.1 Loss of agricultural lands

Although not large in area, the construction activities will cause temporary loss of agricultural land to farming families during the length of the construction activities due to the extraction of sub-base material at chainage 142+500, 284+600, 291+100, 384+000, 394+200, 396+900, 411+900, and 415+200 and quarry development at 26+600, 27+700, 211+700, 267+400, 278+100, 288+600, 364+400, 368+600, and 374+900 construction of access road to these sites, land required for detour and working area.

5.4.2 Loss of grazing land

There will be no permanent losses of grazing lands. However, the detour and construction of the access road to the quarry and subbase material sites at chainage 26+600, 44+700, 68+400, 81+900, 129+300, 142+500, 145+100, 291+100, 382+100, 396+900, 409+200 will affect grazing land. The greater part of the required grazing land is for communal use. The land to be taken is small, therefore, this loss will not result either directly or indirectly in significant changes to the pattern or location of traditional grazing territories.

5.4.3 Loss of property

Residential and/or other buildings. There is no need to remove buildings along the project road. However, the sub-base material site at chainage 129+300, 145+100, 350+200, 382+100, 394+200, and 430+200 are located very close to residential houses and the site at chainage 384+000 may affect about 6 residential houses if required quarry area is wide.

Crops and trees. There will be temporary losses of agricultural land (for detours, ERA camps, storage sites, asphalt plants etc.) In this case the compensation is based on the value of the lost crop for one or two years depending on the time detour is used.

There are no forests by the road but some new cultivated groups of trees, more in the southern part of the road, where some trees may be affected.

5.4.4 Employment opportunities

Due to high unemployment rates in the towns people along the road wait for the construction work to start due to the anticipated/expected employment possibilities.

The road construction employs 150-250 people who resides in the camps. Besides these some 300-400 daily labourers will be hired locally for construction work. Previously only men were hired but now also women participate in road construction work. Some local people will also be hired locally for the camps as cooks and cleaners, some of them women.

If the availability of the modern machinery and equipment will increase with new (foreign) contractors the share of local labour might decrease, despite the labour-intensive policy recommended in the RSDP. However, along this road local daily labour will be needed especially in many erosion prone places to level out the worst erosion which would affect the road.

Outside the construction work there will be other economic activities due to the construction camp and demand of different products and services by the construction workers. Most of these activities would be run by women.

5.4.5 Change in economic activities

There will be no significant changes in the economic activities in the settlements due to the road upgrading project. The road construction will, however, create more opportunities to economic activities which are already available: more services, more sales etc. than create new type of work.

Most of this increase in quantity will be temporary by nature, but some may turn out to be permanent even after the camp has been demobilized.

5.4.6 Effects on public and private services

During the construction period the construction camps might overload the public services, mainly in the health sector, since in the camps only first aid in case of accidents can be given. Demand on the private services will increase, benefitting the local community. These impacts are temporary.

The longer lasting impacts will be on the public transportation, which will be improved, since with the better and paved road mainly private minibuses will appear on the road, as they do in the other parts of the country after pavement. Due to their lower prices more people would use them than what people now use long distance busses.

It is also anticipated that more youngsters would enroll to the school or go on to the higher grades due to the better transportation. This effect might be more beneficial to the girls than boys. However, if this happens in a large scale this might put a pressure to the educational institutions. However, better road only gives this possibility, there are so many other reasons why this opportunity will not be used.

The water resources as well as fuel needs will increase during the construction period. The location of the camps must be such as not to put any extra burden to the local resources.

5.4.7 Impacts on national economy

This is an important trunk road connecting Addis Ababa and the northern and north-western parts of the country to the Sudanese and Eritrean borders.

Setit Plain is very fertile land and there are few big plantations mainly for oil plants and also cotton. The whole area has a big agricultural potential to turn out to be one of the granaries for the whole country. The present project road will be an important part of the transportation channel between this area and the center of the country. The agro-industry already using the products are situated in Gondar (cotton gin) and in Bahir Dar (edible oil factory), both in the survey area.

Also east of Tana Lake the lands are fertile and with good irrigation possibilities. These areas and Birr State Farm are connected through this road to the towns in the other part of the country.

For the transportation of the ready products or raw materials there are no other alternatives than this road. There are flight connections from Addis to Debre Markos, Bahir Dar and Gondar (where also an international airport is under construction), but these will also in the future serve mainly passengers.

The improved road will have impacts on tourism which is expected to increase. Also foreign tourists are interested in the historical and cultural sites, many of which are reached from this road. The road from Merawi to Hamusit is rated as one of the scenic routes in the country. Foreigners are also interested in the country's unique natural environment. The birdwatchers to Lake Tana have already discovered its uniqueness. The foreign currency reserve is expected to grow with the increasing tourism and offer employment possibilities in this sector.

5.5 Human and Social Environment: Other Issues

5.5.1 Cultural, religious and historical areas

This road is one of the most interesting historical roads in the country and there are many valuable cultural and historical monuments and sites in the vicinity of the road, and in the towns through which the road goes. However, none of these monuments, places or sites will be directly affected by the upgrading project.

The improved road make it easier to the tourists to reach these places. Even if the money they bring is valued, there should be plans already from the beginning to handle the tourist business with the controlled manner. Such as parking places could be negotiated with the authorities of these places.

5.5.2 Health and sanitary issues

The pavement of the road benefits people, who now suffer from the dust, which is also one of the additional reasons to common respiratory diseases and trachoma. People do not

complain very much of the other type of air pollution, and the release of harmful emissions need some other measures to be decreased (such as better car condition inspection etc.).

ERA camps have also easily different health risks. Due to the crowded lodging contagious diseases may cause epidemics, especially in malaria prone areas.

Many of the existing sub-base material sites specially at chainage 430+200 have been a suitable ecology for mosquito breeding sites.

There will also be a risk to the construction workers themselves of contracting malaria and other diseases endemic to the area and risk to the public from blasting activities associated with quarry activities and diversion road construction.

Due to the relations between the locals and camp workers, also occurrence of veneral diseases may increase among the local population.

5.5.3 Road safety

Many reasons contribute to weak traffic/road safety on the road. Dust and high speed are said to be the biggest reasons for the accidents. Animals on the road are causing many accidents.

Due to the bad road condition all cars can not speed but occasionally. However, when the road will be asphalted, the used speeds will get higher. The speed will cause more accidents, while the accidents caused by the dust will decrease.

Better inspection of car condition could diminish some accidents (but this belongs to the other authorities, not ERA). The traffic police already now inspects overloads and over speeds. After the creation of the Road Fund the fines will go to this fund instead of the Treasure, and fund money will be used also for better road safety activities. These activities should also include traffic education.

5.5.4 Public consultations

Public consultations give to the decision makers environmental data, understanding of likely impacts and information of individual and community preferences as well as possible project alternatives, which can be used to avoid or mitigate negative impacts of the proposed project.

Problems during the construction can be mitigated by establishing local committees with the local knowledge of the physical, social and economic environment. The committee should represent different stakeholders. Although the committee was seen to be very necessary especially for compensation issues/concerns, it could also guide in other local issues. For example, local knowledge was felt to be necessary in the cases such as identifying quarry sites, detours and other construction sites before they are selected and decided by the consultant. Local knowledge would minimize the negative impacts.

6. ANALYSIS OF ALTERNATIVES

The upgrading of this road to the proposed standard compared to the "zero alternative" (no project) is environmentally more sound solution. The benefits can be justified by the following environmental and safety points:

- through upgrading, the erosion problems due to the low standard of the road will be mitigated

- the new pavements will tremendously reduce the dust and thereby the amount of accidents caused by dust which blocks the visibility from drivers and pedestrians will be diminished; reduced dust problem improves the living standards and health status especially in the towns

- during the rainy season the paved road will not be as slippery as the present gravel road

- it is environmentally friendly that vehicles stay in better condition due to improved road surface

- in the Fogera Plain between Hamusit and Addis Zemen there is flooding of Tana Lake, for which the road has a damming effect; the situtation will be improved by the present designs through culverts (which help the water to recede on time for the farmers to proceed on their jobs)

Furthermore, the road improvement plans are well accepted by the people residing along the road as well as by the people engaged in the transitory traffic.

The adverse impacts of the proposed road improvement are mainly related to the construction period and therefore temporary. These impacts are small compared to the positive economic and environmental benefits of the road rehabilitation. Even the impacts would be minimized by including the technical, operational and phasing procedures in the tender document for the contractor.

