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

WOLDIYA-ADIGRAT-ZALAMBESSA ROAD

Final Report
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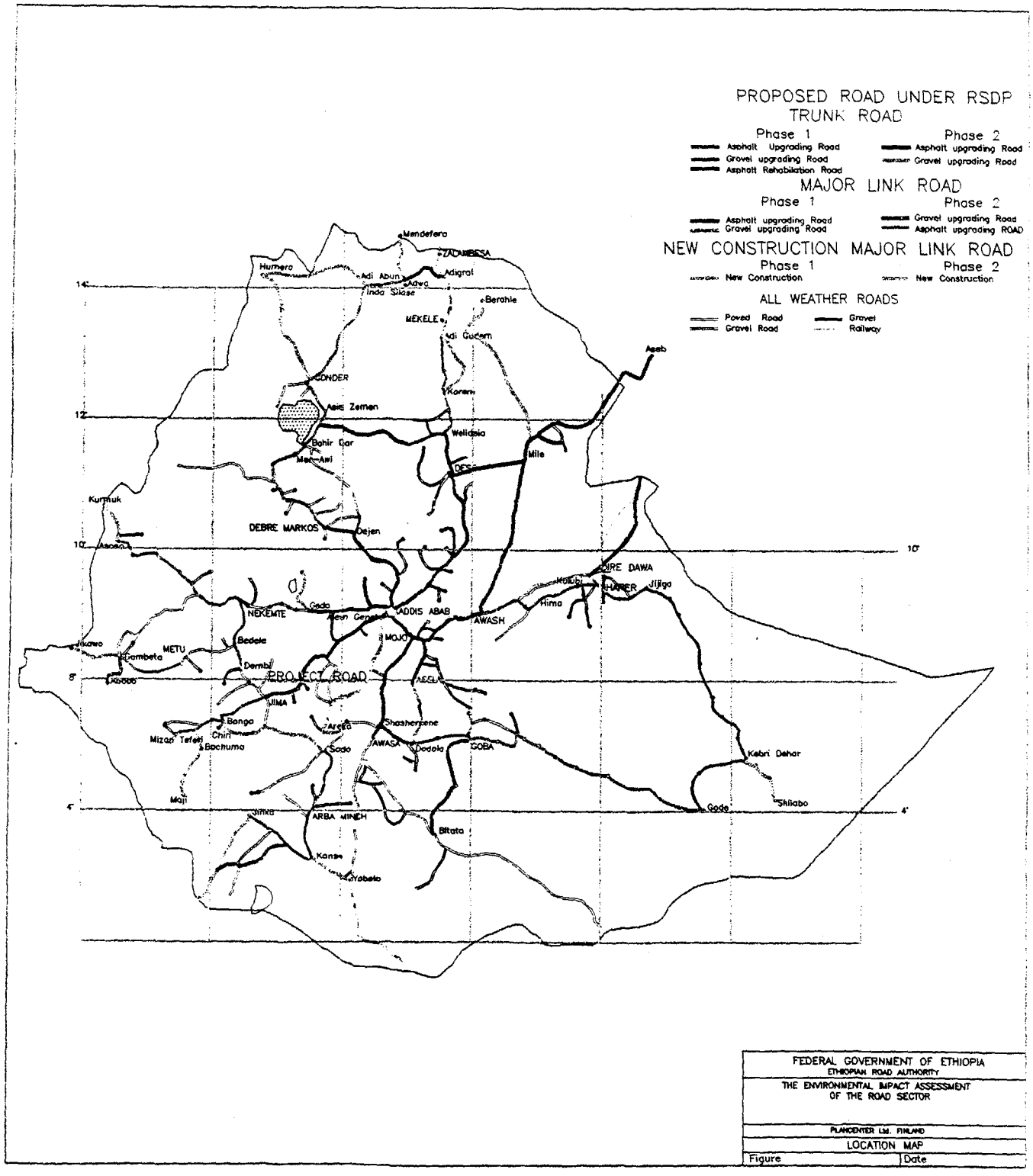
TABLE OF CONTENTS

APPENDICES

ABBREVIATIONS

ADLI	Agricultural-Development-Led-Industrialization
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 and Mojo-Awash-Mille Road. This report is the environmental analysis of upgrading of the Woldiya-Adigrat-Zalambessa 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 407 km between Woldiya and Zalambessa is part of the road linking Addis Ababa to Asmara, the capital of Eritrea. From Asmara the road goes to the port of Massawa. It is an important import / export road used by heavy trucks and trailers when carrying goods and fuel from Massawa port to the inland of Ethiopia. Although now almost totally unpaved over the southern three quarters of its length, this road once had a bitumen surface. The 110 kilometre section of the road from Wukro north to Zalambessa has a sealed bitumen surface. The road from Woldiya to just south of Maychew is currently being gravelled under the Emergency Regravelling Programme funded by the World Bank.

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 level 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 issues 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/rehabilitation. Negative impacts can 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. This means that upgrading and/or rehabilitation of the road has a positive impact on erosion.

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

Pollution hazards 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 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 rehabilitate the present road is very high. All people and organizations interviewed and the participants in the public hearing 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 houses to be demolished are compensated according to the costs of a new similar house. However it is recommended by the consultant that wood & mud houses would be compensated by the value of hollow block or natural stone houses to save the scarce tree resources.

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 permanent crop

the estimation should be based on many years' production. There will be few places where the trees would be affected. The compensation will be estimated using market value.

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.

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.