7 MITIGATION MANAGEMENT PLAN

The potential negative impacts have been identified and discussed in Chapter 5 and the recommended mitigation measures that should be adopted to avoid or minimise potential adverse impacts are discussed in this chapter, following the same categorization (and numbering) as in Chapter 5. Some of the measures involve good engineering practices while others are viewed from human and social angle. The table in the end of this Chapter 7 provides a summary of the mitigation plan, the organisation responsible for their implementation and cost estimates.

7.1 Physical Environment

7.1.1 Soil and erosion

The bidding document for construction should include technical specification for the prevention of environmental hazards and pollution i.e.

Erosion:

- Additional culverts shall be provided to decrease flows where erosion (scouring) of culverts are high (hilly terrain) and at flood plains to increase damming effect of the road especially along the Hamusit-Addis Zemen section of the road.
- The principle of no scour and no silting design approach shall be adopted in the design of side ditches.
- Energy dissipators at bridges and culverts shall be maintained and provided where it is necessary.

Borrow Materials/Borrow and/or quarry sites:

- Materials will be preferably extracted from existing quarries.
- Gravels and sands shall not be extracted from minor river bed to avoid scouring and water pollution.
- Washing water shall be systematically cleaned before discharging to rivers or streams.
- After completion of the work restoration of the sites is required.

Cuts in Soil and in Rock and Construction of the Embankment:

- Cut of topsoil to be used for plantation of the embankments and to refill borrow pits.
- Blasting should be optimized not to cause slope destability and damage adjacent built structures.
- Embankment should be compacted.

Hydraulic Structures (Bridges and Culverts)

Provide appropriate return period floods for determining the opening dimension of additional culverts and bridges and check the existing structures.

Avoid erosion of cuts and fills by providing proper drainage.

Care should be taken not to pollute the river water during concrete work from cement slag and spills of oil and fuel by providing diversion and other measure appropriate to each specific site.

7.1.2 Hydrological conditions and water quality

Water resources

Construction activities in and around perennial rivers should be conducted during dry season to minimize sediment loading. In order to prevent accident spillage of pollutants to water sources or leakage to the ground, all temporary and permanent storage facilities should be located away from these sites and in a bounded enclosure with an impermeable liners. Waste oil and other liquids originating from on-site maintenance of construction equipment must be disposed of in a proper manner. A spill contingency plan should be drawn up before the start of the construction activities.

Periodical monitoring of the road for environmental impact should be conducted and appropriate measure must be taken.

In general the rehabilitation of the road have no impacts compared to the existing road from the physical point of view.

Once the construction of the project is complete, the contractor is required to remove all equipment from the site and clear the site from potentially hazardous materials. Reclamation of sites exposed during construction will include re-grading and re-vegetation.

Water quality

Clearing of vegetation cover for excavation and filling of construction areas exposes the underlying soils and rock surfaces to erosion and erodible materials may eventually find their way into the river causing increases in the suspended sediment concentration in the river. However, sound engineering practice by the contractor will be required to completely avoid where possible, or minimize, erosion of excavated areas and spoil dumps to avoid increases in turbidity in the downstream rivers during times of heavy rainfall causing surface runoff. Therefore, these activities should be carried out in the dry season to reduce the potential environmental damage and soil erosion and sediment loading to streams and lakes.

In order to prevent accidental spillage of pollutants to water courses or leakage to the ground, all temporary and permanent storage facilities should be located away from these sites and in a bounded enclosure with an impermeable liners. Waste oil and other liquids originating from on-site maintenance of construction equipment must be disposed of in a proper manner. A spill contingency plan should be drawn up before the start of the construction activities.

Highway run offs

Highway runoff along the side ditches of the road is maximum during rainy season when natural drainages (rivers, streams and flood paths) have peak floods. Therefore discharging the highway run off to the natural drainage will have high dilution effect which will have

no change of the water quality. Therefore no mitigation measure is required along the road route.

7.1.3 Nuisance noise

Activities producing excessive noise levels should be restricted to the day time, and equipment normally producing high levels should be suppressed or screened when working within a distance of 200 m from any settlement or religious building. To cause the least disruption to the local population, it is recommended that construction producing nuisance level noise shall be minimized or rescheduled so as not to occur at night or locally recognized religious days (i.e., Saints' days, etc.) and Sundays.

7.1.4 Air quality

Air quality can be affected by particle emissions during construction work, batch plants operations and traffic.

All trucks carrying fine materials should be covered. Where top soil is to be stockpiled for a long period of time, it should be covered or seeded to prevent wind erosion. Traffic speeds should be reduced and regular application of water on road pavements may be required as appropriate to prevent high dust emissions.

Poor air quality can result from diesel powered machinery vehicles. Construction machinery must be well maintained to minimize excessive gaseous emission.

Once the construction of the road upgrading project is complete, the contractor is required to remove all construction equipment from the site and clear the site of potentially hazardous materials and re-contour and landscape the disturbed areas. Restoration plan of sites exposed during construction will include re-grading of the disturbed areas and planting appropriate ground cover to minimize erosion and to provide a more aesthetically pleasing appearances to the visible project facilities.

7.2 Natural Environment and Biodiversity

7.2.1 Loss of terrestrial vegetation

One of the major unavoidable impact of roads is the effect on the terrestrial vegetation in the vicinity by the virtue of the construction. Major environmental impact will results from excessive widths of right of way. While some flexibility is essential to achieve stability of cuts and fills, exacting principles of design also need to be adhered in order to avoid excessive destruction of vegetation and disturbance of land.

The most important mitigation options for forest resources include:

- consider the location of mature trees during route selection for the detour to minimize destruction of trees;
- during borrow area clearing, prepare a plan to remove mature trees in the borrow area to obtain optimal benefits from harvested timber;
- in order to compensate for loss of trees;

- replanting must be made mandatory and quarrying must be limited to the direct needs of construction works within the National Forest Priority Areas.

To compensate for the losses, it is recommended to re-forest land in the project area. Designation and management of the re-forested area will be co-ordinated and implemented by the Forestry Department of Agriculture Bureau office to establish a Forest Development team to organize and manage the overall implementation of this proposal as soon as the fund is made available for the construction of the project. Forest department of the concerned zonal administration has to be consulted with regard to selecting plant species for land restoration to both erosion and improving habitat.

The estimated cost to implement the programme over a period of two years is about Birr 207,000. Table 3 shows the cost break down. Regular programme reports will be prepared by the team and submitted to ERA.

Table 3 Cost estimate for compensation reforestation programme

Cost Item	Amount (Birr)
Nursery Support	30,000
Labour and Transport	120,000
Monitoring and Evaluation	30,000
Total	180,000
Contingency (15 %)	27,000
Grand Total	**207,000**

7.2.2 Effects on Wildlife and Wildlife Habitat

Construction of the project will not significantly affect wildlife population because the area has no wildlife reserves and couldn't provide a good habitat to support a diverse wildlife species due to extensive human intervention in the area.

7.3 Human and Social Environment: Social Issues

7.3.1 Social acceptability

There should be good information about the future project activities and alternative designs through the consultations along the road. The consultation places should be with short intervals in order to make it possible for people to attend. All stakeholders should be involved in consultations. Also alternative designs should be available before consultation.

ERA sets a committee before road construction activities to set the compensations. The role of this committee could be widened to include resettlement and other local development issues.

Cost of the mitigation measures

The costs of information and consultations will be very small if they are arranged along the road when designers go along the road any way. Main cost will be the time used for consultations. However, many future costs to the contractor can/may be avoided due to proper stakeholder participation assuming that environmental costs will be the responsibility of contractor in the future.

7.3.2 Resettlement/displacement of people

There will be no resettlement needs due to this project. However, if this question arises later for changed designs or for other reasons the next issues/concœrns should be taken into consideration.

The demolishing of present houses should be minimized to avoid the displacement of people. Still the displacement of quite many households seems to the unavoidable and the resettlement should be arranged.

The ERA coordinated compensation committee should negotiate with the local administration the resettlement and also see that the resettlement is really done. ERA should evaluate the resettlement situation later.

Also people who have been displaced from the 'illegal' settlements, should be resettled with those who are displaced from outside Right of Way or from legal settlements.

In general a clear resettlement policy should be created instead of traditional practice. The policy should clearly state who are responsible to resettle displaced people and under which conditions.

7.3.3 Demographic changes

There is no need for mitigation plan due to the rehabilitation project.

7.3.4 Change in way of life

No mitigation plan needed

7.3.5 Impacts on women

The local women should be consulted for their needs and recommendations. Often small changes in the design might have quite big positive impacts to women and cost little or nothing at all to the project.

7.3.6 Impacts on indigenous peoples

No mitigation plans needed.

7.3.7. Induced development

To induce planned development the sites should be selected in a way which take into consideration the available natural resources (such as availability of water, fuel etc.) for potential permanent settlement in the future. The fact that the contractor will choose the construction camps on technical bases locating camps at about 80-100 kilometers' interval should give a few kilometers' flexibility in selection of the sites.

The preconditions to chose the location of the camp should be the same as for any planned permanent residence place. Enough water for present and future use, natural resources needed for the permanent settlement and their use should be planned and controlled.

Houses which are build temporarely and illegally due to a camp should be registered by kebeles/PAs inorder to avoid illegal permanent settlements. By registration also 'rents' to private land owners would stay at more normal level.

7.3.8 Conflicts between locals and immigrants

Although big ethnic conflicts are not to be expected, the decisions of the camp locations have to take this possibility into consideration.

The 'shopping week-ends' should be divided among the staff as to avoid all of them to appear to one town at the same time.

The health education about veneral diseases (also AIDS is increasing rapidly in Ethiopia) and benefits of condoms should be introduced by the contractor. This can be done in coordination with the Bureau of Health and implementation by local or foreign NGOs such as Red Cross or Care.

7.4 Human and Social Environment: Economic Issues

7.4.1 Loss of agricultural lands

Construction of the road use sub-base material and utilisation of this resource will involve loss of agricultural land on sites. This area is very extensively cultivated and special attention should be given during the construction that no unnecessary losses will happen. Consultation with the local people is important.

It is not possible to propose any compensation scheme about the loss of agricultural land because, the final location and extent of the affected area is not determined. Due to this, it is recommended that a detailed assessment should be conducted in the project area, particularly in the selected quarry and sub-base material sites and the compensation plan be formulated and implemented in the future. To compensate loss of land by allotment of agricultural land will not be possible due to unavailability of free land in the project area, therefore, as much as possible avoid all borrow and quarry sites with the potential to completely evict any farmer from his whole farm land. In case of permanent losses there should be serious negotiations between ERA compensation committee and local administration about new lands.

While there would appear to be no restriction on constructing detour on arable land, the affected communities should have the right to be consulted over the selection of construction material site and routes for access road and detour in these areas to minimise potential damage.

After the project the contractor is responsible to rehabilitate the used sites to their previous condition.

7.4.2 Loss of grazing land

Consultation with the local cattle owners about the location of camps and other construction sites. After completion of the construction work, the pasture land should be rehabilitated by reseeding immediately to minimize disturbance to grazing land.

Compensation of the lost vegetation estimated by ERA compensation committee including negotiations with cattle owners themselves.

7.4.3 Loss of property

There are no forests by the road but some new cultivated groups of trees, more in the southern part of the road, where some trees may be affected. The value of lost property (grain crops and trees) is estimated by temporary ERA Compensation Committee and based on market price.

There will be no buildings which should be demolished. However, if this is needed due to the design changes there must be consultations with the local administration to minimize the removal of houses. In that case also ERA compensation committee should be involved with the resettlement planning.

7.4.4 Employment opportunities

Local administration should have a say on who would be employed by the contractor
The preference should be given to those people who lose their own economic activities due to the project.

7.4.5 Effects on Public and Private Services

The construction camps should provide services which otherways would overburden the local public facilities/utilities. The selection of camp sites should be done in good cooperation with the local administration.

7.5 Human and Social Environment: Other Issues

7.5.1 Cultural, religious and historical areas

The destruction of locally important sites can be avoided in cooperation with local elders/administration. The local religious places, graves and funeral places as well as holy trees or springs must be taken into consideration when the detours, quarry and other construction sites are designed.

7.5.2 Health and sanitary issues

Construction and operation of the road project can result in specific health impacts for residents close to construction sites and the workers. The contractor is responsible to minimise the potential health risk and the following mitigation measures are recommended:

- ensure that adequate health facility systems are in place on-site to deal with the influx of temporary workers and open the facility to local residents as a benefit of the project to the community;
- pre-employment medical screening and effective medical treatment of workers could reduce the likelihood of disease outbreak;
- preventive measures for malaria should be strictly enforced in construction camps. It will be important to ensure the use of nets and insect repellents, as well as medical treatment of malaria cases;
- improve the provision of a safe water supply and appropriate waste disposal facilities including the provision of sanitary latrines to control other water-borne diseases. Make the water available to local residents and hand over the water system in good working condition to the residents upon project completion;
- strict adherence to speed limits on access roads during construction;
- erect sufficient and clearly visible warning signs on the road during construction;
- borrow area should be graded after use to prevent the formation of a pond which is a suitable ecology for mosquito breeding.
- health education about veneral diseases (also AIDS is increasing rapidly in Ethiopia) and benefits of condoms should be introduced

7.5.3 Public Consultations

Sound and transparent public meetings/consultations shall be held with relevant information before decision making. Consultations should include all stakeholders and should be held in all localities along the road. Before the public consultation local people should be well informed about the project design and activities.

MITIGATION MANAGEMENT PLAN

	Potential Adverse Environmental Impact	Mitigation Measure	Responsible Institution/Person	Cost
1	**Physical Environment**			
1.1	Soil and erosion			
	- Erosion	* Revegetate and restore bare surfaces * Blasting should be optimised not to cause slope destabilise and damage to adjacent structures. * Materials will be preferably extracted from existing quarries.	Contractor ERA	No costing
	- Soil contamination by spills of hazardous material	* Provide appropriate measures to decrease accidents. * Control careless disposal from engines used oil and lubricants along the road.	ERA & Road transport	
1.2	Hydrological conditions and water quality			
	- Water resources and water quality	* Limit construction activities around perennial rivers and lake to dry season * Storage facilities should be located away from these sites and in a bounded enclosure * Waste oil and other liquids must be disposed of in a proper manner * A spill contingency plan should be drawn up before construction * After construction all equipment has to be removed from the site and clear the site	Contractor	-
1.3	Nuisance noise	* Activities causing noise to be restricted to the day time/working days; and equipment normally producing high levels should be suppressed or screened when working within a distance of 200 m from any settlement or religious building.	Contractor	-
1.4	Air Quality	* All trucks carrying fine materials should be covered. * Where top soil is to be stockpiled for a long period of time, it should be covered or seeded to prevent wind erosion. * Traffic speeds should be reduced and regular application of water on road pavements may be required as appropriate to prevent high dust emissions. * Construction machinery must be well maintained to minimise excessive gaseous emission.	Contractor	-

	Potential Adverse Environmental Impact	Mitigation Measure	Responsible Institution/Person	Cost
2	**Natural Environment and Biodiversity**			
2.1	Loss of terrestial vegetation	* Consider the location of mature trees during route selection for the detour to minimise destruction of trees * Rehabilitation of detours after construction * Compenstion Afforestation	Contractor Contractor ERA	about 200,000 Birr

	Potential Adverse Environmental Impact	Mitigation Measure	Responsible Institution/Person	Cost
3	***Human and Social Environment;Social Issues***			
	3.1 Social acceptability	* Good information before the construction should be available to all stakeholders; through Public Consultations held along the road. * Clear information about the compensation system should be given to those who might be affected. * ERA Compensation Committee to be established for all road projects (including all stakeholders).	ERA	For ERA coordinator per diems and transportation costs
	3.2 Resettlement	* To minimize the displacement of people. * Consensus of resettlement plans must be achieved	ERA	
	3.7 Induced development	* To induce planned development the sites should be selected in a way which take into consideration the available natural resources (water, fuel etc) for potential permanent settlement after the construction camps are removed * Houses which are build 'temporarily' due to the camps should be registered by the kebeles/PAs in order to avoid illegal permanent settlements.	ERA and Local Administration Local Administration	
	3.8 Conflicts between locals and immigrants	* The 'shopping week-ends' should be divided among the staff as to avoid all of them to appear to one town at the same time.	Contractor	

	Potential Environmental Impact	Mitigation Measure	Responsible Institution/Person	Cost
4	**Human and Social Environment; Economic Issues**			
	4.1 Loss of agricultural land	* Avoid/minimize the temporary losses of agricultural land. * After the project the contractor is responsible to rehabilitate the used sites to their previous condition.	ERA Contractor	
	4.2 Loss of grazing land	* Avoid/inimize the temporary losses of grazing land. * After the project the contractor is responsible to rehabilitate the used sites to their previous condition.	ERA Contractor	
	4.3 Loss of property	* The needed areas for construction should be planned as to minimize the effects on the growing crop, coffee and chat plants, and trees * The value of the lost crop should be estimated according to market prises.	ERA ERA	