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 improved road would not raise dust which is one of the biggest reasons for accidents alongside the slippery road surface during rainy season. The better pavement 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 road; and (iv) it is environmentally friendly that vehicles stay in better condition due to improved road surface. and (v) flooding to the road near Robit town will disappear with the new bridge.

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.

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.

The needed areas for construction should be planned as to minimize the effects on the growing crop, coffee, trees and temporary losses of agricultural and grazing land. The value of the lost crop should be estimated according to market prizes. Demolished houses are compensated by ERA according to the costs of a new house. It is recommended that wooden houses will be compensated with a price needed for hollow block or natural stone houses for environmental reasons.

Resettlement must be planned before the implementation starts. Both the compensation and resettlement should include all displaced people, independent of the fact if they reside in legally or illegally built houses.

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 camping 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 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.

The health education, especially about veneral diseases should be included in the mitigation plan.

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.

There has been no evaluation or monitoring on resettlement / compensation from ERA's side. It is ERA's responsibility to monitor the compensation and resettlement implementation.

1. INTRODUCTION

1.1 Background

The need to include environment impact considerations 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. This report is the environmental analysis of the Woldiya-Adigrat-Zalambessa 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 the Appendix 1.

1.2 Location of the Study Area

The 407 km between Woldiya and Zalambessa is part of the road linking Addis Ababa to Asmara, the capital of Eritrea. From Asmara the road goes to the port of Massawa. Although now almost totally unpaved over the southern three quarters of its length, this road once had a bitumen surface. The 110 kilometre section of road from Wukro north to Zalambessa has a sealed bitumen surface. The road from Woldiya to just south of Maychew is currently being gravelled under the Emergency Regravelling Programme funded by the World Bank.

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; literature (listed in Appendix 2)

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

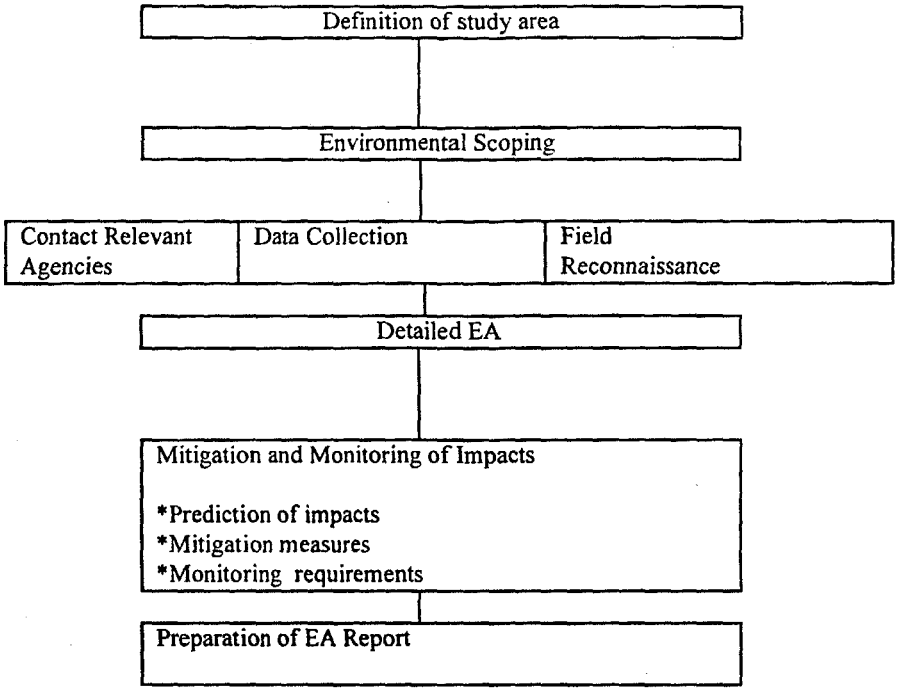
- site visits; the whole road section was studied by the team (see site visit programme; Appendix 4)

- interviewing different governmental and non-governmental organizations relevant to the road section, public consultation (minutes in the Appendix 5)and 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 site visits and 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 the 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 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 the Chapters 6, 7 and 8 respectively. Training needs are only briefly discussed in the Chapter 9 of this report. They will be handled more thoroughly in a separate EA report for the road sector.

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 agricultural 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.