5 Human and Social Environment; Other Issues			
5.1 Cultural, religious and historic areas	* The destruction of locally important sites can be avoided in cooperation with local elders/administration. * The local religious places, graves and funeral places as well as holy trees or springs must be taken into consideration when the detours, quarry and other construction sites are designed.	ERA	
5.2 Health and sanitary issues	* ensure that adequate health facility systems are in place on-site to deal with the influx of temporary workers and open the facility to local residents as a benefit of the project to the community; * pre-employment medical screening and effective medical treatment of workers could reduce the likelihood of disease outbreak; * preventive measures for malaria should be strictly enforced in construction camps. It will be important to ensure the use of nets and insect repellents, as well as medical treatment of malaria cases; * improve the provision of a safe water supply and appropriate waste disposal facilities including the provision of sanitary latrines to control other water-borne diseases. Make the water available to local residents and hand over the water system in good working condition to the residents upon project completion; * strict adherence to speed limits on access roads during construction; * erect sufficient and clearly visible warning signs on the road during construction; * borrow area should be graded after use to prevent the formation of a pond which is a suitable ecology for mosquito breeding; * the health education about veneral diseases (also AIDS is increasing rapidly in Ethiopia) and benefits of condoms should be introduced; * availability of condoms must be assured	Contractor	
5.5 Public Consultations	* Sound and transparent public meetings/consultations shall be held with relevant information before decision making. Consultations should include all stakeholders and should be held in all localities along the road. Before the public consultation local people should be well informed about the project design and activities.	ERA	

8. ENVIRONMENTAL MONITORING PLAN

Monitoring is carried out to assess any disturbance to the environment and to protect both ERA and the affected parties from false charges. It is recommended that an environmental inspector be assigned to this project by ERA or the Supervising Consultant. The inspector should have a number of short term inputs from the commencement of the construction through to its completion and until cleanup has been finalised.

The Environmental inspector will take a pictorial record of all the quarry and borrow material sites and the critical sites before any construction commences. This can be used to ensure that pre-construction conditions have been restored after clean up, specially at quarry and borrow sites, detours and temporary access roads and construction camp sites. The environmental inspector's responsibilities will be to ensure that the mitigation and monitoring requirements are carried out effectively as outlined in the report and that good construction practices are followed to minimise impacts to the environment.

During construction, monitoring of the following indicators are recommended. Although ERA will retain administrative directive and management, certain part of this programmes, as described below, will be performed by other governmental agencies under contract to ERA.

8.1 Soil and Erosion

Monitoring during construction shall be done by the environmental inspector as per the mitigation measures recommended in Chapter 7.1.1.

During operation the surveillance of erosion should be conducted by the district maintenance office.

8.2 Terrestrial Vegetation

The purpose of this programme is to monitor effects of the project during the construction and after the completion of the project. The monitoring of components associated with terrestrial vegetation will be contracted to the Department of Forestry under Agriculture Bureau of the Amhara Region. The Department of Forestry, will determine which types of forest stands should be planted and implement as recommended by mitigation plan and periodically report the progress to ERA. It will be the responsibility of the environmental inspector to be assigned by ERA or the supervising consultant to ensure the protection of important vegetation covers as outlined in section 7.2.1.

8.3 Agricultural Land

The Environmental Inspector together with the Agriculturalist should ensure that topsoil stripping and separate stockpiling occur during construction on agricultural land. Topsoil shall be removed to its actual depth. After completion of the work all stored topsoil shall be returned to its original area. Upon completion of backfilling, the area shall be graded and compacted to allow the topsoil to be replaced uniformly over the original area.

8.4 Health and Safety

The contractor will have primary responsibility for treatment and control of the vector-borne diseases in the construction site and workers camps.

The monitoring of public health will focus primarily on pre-employment medical screening and the environmental inspector together with the public health departments within the respective administrative regions will conduct periodic surveys of the project area once the construction starts to assess the safety issues associated with construction in the vicinity of the towns and villages.

8.5 Nuisance Noise and Dust

It will be the responsibility of the Site Engineer and Environmental Inspector to ensure that appropriate control measures are taken and that construction activities generating significant noise and dust do not occur outside of the hours specified in section 7.13.

8.6 Equipment Fuelling and Maintenance

It will be the responsibility of the Environmental Inspector to ensure that recommendations outlined in section 7.1.2 are implemented and strictly followed.

8.7 Cleanup

Following the completion of the road project, it will be necessary to cleanup and rehabilitate the construction site.

This monitoring will be maintained for only a short duration during the cleanup of the construction site to ensure that environmental precautions are implemented by the construction contractors and that the required landscaping and re-vegetation programmes on all quarry and borrow areas are done as part of the construction demobilisation project. This shall also include all work necessary to rehabilitate the site including reclamation of the borrow pits, remove waste materials generated during the construction process, surplus materials from right-of-way and permanently repair or replace all damages resulting from the construction.

This will be inspected by the project environmental inspector and the site clean-up approved before the contractor is allowed to abandon the site.

8.8 Monitoring of Social and Economic Issues

During design/planning phase ERA's Environmental Protection Unit is responsible to look after that the public consultations are held as agreed in the tender.

After the project the Environmental Protection Unit will be responsible to monitor that the compensation (and possible resettlement) has been implemented as agreed by the ERA Compensation Committee.

9. TRAINING NEEDS

An analysis of the capacity building and training needs and a detailed training plan will be presented in the Sector EA Report. The plan will include the proposal for staffing and responsibilities for the new environmental unit of ERA.

Training programmes shall be organized at least at two levels:

1. First level training - training for the staff of the environmental protection unit of ERA, which may be at least partly conducted outside the country

2. Second level training - training organized periodically (eg. annually) at the training center of ERA for their own staff;

   - training possibilities shall be also arranged for designers, contractors, supervisors, operation and maintenance engineers and supervisors of private and government contractors and designers organized by the environmental protection unit in collaboration with EPA and other related institutions.

The training contents should be tailored to meet the needs of the personnel concerned. The training programmes may contain legal and regulatory aspects, capacity building issues, EA procedure, environmental issues in road design (alternatives), environmental impacts to be assessed, carrying out public participation, preparation of statements, preparation of mitigation plan, preparation of monitoring plan, meaning and influence of the EA, results of the EA process, implementation of the mitigation and the monitoring plan as well as environmental aspects in contract specifications, construction supervision, maintenance and operation supervision, other environmental protection issues etc.

Emphasis shall also be given to public education on environmental protection and road safety. issues.

LIST OF TEAM MEMBERS

Foreign Experts

Mr. Hannu Karttunen	Team Leader/Road Engineering (2 months in Ethiopia - at the beginning)
Ms. Ulla Mustanoja	Sociological Aspects (3 months in Ethiopia)
Mr. Reima Petäjäjärvi	Road Sector Environmental Impact Assessment (at the beginning)
Ms. Auli Keinänen	Home Office Coordinator/EIA (1 month in Ethiopia - at the end)

Ethiopian Experts

Mr. Engida Zemedagegnehu	Hydrogeology/Soil Science/Road Engineering
Dr. Dejene Woldemariam	Ecology/Natural Resources Management
Mr. Atnafe Beyene	Sociology
Mr. Imeru Tamrat Yigezu	Institutional, Legal, Policy and Capacity Building Issues
Mr. Mengistu Haile	Project Coordination and Local Liaison/Road Engineering

References/Baseline Documents

Relevant Legislative and Policy Papers and Guidelines of the Government of Ethiopia:

Proclamation No. 1/1995 Constitution of FDRE

Proclamation No. 63/1993 Ethiopian Roads Authority Re-establishment

The National Conservation Strategy 1994, Vol. I, II, III and IV

Vol II	Federal Policy on Natural Resources and the Environment
Vol III	Institutuional Framework and Operational Arrangements for the Federal Policy on Natural Resources and the Environment
Vol IV	Action Plan for the Federal Policy on Natural Resources and the Environment

Proclamation No. 9/1995 Environmental Protection Authority Establishment

Proclamation No. 4/ 1995 - Definition of the Powers and Duties of the Executive Organs of the FDRE Proclamation

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Volume II	Sectoral Guidelines
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The World Bank 1994: Road Maintenance and the Environment

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The World Bank 1996. The Impact of Environmental Assessment; The World Bank's Experience