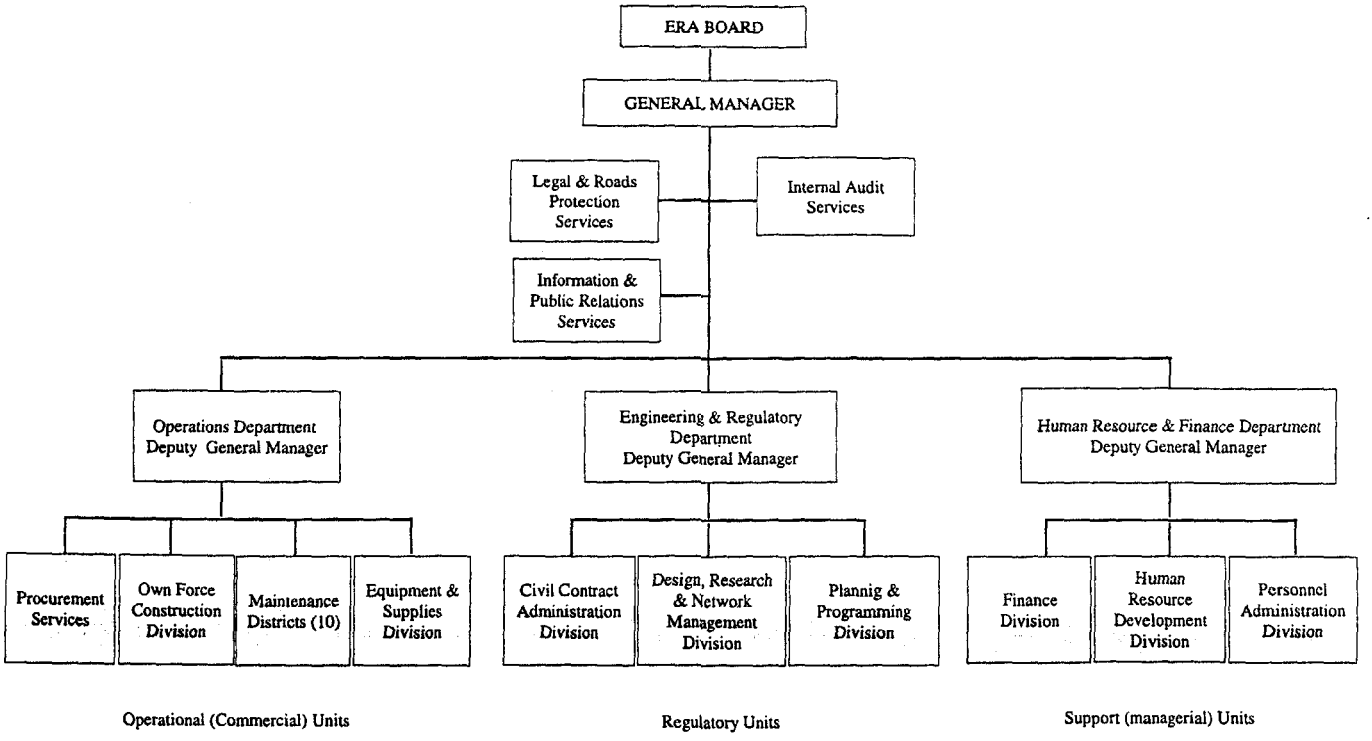
Previous practice shows that apart from routine engineering requirements little attention has been given to incorporate environmental considerations in road sector activities. However, the RSDP has given due attention to the environmental impacts that may arise under the programme and the need for capacity 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 it is 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.

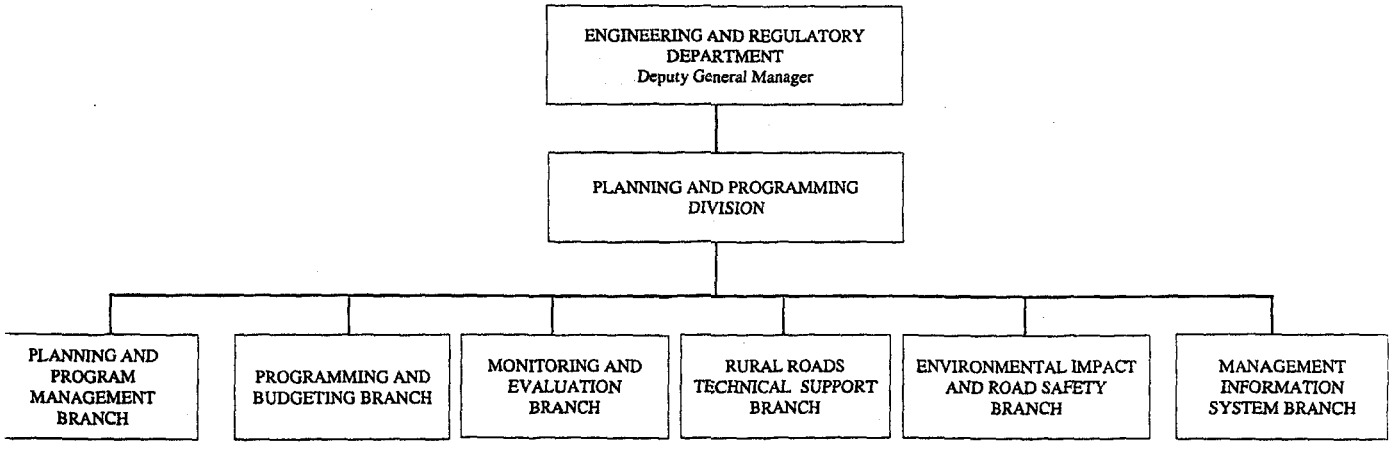
ETHIOPIAN ROADS AUTHORITY
ORGANIZATIONAL CHART



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 Woldiya - Adigrat - Zalambessa upgrading road project falls under the Combolcha and Adigrat District offices. Within the road project there are sections namely Kobo and Maychew under Combolcha District and Wukro and Mekele sections under the Adigrat District.

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 Commissoner 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 committee's 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 build) are allowed to remove their property before the construction activities starts. 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 etc.

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 Light and Power Corporation (former 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 acting 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 may 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 the decision 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 recognize that public consultation is an integral part of EIA and that it should be ensured that EIA procedure include 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 as 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. ERA compensation committee forms one official consultation channel which, however, has very limited purpose and do not substitute public consultations.

3 DESCRIPTION OF THE PROPOSED ROAD PROJECT

The Woldiya - Adigrat - Zalambessa Road is constructed during the Italian occupation in the late 1930's. The telford, which is the hand packed rock foundation and pavement, is the evidence for the type of road construction by the Italian period. As the condition of significant part of the road, particularly from Maychew to Wukro and from Adigrat to Zalambessa, revealed that this road is part of the above facts.