The World Bank 1997: Participation Sourcebook

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Other relevant/available environmental guidelines and documents:

Commission of the European Union 1993: Environmental Manual: Environmental procedures and methodology governing Lomé IV development co-operation projects

Commission of the European Union 1993: Environmental Manual: Sectoral Environmental Assessment Sourcebook

Asian Development Bank 1993: Environmental Guidelines for Selected Infrastructures Project

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  - Volume I: Part III. Statistical Report on Migration, Fertility and Mortality, December 1995, Addis Ababa
  - Volume I: Part IV. Statistical Report on Housing Characteristics, December 1995, Addis Ababa
- Results for Affar Region
  - Volume I Statistical Report, December 1996, Addis Ababa
- Results for Southern Nations
  - Volume I: Part III. Statistical Report on Migration, Fertility and Mortality, June 1996, Addis Ababa
  - Volume I: Part IV. Statistical Report on Housing Characteristics, June 1996, Addis Ababa

Statistical Abstract 1995, Ethiopia, April 1996

General data of Ethiopia:

Spectrum Guide to Ethiopia 1995

Sources of social, cultural, economic and health data:

Trends in Developing Economies, World Bank, 1994

The socio-cultural and economic baseline data is based on several documents (books, studies, reports, articles and other relevant literature)

Lankinen, Bergström, Mäkelä & Peltomaa 1994: Health and Diseases in Developing Countries

List of Organizations, Institutions and Persons Met/Interviewed during the Work

Ethiopian Roads Authority, ERA
ERA District Office Manager, Gondar
ERA District Office Manager, Adigrat

Environmental Protection Authority of Ethiopia, EPA

The World Bank, Addis Ababa

The Delegation of the European Commission

Ministry of Information and Culture
- Department of Archeology and Anthropology
- Department of Information

Ministry of Agriculture
- Ethiopian Wild Life Conservation Authority
- Land Use Policy and Planning

Forestry Department

Ministry of Economic Development and Cooperation
- Environmental Planning Unit

Road Transport Authority

Chairman of the Council of Representatives of the Hadiya Zone
Economic Development Section Head of the North Wolo Zone
Inspector of the Mashilaye Transport Association
Accountant of the Mashilaye Transport Association
Deputy Chairman of the Council of Representatives of the South Tigray Zone - Maichew town
Traffic Policemen in Hirna, Asebe Teferi and Alamata towns
Elders of the Robit town
Residents in different villages/towns
People interviewed by the roads

List of Organizations, Institutions and Persons

Participants representing the following organizations in Public Meetings:

Place Dire Dawa
Date June 20, 1997

Representatives from:

1	Kulubi Saint Gabriel Church	Kulubi
1	Kulubi Town	Kulubi
3	Kulubi Peasant Association	Kulubi
1	Kersa Administration	Kersa
1	Education Office	Kersa
1	Agricultural Office	Kersa
1	Oromo Development Association	Kersa
2	Hirna Town	Hirna
1	Dire Dawa Administration	Dire Dawa
1	Dire Dawa Municipality	Dire Dawa
1	Planning Office	Dire Dawa
1	Public Works & Urban Development	Dire Dawa
1	Education Bureau	Dire Dawa
2	Agricultural Bureau	Dire Dawa
2	Agricultural Office	Dire Dawa
1	Trade Council	Dire Dawa
1	Food Complex Factory	Dire Dawa
1	Textile Factory	Dire Dawa
2	Chat Association	
1	Alem Maya Administration	Alem Maya
2	Alem Maya University	Alem Maya
1	Planning & Economic Devt Office	Harar
1	Public Works & Urban Devt.	Harar
2	Agricultural Bureau	Harar
1	Social Affairs	
1	Harar Beer Factory	Harar

Place Awash Town
Date June 22, 1997

Representatives from:

2	Woreda Council	Awash
2	Awash Town Municipality	Awash
1	Awash Kebele	Awash
1	Women Affairs Office	Awash
1	Justice Office	Awash
1	Education Office	Awash

List of Organizations, Institutions and Persons

1	Trade and Industry Office	Awash
2	Public Transport Organization	Awash
3	Awash Business Community	Awash
	Awash residents	Awash
2	Elders of Awash Town	Awash
2	Awash National Park	Awash
1	Gewane Town	Awash
1	ERA	Awash
2	ERA	Awash-Gewane

Place Mekele
Date June 26. 1997

Representatives from:

Alamata Administrative Council	Alamata
Southern Zone Administration	Maichew
Regional Administration	Mekele
Regional Adminstration	Mekele
Regional Council	Mekele
Public Works & Urban Development	Mekele
Planning Bureau	Mekele
Mining and Energy Bureau	Mekele
Justice Office	Mekele
EELPA	Mekele
Telecommunications	Mekele
Mekele Town Administration	Mekele
Mekele Town Administration	Mekele
Mekele Town Adminstration	Mekele
Rural Roads Authority	Mekele
Business Community	Mekele
Business Community	Mekele
Relief Society of Tigray	Mekele
Tigray Development Association	Mekele
Woin Newspaper	Mekele
The Press	Mekele
Eastern Zone Administration	Adigrat
Public Works & Urban Development	Adigrat

List of Organizations, Institutions and Persons

Place Hossaina
Date July 8, 1997

Participants/Representatives from:

Amacho Wato town	Amacho Wato
Peasant Association	Limu
Peasant Association	Limu
Tiya town	Tiya
Business community	Butajira
Business community	Butajira
Hadiya Zone Council	Hossaina
Hadiya Zone Council	Hossaina
Hadiya Zone Council	Hossaina
Hadiya Zone Council	Hossaina
Education Office	Hossaina
Women's Affairs Office	Hossaina
Hossaina Municipality	Hossaina
Hossaina Town	Hossaina
Hossaina Hospital	Hossaina
Public Transportation Organization	Hossaina
Hadiya Development Association	Hossaina
Business community	Hossaina
Business community	Hossaina
Business community	Hossaina
Business community	Hossaina
Private investors	Hossaina
The Press	Hossaina
KAT Zonal Council	Durame
Public Works & Urban Development	Durame
Business community	Areka
Business community	Areka
Woreda Council	Shinshicho
Woreda Council	Shinshicho
Education Office	Shinshicho
Sodo Woreda Council	Sodo
Women's Affairs Office	Sodo
Business Community	Sodo
Business Community	Sodo

FIELD VISIT PROGRAMME

The Field Survey on the Five Roads 19.6.-8.7.1997

Date	Road Section/Public Consultations	
19.6.1997	Addis Ababa - Dire Dawa	Night in Dire Dawa
20.6.	*Public Consultation in Dire Dawa*	*8.30 - 13.00*
	Dire Dawa - Harar - Dire Dawa	Night in Dire Dawa
21.6.	Dire Dawa - Awash	Night in Awash
22.6.	*Public Consultation in Awash*	*8.30 - 13.00*
	Awash - Mille - Bati	Night in Bati
23.6.	Bati - Dessie - Woldia	Night in Woldia
24.6.	Woldia - Mekele	Night in Mekele
25.6.	Mekele - Zalambesa - Mekele	Night in Mekele
26.6.	*Public Consultation in Mekele*	*8.30 - 13.00*
	Mekele - Adigrat - Axum	Night in Axum
27.6.	Axum - Gondar	Night in Gondar
28.6.	Gondar - Bahir Dar - Dangla	Night in Dangla
29.6.	Dangla - Debre Marcos - Addis Ababa	
7.7.	Addis Ababa-Hossaina	Night in Hossaina
8.7.	*Public Consultation in Hossaina*	*8.30 - 13.00*
	Hossaina-Addis Ababa	

Persons attending the site visits:

Ms. Ulla Mustanoja	Senior Sociologist
Mr. Engida Zemedagegnehu	Hydrogeology/Soil Science/Road Engineering Expert
Mr. Dejene Woldemariam	Ecology/Natural Resources Management Expert
Mr. Atnafe Beyene	Sociologist
Mr. Taddele Debela	Counterpart from ERA

Problems with the Present Road

Dust The dust is one of the biggest problems on the road and complained by the people living by the road as well as by people engaged in transitory traffic.

The traffic accidents are often caused by dust which blocks visibility to the pedestrians and drivers alike. The dust is causing accidents on the road both in rural areas as well as in towns.

The dust is also entering the houses and shops etc. ERA has received complaints from many sides due to the dust. In Maksegnit the clinic which is near the road has complained about dust which is filling clinic and making dirty clinic facilities and endangering treatment. Also many hotel and restaurant owners in survey area have complained about dust to ERA.