The existing telford width was five meter and it was widened by the ERA to seven meter by covering with natural gavel in the early 1960's. Since then the road had very seldom periodical maintenance until the resent rehabilitation efforts. Between Woldiya - Maychew section for 124 km. is currently being regravelled under the Emergence Recovery and Rehabilitation Program (ERRP) financed by the World Bank. The German contractor namely, Abu Gmbh, is presently working on the project. The progress of the project is very slow by which the commencement date of the work was 1993 and was scheduled for completion in 18 months, however the status of the progress is about 50% to date.

The ERA maintenance crew has currently rehabilitated the section from Adigrat toward Wukro with cold road mix asphalt surface on top of varying thickness granular material. Since this road was under war affected area, it was neglected during the past government so that no study was under taken.

This road is one of the first five priority project, hence it was being evaluated its economical feasibility as part of the RSDP projects. The study was carried out by a consultant named TecnEcon and came up with the results as follow in its draft final report with the recommended treatments. The road is subdivided into sections and presented together;

Section	Treatment recommended	EIRR percent
Woldiya - Maychew	Reconstruct 50mm AC surface + 500mm granular base & sub base	18.7
Maychew - Mekele	Reconstruct 50mm AC surface + 450mm granular base & sub base	23.0
Mekele - Wokro	Reconstruct 50mm AC surface + 450mm granular base & sub base	23.7
Wukro - Adigrat	AC overlay 50mm thick	8.1
Adigrat - Zalambessa	Reconstruct DBST surface + 250mm granular base using existing pavement as sub base	9.5

The design of the road is in its final stage which has been carried out by a French consultant BECOM. All reports are submitted by the consultant including geometric design, hydrology, pavement & material, environmental impact assessment reports. The geometric design is already commented and finalized while the other reports are not yet completed.
As per the geometric design, addition to the existing 87 bridges 28 more are included with more than five meter wide and consisted of 1 - 7 spans. There is about 10 km new realignment besides the smoothening of sharp curves in several stations. The major realignment is found near by Mekele town because of the master plan of the town and the new air port location. The pavement design also considered a 15 years design life for the project.

Condition of the road

The 407 km between Woldiya and Zalambessa is part of the road linking the Addis Ababa with the Eritrean border through to Asmara and the port of Massawa. Although now almost totally unpaved over the southern three quarters of its length, there is evidence that this road may once have had a bitumen surface. The 110 kilometre section of road from Wikro north to Zalambessa has a sealed bitumen surface. The road from Woldiya to just south of Maychew is currently being gravelled under the Emergency Regravelling Programme funded by the World Bank.

Although the mountainous section between Alemata and Maychew is in poor condition, the general state of the road pavement between Woldiya and Alemata is good except for minor defects such as corrugation and deformation in wheel tracks on short sections. Only on the section of road around Korem was subgrade of dark expansive clay encountered and indicators of deep subgrade distress observed.

From Maychew through Mekele to Wukro, the old hand packed stone is covered with a very thin gravel which in many places has left the stone exposed giving a very rough ride although the defects are superficial. The road from Wukro to Adigrat is in a good condition. The ERA is rehabilitating this road, working south from Adigrat towards Mekele. The Adigrat - Zalambessa section remains in a very poor condition.

There are approximately 76 bridges, 1015 culverts, 66 significant retaining walls and three fords. Of the bridges, five can be classed as major structures.

Proposed Activities

The existing alignment can only be improved by limited adjustment of straights and curve radii.

It is estimated that there are four bridges requiring replacement, all between Woldiya and Mekele. Also, there is a need for one new major bridge in this section.

4 BASELINE DATA

4.1 Description of the Road Environment

The project road is a part of the road that links Addis Ababa to Asmara in Eritrea.
It is an important import/export road which heavy trucks and trailers use when carrying goods and fuel from Massawa port to the inland of Ethiopia.

The project road starts from Woldiya in the Amhara Regional State. The trunk road from Addis Ababa through Dessie comes to Woldiya which is the administrative center of North Wollo and also important commercial center to neighboring surroundings. It is connected by all weather road to Bahir Dar through Woldiya Woreta road, and to Lalibela with its eight hundred years old rock churches cut out of soft red volcanic tuff. (Altogether there are about two hundred old rock churches scattered in the survey area, but few easily accessible directly from the road.) (See Figure 4.1).

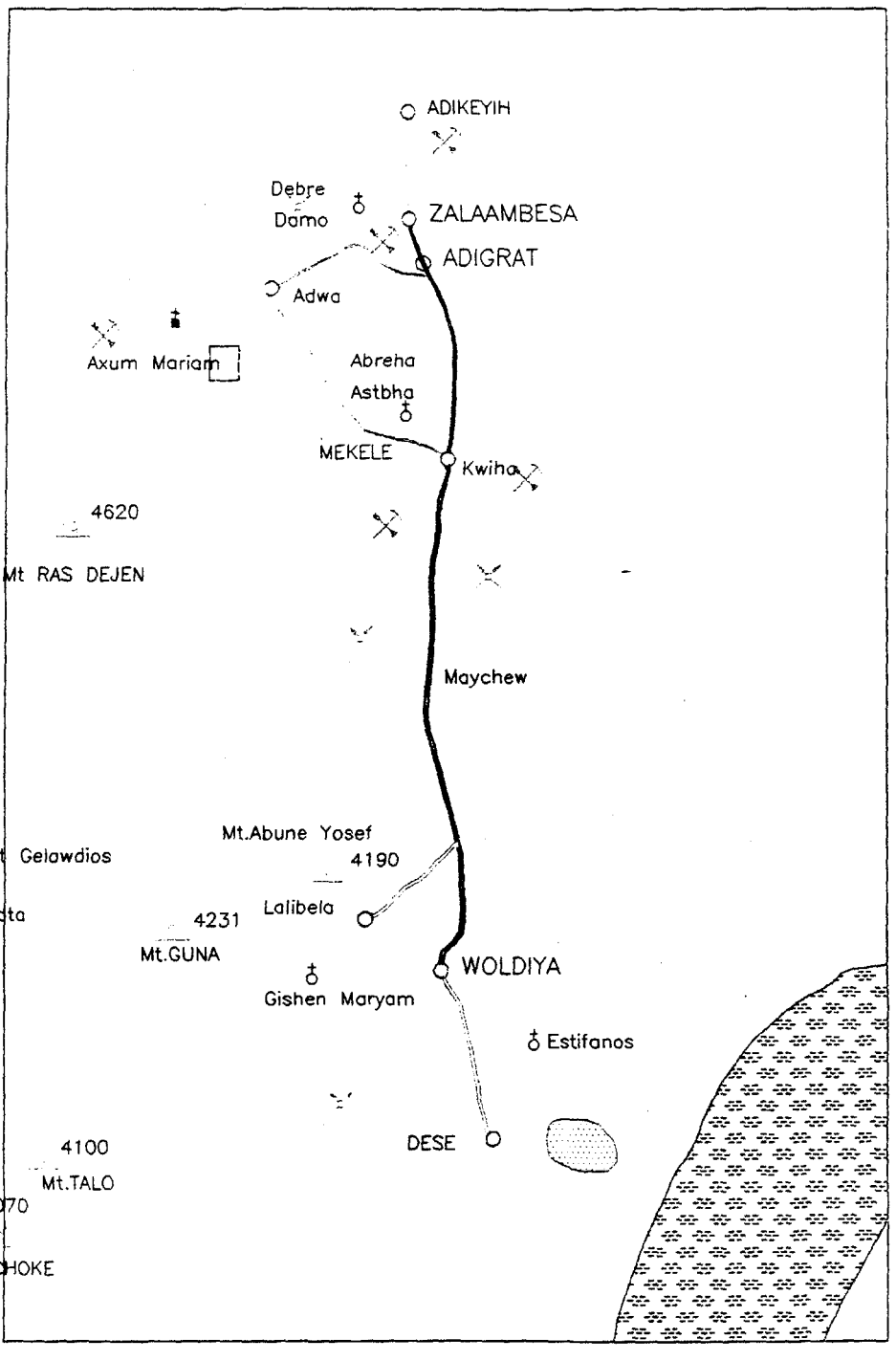
The road passes through Doro Gibir, Gobiye, Robit and Kobo towns before it enters to the Tigrean regional State in Waja. The upgrading follow the old road, but will be realigned in the end of Robit town to cross the river at the narrower part. The old road crosses the river without any bridge and is flooded easily during the rainy season. The realignment requires some houses to be removed/demolished. Also eucalyptus and fruit trees, coffee plants and bananas will be cut down. There are not many places along/by the road with any remarkable forests or tree resources, which would be affected.

After Robit the road goes over the Raya Plain which is very fertile agricultural area. If the rains are in time, and last long enough, the yield production is high. Due to the subsistence farming in the area, the failure of crop has dramatical results ending easily to the shortage of food. Irrigation would help the situation, and before reaching Kobo town there are new irrigation diversion weirs from the Elwuha and Golina Rivers.

In Waja town the road enters Debubawi/South Tigray Zone. The Waja River is a border between The Amhara and Tigrean regional States.

The river in Waja is quite wide and a problem area during rainy season. According to the plans there will be a bridge and culverts to improve the situation. After Waja the road goes through Alamata town and climbs up to the mountain, follows the hills and valleys of Tigray up to Betmara. At Alamata Ethiopian Electric Light and Power Corporation (former EELPA) is constructing a sub-station for the northern grid system including Sekota town in Amhara region. The agricultural land required to the station was compensated to the farmers in the value of lost crop production based on the size of land. Those who lost more than one hectare got as the compensation the average value of ten years' crop, and the least land loss was estimated according to three years' value and the farm lands between these extremes got the compensation based on between three and ten years' value.

After Alamata the road goes through Korem town from where one road leaves for Sekota in Amhara region. The project road continues to Meswait (Chinco Majo) and then to Maichew town, the administrative center of Debubawi Tigray Zone. Historically Maichew is remembered as a place where the Italian Army defeated the Ethiopians and occupied the country in 1937 just before the second world war.



LEGEND

- Major Tourist Areas
- Minor Tourist Areas
- Historic Route/Project Road
- Other Roads
- Archeological Site
- Major Batte Site
- Church
- Monastery
- Mountain Peak
- Ruin

FEDERAL GOVERNMENT OF ETHIOPIA
ETHIOPIAN ROAD AUTHORITY

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

WOLDIYA ADIGRAT–ZALAMBESA

PLANCENTER Ltd. Finland

TOURIST SITES

Figure 4.1 | Date

The road from the Woldiya to Maichew is very slippery, because material used is fine and becomes a "mud cake" when it rains. The driving is very difficult on Alamata Mountain and in Gira Kasso area where many accidents happen due to the soil. The road causes 20-30 major accidents annually between Woldiya and Maichew. During a dry season dust is a problem to pedestrians and drivers not only here but along the whole gravel road. After Maichew road goes through Adishehu, Ambalaje and Betmara towns in the terrain with very difficult uphills and downhills where the driving conditions are also very difficult.