Flood The road between Hamusit and Addis Zemen and the Rib and Gumera Rivers is damming up the normal flow of water in Fogera Plain, which is flooded every year for some weeks in July and August. Not only farm and grazing lands, but also residences are flooded and people are forced to leave them during that period. They move to the hills north of plains, and stay with relatives until the flood subsides. Last year (1996) the flood was so bad that Government gave emergency help to the area in form of tents and food. Older people in Fogera Plain said that although there has always been flooding it was felt only down stream of the rivers and not upstream as it is now.

The area is also malaria prone area and the standing water is a major breeding ground for malaria mosquitoes. However, people want the road to stay where it is now.

Quarry sites Occurrence of malaria have increased due to the used quarry sites which have been left for years without filling and/or rehabilitating them since "there is no tradition to do so". Some quarry sites are quite deep and cost lots of money to fill them again. By some quarry sites, however, some people wanted them to be saved as water ponds for cattle. To make them unsuitable for mosquito breeding, according to the people some oil should be put on the water. Anyway before the quarry sites are decided and designed, there should be negotiations with the local people of possible future and controlled water harvesting.

Animals Animals on the road are causing many accidents due to their behaviour. In Fogera plains both people and animals rest on the road during the rainy season.

People Also people are causing accidents due to their behaviour. The rural people believe that crossing the road in front of approaching car/truck it increases the life span of a person.

Traffic safety According to the ERA District Manager in Gondar traffic education is arranged in some places to drivers and peasants/other groups using different forum such as religious or other public gatherings. The impacts of education has not been significant since it takes time.

Traffic signs are constantly stolen and people are using the metal for other purposes.

QUESTIONNAIRE FOR NON-GOVERNMENTAL ORGANIZATIONS

On the basis of Ethiopian Road Authority's (ERA) in-house preparatory activities and the results of the Road Transport Sector Study, the Government formulated the Road Sector Development Plan (RSDP) covering the period 1997 to 2007.

The RSDP aims to enhance and expand the Ethiopian road network over a ten year period and involves both road rehabilitation and construction of new roads. Detailed design of the individual road components will be developed gradually over this period. Environmental Assessment of the Program is required according to national policies, regulations and guidelines as well as to regulations of the financing institutions.

These questionnaires are preliminary for the Environmental Assessment for

(a) the rehabilitation of the Mojo-Awash-Mille bitumen surfaced road;
(b) the upgrading of the Alemgena-Hossaina-Sodo gravel road;
(c) the upgrading of the Woldiya-Adigrat-Zalambessa gravel road;
(d) the upgrading of the Debre Marcos-Gondar road; and
(e) the upgrading/rehabilitation of the Awash-Kulubi-Dire Dawa-Harar gravel/paved road

We cordially ask Your Organization's view about the present environmental situation along the above mentioned road as well as the anticipated positive and negative impacts for the local communities during the construction period and after it.

If Your Organization is not active along the roads mentioned above, we nevertheless appreciate your general opinion and experiences about the social and environmental issues/ concerns which should be taken into consideration when constructing/ upgrading or rehabilitating the roads in the country.

We kindly ask you to fill the attached questionnaire, However, we welcome any additional comments and suggestions Your Organization can provide of the problems and wishes related to the use and construction of roads. If the space left for the answers is not enough, please, use the back of the paper.

The answers are received and studied by the independent consultants participating in the development of the Environmental Assessment (EA) for Road Construction for ERA. The answers will be confidential.

NGO Questionnaire

Due to the limited time for this preliminary study the filled questionnaires should be back to us no later than the 5th of July to

Plancenter Ltd
P.O.Box 100086
Addis Ababa
[Fax number 614939]

Thank You for Your cooperation!

Questionnaire for NGOs for the ERA Environmental

Name of the NGO:
Main office location:
Type of activities:

Locations of the activities:

Participation in decision making

The road prodects may have significant impacts to human and natural environment. Therefore, to avoid community or sectional opposition to the road project, the community members along the proposed road sites need to have an opportunity to be involved in an early stage in the planning process.

According to your opinion, how should this be done?

- Who are the individuals or groups who especially should be contacted?

- Especially for which road construction activities affecting people (loss of land, drainage design, location of schools etc.) should local people be contacted?

- Who/which ministry/ authority should have the responsibility to decide that environment will be taken into consideration

Use of Road

Which are the most important uses of the road by people living by the road?

Which of these activities would not exist without the road?

Who are the main users of the local roads?
- men
- women
- children
- shop keepers
- others such as

What should/ could be done with the domestic animals to avoid traffic problems?

NGO Questionnaire

The Biggest Problems with the Roads

What are the present problems with the existing road?

Which groups of people have problems with the road or who are suffering most of the road?

How these problems should/could be decreased or eliminated according to your judgement?

What type of measures - and by whom - can be taken to mitigate the anticipated problems caused by the upgrading/rehabilitation of the road

Road Safety and Traffic Accidents

Ethiopia has one of the highest frequency of traffic accidents in the world and hence the traffic safety should be increased on the roads.

- What are the biggest reasons for road accidents?

- What are the most "typical" accidents?

According to your judgement, what should be the first tasks to decrease the amount of accidents?

- Who should do it?

Has any of your vehicles had any accident on above mentioned roads (or on some other road)? If yes, what was the reason for accident?

- What happened after the accident, what measures were taken to deal with the accident?

Compensation Issues

In case of an traffic accident such as losing human life, what is the compensation system in practice?

What would be the just compensation due to the loss of farm land or other property to the road construction?

Erosion

Erosion is one of the major causes deteriorating /damaging the roads in Ethiopia. What are the biggest reasons for erosion along the road sides?

- Which human or village activities are causing the environmental problems such as erosion (or other problems) to the roads?

- What could /should be done to avoid these activities? Who should do?

Road Construction Period

Road construction needs machinery and labour, which disturbs the normal life of the road side people. What are the biggest problems caused by the construction work?

What are the social and environmental problems to the local people left behind by the road construction machinery or their storage?

What could/should be done to avoid or mitigate the problems?

What benefits are the construction workers/camps bringing to the area?

How could the benefits be increased or made permanent?

What problems are the construction workers /camps bringing to the area?
What should be done to avoid the problems?

What should be taken into consideration during the upgrading/ rehabilitation of the road to mitigate the problems during construction period.
Benefits from the improved roads

What do you think will be the benefits from the improved road and why?
- to the community at large

- for the business community

- for governmental administrative staff

- to the communities along the road

- to tourism

- to any other persons/groups

NGO Questionnaire

Settlement patterns

Many people are settling down by the roads and build their houses there. What are the biggest reasons for that?

Who are the people who prefer to settle down by the road?

What are the reasons for the new settlements?

What should be done with the illegal settlements?

Cultural and Historic Sites and Wild Life Sanctuaries

How should/could they be taken into consideration?

CHECKLIST FOR SCOPING

Project: Debre Markos - Gondar

	Potential Environmental Impact Area	Adverse Impacts	No Impacts	Beneficial Impacts	Evaluation Base
I	**Physical Environment**				
1	**Soil and bedrock**				
	1.1 Erosion	X		X	
	1.2 Stability of slopes	X			
	1.3 Soil contamination by spills of hazardous materials	X			
	1.4 Material use	X			
	1.5 Ground subsidence		X		
	1.6 Others				
2	**Water Resources and Water Quality**				
	2.1 Changes in surface water hydrology	X		X	
	2.2 Changes in ground water hydrology		X		
	2.3 Sedimentation/Siltation		X		
	2.4 Water harvesting		X		
	2.5 Highway runoff pollution	X			
	2.6 Others				
3	**Air Quality**				
	3.1 Air pollution due traffic	X		X	
	3.2 Others				

	Potential Environmental Impact Area	Adverse Impacts	No Impacts	Beneficial Impacts	Evaluation Base
II	**Natural Environment**				
4	**Biological and Ecological Changes**				
	4.1 *Impact on vegetation*	X			
	4.2 Impacts on important flora and fauna	X			
	4.3 Degradation of ecosystem with bio-diversity	X			
	4.4 Wildlife reserve		X		
	4.5 Impairment of fisheries	X			
	4.6 Encroachment into precious ecology	X			
	4.7 Others				