After Betmara the road goes over the flatter part of Tigray. The road goes through Hiwane, Mainebri, and Adigudom, and also from here there is an access road to the Lalibela-Adwa road. After Quiha the road reaches Mekele, the capital of the Tigrean Regional State. This part of the road to Mekele is in a very bad condition and inconvenient to drive. The old Italian road is surfaced and visible most of the time. The road condition between Maichew and Mekele towns is so bad that it creates problems for the Maichew administration "even run the Government business" since the vehicles are broken during the trip from Maichew to Mekele. Also the consultants saw a number of vehicles, mainly trucks and trailers, broken on the road due to its condition at a time of a field visit.

Before Mekele the road has already a new alignment going around the new international airport which is under construction. The road entering the town is also planned to have a new realignment which would be a part of the ringroad in the future according to the Master Plan to Mekele town. At the end of the town one road goes to the north-west to Hagere Selam and eventually to Adwa.

The road from Woldiya up to Maimekden is a gravel road except in Mekele town. Also Mekele has been one time capital of the Empire and Emperor Yohannes's palace has been turned into an interesting museum housing manuscripts, books, and furniture from the emperor's time.

It is also here where the camel caravans climb up from the Danakil Depression, carrying tablets of salt. Salt trade by the Afars may not be any more the most important source of money to the Afars, but historically this trade has been important from Danakil Depression to the highlands. The depression is one of the hottest places on the earth, with many points more than 100 meters below sea level. It is the site of famous dry salt lake from which the Ethiopians since time immemorial have obtained their bars of salt or *amoles* used both for consumption and as 'money'. Mined by the Afar people, the salt is loaded on camels and taken up into the highlands, where it is in considerable demand and fetches good price.

From Maimekden to Adigrat the road is a good asphalted road recently maintained. After Maimekden the road crosses Agulai, Wukro, and Negash towns. According to the tradition it was in Negash where the Muslims got a shelter during Profet Muhammed's time when they fled in fear of persecution by the Meccans. After Negash the road goes to Frewoine, where some houses were already marked to be demolished. Before Adigrat the road goes through Edagahamus town.

Adigrat is the administrative center of Misrakawi/Eastern Tigray Zone. It is also an important business center. In Adigrat there is also a fuel depot for the northern region; fuel is imported here from the Massawa port. Also a drug factory is under construction in Adigrat.

less than 600 mm (Zalambessa). There are two distinct rainy seasons along the road that is the main rainy season (June - September) and Belg (March - May)

Climate is the principal cause of flows since the annual mean rainfall decreases from Woldiya to Zalambessa correspondingly frequency of perennial rivers decrease similarly. The high run off coefficient of sedimentary and crystalline rocks is the main cause of high floods of seasonal rivers during the rainy season. In addition human activity that is high deforestation is the main reason for high floods in the area and low flow or no flow during dry period of the year. Deforestation of upper catchment have produced high sedimentation and siltation on the road section from Robit to Alamata.

The rainfall of the study area is divided into two seasons: the rainy season (Kiremt), between the month of June and September, and a dry season from October to March (Bega). In the month of April and May minor rains (Belg) often occur.

The total annual rainfall varies from 990 mm, 615 mm and 540 mm in Woldiya, Mekele and Adigrat respectively. The June - September rainfall varies between 200 mm and 800 mm along the road corridor. The average annual precipitation in the project area decreases in general from 990 mm in South to 540 mm in North. Yearly Rainfall for Selected Location In The Project Area is shown in Table 1 in Appendix 8.

Temperature

The mean annual temperatures is between 14.1 and 22.1°C along the road corridor (see Table 2 in Appendix 8).

Water Resources

The primary sources of water is rainfall. Though there are no major perennial rivers along the road corridor between Woldiya and Zalambessa, there are a number of streams and catchment areas with the potential to produce very strong and intensive floods. Lake Ashengi near Korem is located about 3 km away from the road.