	Potential Environmental Impact Area	Adverse Impacts	No Impacts	Beneficial Impacts	Evaluation Base
III	**Human and Social Environment**				
5	**Social Issues**				
	5.1 Social acceptability		X		
	5.2 Resettlement/Displacement	X			
	5.3 Demographic changes		X		
	5.4 Change in way of life		X		
	5.5 Impacts on women			X	
	5.6 Impact on indigenous peoples		X		
	5.7 Induced development	X		X	
	5.8 Conflicts between locals and immigrants	X			
6	**Economic Issues**				
	6.1 Loss of agricultural land	X			
	6.2 Loss of property	X			
	6.3 Employment opportunities			X	
	6.4 Change of economic activities			X	
7	**Effects on Public and Private Services**	X		X	
8	**Health and Sanitary Issues**	X		X	
9	**Traffic Safety**	X		X	
10	**Cultural, Religious and Historical areas**			X	
11	**Damage to Aesthetic Sites**		X		
12	**Impacts on Local and National Economy**			X	

Table 1 Annual Rainfall for Selected Location In The Project Area (mm)

Month	Locations				
	Merawi	Bahir Dar	Werota	Addis Zemen	Gondar
January	3.3	2.7	0.3	88	48
February	2.3	2.3	1.0	38	33
March	14.3	7.0	3.8	27	184
April	38.2	23.3	16.7	199	387
May	122.5	83.7	68.6	601	840
June	275.7	177.2	169.5	1822	1468
July	430.3	438.4	374.0	4504	2964
August	369.8	394.6	377.1	3849	2582
September	211.3	202.3	166.2	1847	1162
October	83.4	93.2	50.0	603	584
November	14.6	23.1	8.2	144	236
December	6.6	3.4	1.4	56	81
Annual	**1572.3**	**1451.3**	**1236.7**	**14102**	**10571**

Table 2 Mean Monthly Temperature (°C)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
B. Dar	26.4	27.6	29.4	29.5	28.7	26.5	23.8	23.7	24.9	25.9	26.1	25.9	26.5
Merawi	28.5	29.6	30.8	30.2	29.0	26.6	24.0	23.9	25.0	26.0	27.6	27.8	27.4
Werota	29.0	29.4	30.6	30.4	29.1	27.0	24.7	23.6	24.9	26.9	28.1	28.5	27.7

Baseline Data/Physical and Natural Environment

Table 3 Mean Monthly Flows for Selected Rivers Along the Road

Month	Locations					
	Gilgel Abay at Merawi	Rib at Addis Zemen	Megech at Azezo	Birr At Jiga	Ketchem	Abay At Bahir Dar
January	18.99	1.4	0.62	0.74	0.28	
February	12.30	0.9	0.46	0.33	0.16	
March	10.41	0.82	0.44	0.24	0.14	
April	8.49	0.83	0.69	0.18	0.11	
May	17.56	1.32	1.10	0.49	0.14	
June	95.87	7.76	8.48	4.91	1.09	
July	430.09	91.46	46.62	41.07	12.90	
August	576.71	199.40	132.54	81.26	24.20	
September	414.22	85.86	37.51	35.76	15.30	
October	170.19	18.76	4.88	11.18	6.15	
November	61.58	8.56	2.15	3.75	1.33	
December	32.82	3.56	1.15	1.85	0.83	
Annual Mean				**15.15**	**5.22**	

Table 4 Water Quality of Selected Rivers Along the Road and Lake Tana

Parameter	Locations			
	Birr River	Koga River	Abay River	Lake Tana
EC (ys/cm)	140	71.2	170	180
pH	7.61	6.4	70	7.5
Ca^{2+} (me/l)	0.82	21.6	18.4	17.6
Mg^{2+}(me/l)	0.58	22.5	ND	ND
Na^{+} (me/l)	0.31	3.7	ND	ND
K^{+} (me/l)	0.04	2.7	ND	ND
Cl^{2+} (me/l)	0.10	1.7	2.0	1.80
SO_4^{2-} (me/l)	0.05	2.0	3.0	NIL
$CO_4^{2-} + HCO_4^{-}$ (mg/l)	1.45	37.2	56	52
SAR	1.10	0.80	ND	ND
$N\text{-}NO_3^{-}$ (mg/l)	0.70	NIL	3.08	3.96
$N\text{-}NO_2^{-}$ (mg/l)	2.00	1.00	0.13	NIL
$N\text{-}NH_4^{-}$ (mg/l)	0.30	0.10	ND	ND
PO_4^{3-} (mg/l)	0.11	0.20	0.20	0.19
Total Fe^{2+} (mg/l)	0.33	0.70	ND	ND
B (mg/l)	0.002	ND	ND	ND
DO (mg/l)	10.60	ND	3.84	6.4
Temperature (^{o}C)	19.80	21.0	ND	ND

Note: ND - Not Determined

Table 6 Mammals of the Project Area
Table 5 The dominant tree and shrub species found in the project area

Common Name	Vernacular Name	Scientific Name
Peacock flower	Ambabesa	Albizia gummifera
	Wanza	Cordia africana
	Wulkeffa	Dombeya Spp
Flame tree	Kuara	Erythirina abyssinica
Sycamore fig	Bamba	Ficus sycomorus
Red stinkwood	Buraya	Prunus africanus
Waterberry	Dokma	Syzygium guineense
Murray red gum	Key bhir zaf	Eucalyptus camaldulensis
Tasmanian blue gum	Nech bahir zaf	Eucalyptus globulus
Mexican cyprss	Yefernji tid	Cupressus lusitanica
Sydney black wattle	Akacha	Acacia decurrens
Willow wattle	Akachasalgna	Acacia saligna

Table 6 Mammals of the Project Area

Common English Name	Scientific Name
Bohor Reedbuck	Redunca redunca
Warthog	Phacochoerus aethiopicus
Lion	Panthera leo
Leopard	Panthera pardus
Bushbuck	Tragelaphus scriptus
Aardvark	Orycteropus afer
Serval	Felis serval
Spotted hyaena	Crocuta crocuta
Anubis Baboons	Papio anubis
Crested Porcupine	Hystrix sp.
Grivet Monkey	Cercopithecus aethiops
Common Jackal	Canis aureus
African civet	Viverra civetta
Klipspringer	Oreotragus Oreotragus

Baseline Data/Human and Social Environment

Table 1 **The population in the survey area by zones, by woredas, and by towns along the road; percentage of women of total population; percent of urban population of total population and percent of population under 15 years of age of total population.**

	Total pop.	% Women	% Urban	% <15 yrs
The Amhara Regional State	1265315	54.4	0.9	44
Misrak Gojam Zone	145295	54.9	11.3	46
Debre Markos Woreda	49297	53.9	100.0	
- Debre Markos town	49297	53.9	-	36
Machacel Woreda	188472	49.9	5.0	
- Amanuel town	5849	53.9	-	40
Mirab Gojam Zone	107238	55.5	6.0	48
Denbecha Wored	89456	49.9	12.9	
- Denbecha town	8663	55.1	-	39
Jabi Tehnan Woreda	194942	49.9	12.6	
- Jiga town	7501	55.6	-	42
- Finote Selam town	13834	54.1	-	36
- Mankusa town	2857	53.4	-	41
Bure Wemberma Woreda	214714	50.1	8.8	
- Bure town	13437	54.8	-	38
Agew Awi Zone	65232	54.9	9.1	48
Banja Woreda	151091	50.2	6.5	
- Tilili tow	5106	55.6	-	44
- Kesa town	1327	54.1	-	47
- Kosober town	2679	56.6	-	41
- Injibara town	754	56.8	-	43
Dangla Woreda	149091	50.0	12.3	
- Dangla town	15437	55.9	-	38
Mirab Gojam Zone	107238	55.5	6.0	48
Achefer Woreda	238255	48.8	5.9	
- Durbete town	7774	55.5	-	42
Merawi Woreda	244943	49.5	5.0	
- Merawi town	9282	57.1	-	40
Bahir Dar Zuria Woreda	198284	48.6	4.0	
- Meshenti town	2161	56.4	-	44
Bahir Dar Special Zone	96140	52.7	-	37
Bahir Dar Woreda	96140	52.7	100.0	
- Bahir Dar town	96140	52.7	-	37
Debub Gondar Zone	1768732	48.8	6.6	44
Dera Woreda	212341	48.2	5.9	
- Hamusit town	6994	55.4	-	43
Fogera Woreda	185280	48.7	9.9	
- Woreta	15181	54.8	-	41
Kemekem Woreda	220414	48.8	8.4	
- Addis Zemen	14342	55.0	-	43
Semen Gondar Zone	2088684	48.9	11.3	46
Gondar Zuria Woreda	192337	49.0	8.1	
- Enfranz town	5302	56.6	-	46
- Maksegnit town	5746	55.7	-	43
- Teda town	2853	58.2	-	44
Gondar Woreda	112249	54.2	100.0	
- Gondar(/Azezo)	112249	54.2	-	39

Baseline Data/Human and Social Environment

Table 2 The total fertility rate by region, by zones and by towns.

	Urban	Rural
Amhara Region	2.725	4.475
Misrak Gojam	2.595	5.430
Mirab Gojam	3.075	5.350
Agew Awi	2.870	4.515
Bahir Dar Special	2.435	-
Debub Gondar	2.965	4.220
Semen Gondar	2.605	4.105
Debre Markos	1.920	
Finote Selam	2.280	
Dangla	2.355	
Bahir Dar	2.435	
Woreta	2.320	
Addis Zemen	4.280	
Gondar	2.305	

Table 3 Average household size

	Urban	Rural
Misrak Gojjam	4.1	4.5
Mirab Gojam	4.0	4.8
Agew Awi	4.3	4.9
Bahar Dar Special	4.4	-
Debub Gondar	4.0	4.5
Semen Gondar	4.2	4.9

Table 4 Literacy rates in the survey area

	Urban		Rural	
	Male	Female	Male	Female
Amhara Region	74	52	18	7
Zones:				
Misrak Gojjam	75	50	22	6
Mirab Gojam	73	46	20	5
Agew Awi	69	47	20	7
Bahar Dar Special	82	61	-	-
Debub Gondar	71	46	19	7
Semen Gondar	72	52	11	4

Table 5 Migration pattern in percentage and by sex

	Total	Female
Rural-rural	56	58
Rural-urban	22	23
Urban-urban	14	13
Urban-rural	76	

Table 6 The percentage share of migrant population of all population by zones and by sex

	Total	Female
Misrak Gojam	10	12
Mirab Gojam	10	12
Agew Awi	16	18
Bahir Dar Special	54	56
Debub Gondar	6	8
Semen Gondar	13	15

Table 7 Share of migrants

I Share of migrants of all population
II Share of women migrants of total women population
III Share of migrants who moved to the town within less than two years before 1994 census year

	I	II	III
Debre Markos	38	38	21
Amanuel	58	60	24
Denbecha	42	42	27
Finote Selam	56	58	25
Tilili	49	54	33
Kosober	72	72	54
Dangla	47	49	27
Merawi	50	53	13
Meshenti	44	47	17
Bahir Dar	54	56	21
Hamusit	47	49	10
Woreta	41	43	18
Addis Zeme	39	41	13
Maksegnit	30	32	16
Enfranz	26	27	12
Gondar	36	36	18

Table 8 The availability of television, radio and telephone in the survey area

	Television	Radio		Telephone
	Urban	Urban	Rural	Urban
Amhara Region	2.5	35	5	3.9
Misrak Gojam Zone	1.9	33	5	4.9
Mirab Gojam Zone	0.1	27	5	1.9
Agew Awi Zone	0.9	29	5	2.2
Bahir Dar Special	4.4	46	-	4.9
Debub Gondar Zone	1.6	29	3	2.8
Semen Gondar Zone	3.3	33	5	4.0

Table 9 The average monthly rent per housing unit, the percentage share of units rented from a kebele and from private households and the share of owner occupied housing units In Amhara Region, the Zones and towns.*

I The average monthly rent per housing unit
II Rented from the Kebele
III Rented from the private household
IV Owner occupied

	I	II	III	IV
The Amhara Regional State	17	20	22	50
Misrak Gojam Zone	15	19	21	53
- Debre Markos town	19	26	14	51
- Amanuel town	13	14	32	49
Mirab Gojam Zone	11	20	25	50
- Denbecha town	8	26	20	51
- Jiga town	8	24	14	55
- Finote Selam town	15	24	10	41
- Mankusa town	10	6	14	55
- Bure town	16	25	24	43
Agew Awi Zone	15	17	22	55
- Tilili town	8	15	12	70
- Kesa town	17	3	13	78
- Kosober town	36	3	45	46
- Injibara town	14	51	2	43
- Dangla town	10	27	24	40
Mirab Gojam Zone	11	20	25	50
- Durbete town	8	27	20	49
- Merawi town	10	20	30	43
- Meshenti town	6	24	19	58
- Bahir Dar town	31	15	31	44
Debub Gondar Zone	16	11	24	59
- Hamusit town	24	3	23	68
- Woreta	20	12	26	57
- Addis Zemen	13	13	21	58
Semen Gondar Zone	18	21	28	48
- Teda town	7	25	18	55
- Maksegnit town	14	7	19	64
- Enfranz town	9	13	17	66
- Gondar(/Azezo)	19	29	20	41

* The table does not include the other sources of renting due to their small share in renting system.

Table 10 The percentage share of total housing units using fire wood, charcoal, kerosine or electricity alone or with other fuels in the towns with more than ten thousand habitants.

I Firewood only or with other fuels
II Charcoal only or with other fuels
III Kerosine alone or with other fuels
IV Electricity alone or with other fuels

	I	II	III	IV
Amhara Region	91	36	6	2
Misrak Gojam	92	22	1.6	0.6
- Debre Markos	91	31	1.7	2
Mirab Gojam	96	35	0.5	0.2
- Finote Selam	95	62	0.0	0.1
- Bure	95	36	0.3	0.0
Agew Awi	97	28	0.2	0.2
- Dangla	95	36	0.3	0.7
Bahir Dar Special	88	65	2	4
Debub Gondar	95	42	0.5	0.2
- Woreta	89	53	1	0.1
- Addis Zemen	98	51	0.6	0.0
Semen Gondar	93	60	0.4	1
- Gondar	92	75	0.5	2

Table 11 Economic activity rate for the whole Amhara region and separately for the zones along the road

	Male	Female
Amhara Region	87.75	73.47
Misrak Gojam	86.19	77.00
Mirab Gojam	87.71	80.89
Agew Awi	87.05	80.31
Bahir Dar Special	56.22	44.99
Debub Gondar	90.95	84.95
Semen Gondar	86.53	59.82

Table 12 Total unemployment rates for the Amhara Region, the Zones and the towns along the road by sex.

	Total		Urban	
	M	F	M	F
Amhara Region	0.96	1.10	11.98	11.61
Misrak Gojam	0.87	0.99	11.12	9.93
Mirab Gojam	0.64	0.74	10.56	8.96
Agew Awi	0.80	0.87	8.43	9.46
Bahir Dar Special	14.22	18.36	14.22	18.36
Debub Gondar	0.41	0.41	7.10	4.99
Semen Gondar	1.22	1.74	13.80	11.28
Debre Markos	19.37	20.70		
Amanuel			6.76	6.52
Denbecha			13.96	10.50
Jiga			11.86	7.59
Finote Selam			15.79	14.38
Mankusa			6.79	8.28
Bure			12.40	10.66
Tilili			10.54	8.07
Kosa			2.11	8.33
Kosober			11.76	6.14
Injibara			7.84	3.98
Dangla			12.03	16.57
Durbete			13.97	6.43
Merawi			6.60	2.10
Meshenti			8.71	11.95
Bahir Dar			14.22	18.36
Hamusit			6.64	0.62
Woreta			5.03	4.13
Addis Zemen			12.43	3.02
Teda			6.84	5.08
Maksegnit			4.94	2.98
Enfranz			5.62	3.03
Gondar			17.75	16.64

Table 13 Employment

	Percent	Out of which women - in percent
Self employed	36	21
Unpaid family workers	58	62
Employers	3	16
Government employees	0.3	35
Private employees	2.4	19

Table 14 Economically active population ten years and over by sex and major industrial divisions (Amhara Region-total)

	Total	%Women
Economically active	7647025	45
Agriculture, hunting, forestry, and fishing	7108910	41
Mining and quarring	1606	20
Manufacturing	130494	61
Electricity, gas and water supply	2435	14
Construction	9887	9
Wholesale and retail trade, repair of vehicles, personal and household goods	90243	46
Hotels and restaurants	107328	94
Transport, storage & communication	24674	21
Financial inter-mediation	761	20
Real estate, renting and business activities	794	24
Public administration and defence, compalsory social security	41747	21
Education, health and social work		
Other social, cultural, personal and household activities	15411	29
Private households with employed persons	40090	90
Extra-territorial organization and bodies	237	17
Not stated	36460	54

Source: The 1994 Population and Housing Census of Ethiopia