Ground water

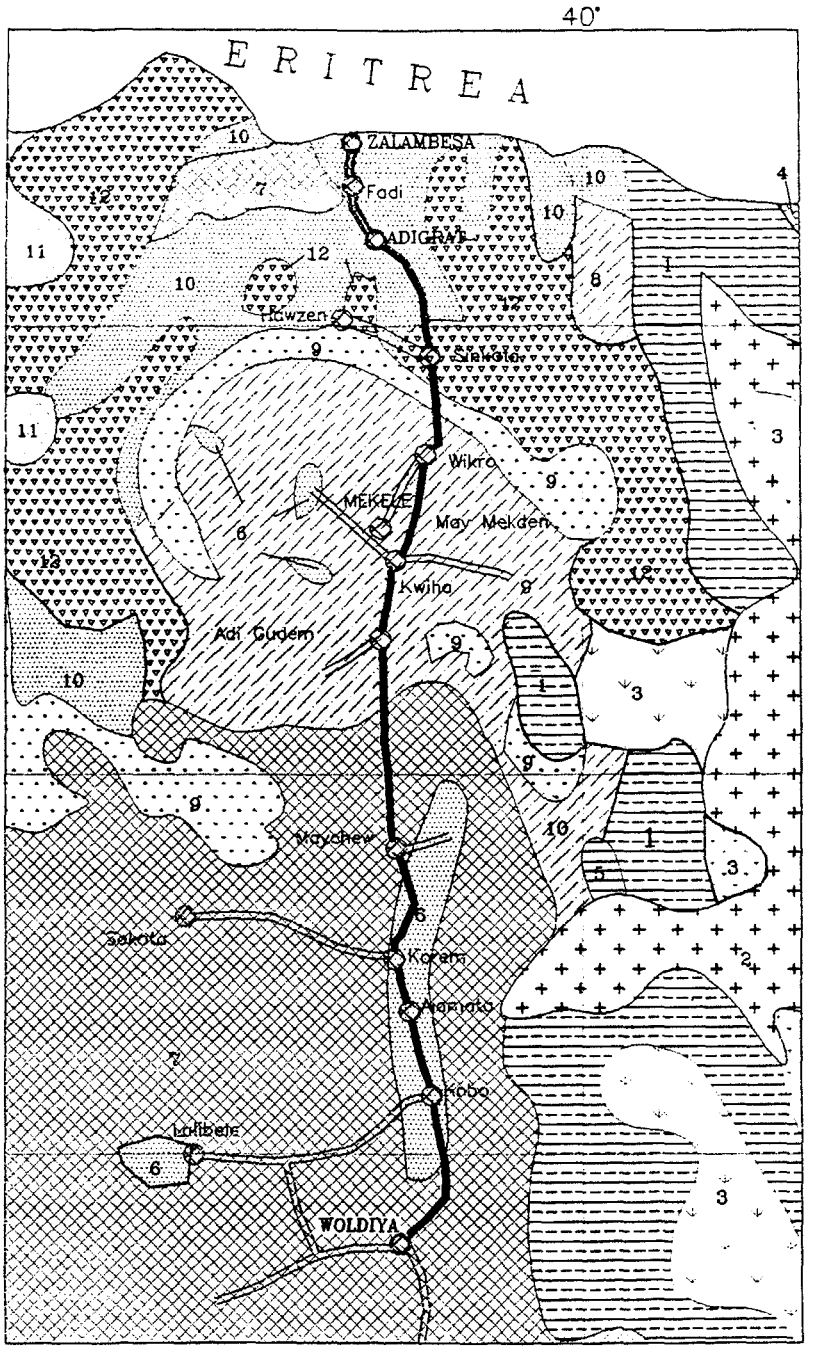
From Woldiya to Robit extensive fractured aquifer localised at fault zone and fractured areas of high productivity. Static water level greater than 20 meters.

From Robit to Alamata alluvial unconfined aquifers static water level greater than 20 meters. Alamata to Hiwane fractured localised aquifers with static water level greater than 20 meters. Hiwane to Zalambessa fracture aquifers confined with static water level greater than five meters.

4.2.2 Physiography

4.2.3 Topography and hydrography

The road traverses different topographic terrain of hilly mountainous, rolling and undulating hilly plains and flat plains. The road crosses the Awash, Danakil and Tekeze river basins drainage.



LEGEND

- Quaternary Sediments
- Basaltic flows and related Spatter Cones — QUATERNARY VOLCANICS
- Basaltic intermediate and felsic Volcanic — QUATERNARY VOLCANICS
- Dogali formation,Deset Formation Dunkshub Formation Red Sea Series — TERTIARY SEDIMENTS — CENOZOIC
- Alkaline Granite and Syenite
- Magdala Group — TERTIARY VOLCANICS — CENOZOIC
- Trap Series — TERTIARY VOLCANICS — CENOZOIC
- Antalo group — CENTRAL PLATEAU SEDIMENTS — MESOZOIC
- Adigrat Sandstone — CENTRAL PLATEAU SEDIMENTS — MESOZOIC
- Upper Palaeozoic Triassic Sandstone Shale, Glacial deposits — MESOZOIC
- Post-Tectonic granitoids (Upper Complex) — PRECAMBRIAN
- Upper Complex — PRECAMBRIAN
- Project Road
- Other Roads

FEDERAL GOVERNMENT OF ETHIOPIA

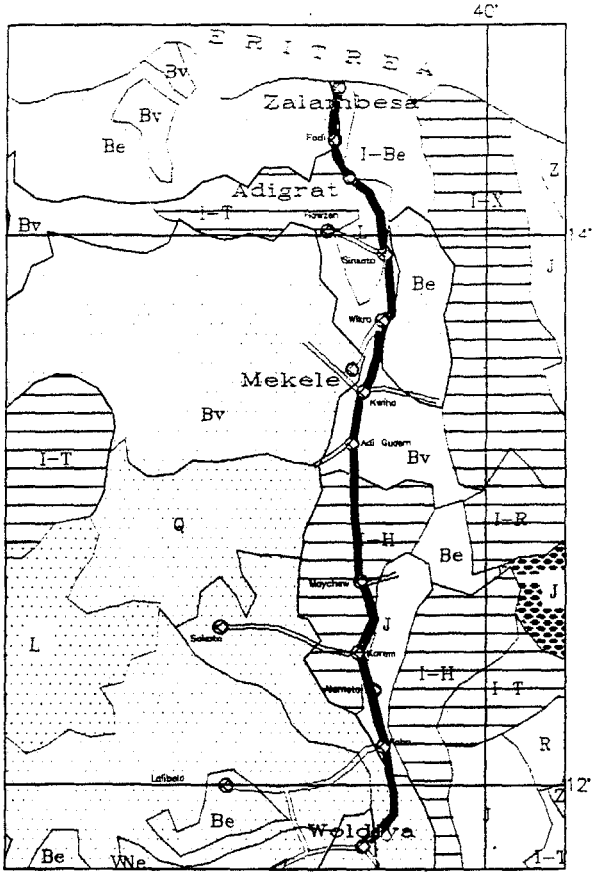
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FIVE ROADS SELECTED FOR REHABILITATION AND/OR UPGRADING

WOLDIYA–ADIGRAT–ZALAMBESA ROAD

PLANCENTER Ltd. Finland

GEOLOGICAL MAP

Figure 4 2 | Date



Be	Chromic Eutric and Calcic Cambisols
Bh	Dystric and Humic Cambisols
Bv	Vetric Cambisols and Vetric Luvisols
I	Lithosols
J	Calcric and Eutric Fluvisols
L	Chromic and Orthric Luvisols
Ne	Eutric Nitosols
Q	Cambic Arenosols
T	Humic,Mollic and Vetric Andosols
V	Chromic and Pellic Vetrosols
X	Haplic, Calcic and Luvic Xerosols
	Project Road
	Other Roads

PHASES

- Lithic
- Stoney
- Flooding

FEDERAL GOVERNMENT OF ETHIOPIA

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

WOLDYA–ADIGRAT–ZALAMBESA ROAD

PLANCENTER Ltd. Finland

SOIL MAP

Figure 4.3 | Date

4.2.6 Seismicity and earthquakes

The road section from Woldiya to Korem is found in seismic and earthquake active part of the Ethiopian rift system.

4.3 Biological Environment

4.3.1 Land use

The present land use of the road corridor between Makmati Iwir and Zalambessa is intensively cultivated and this include rainfed cultivation, grazing on unimproved pasture and fallow. The major crops in the cultivated areas include teff, wheat, barley, maize, sorghum, millet and horse bean.

Bushland and shrubland occupy the area between Woldiya to Michew and mostly found on the side slopes and footslopes.

Figure 4.4 shows the general land use - land cover along the road.

4.3.2 Flora

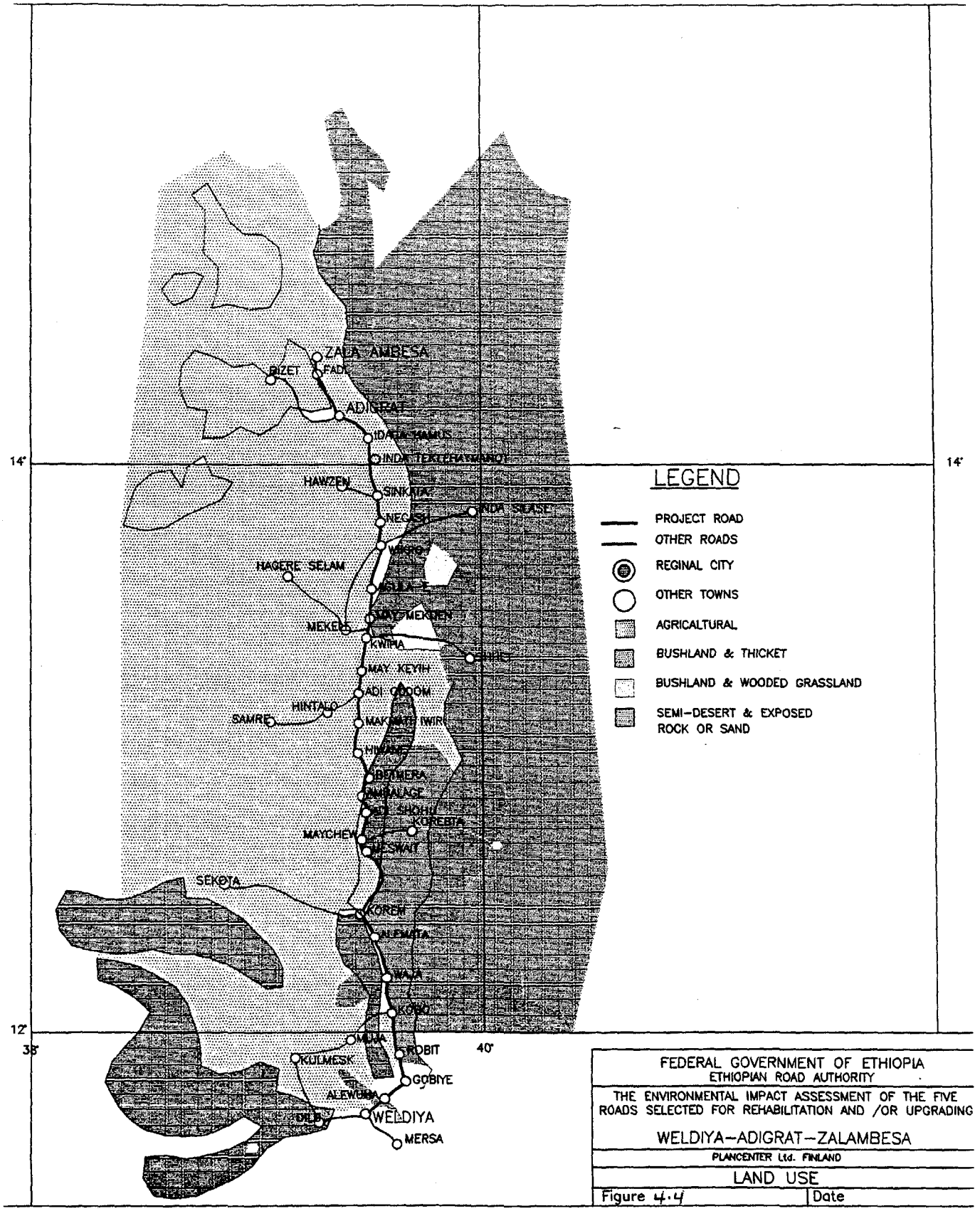
The natural flora of the study area between Woldiya and Zalambessa has disappeared due to over exploitation of forest resources, due to population growth, increased demand for agricultural land, encroachment for grazing, feulwood and construction practices. The original vegetation cover is evident along this section of the project area. Figure 4.5 shows the land cover that would have developed in the absence of human influence.

Gumburda - Grakas forest is one of the National Forest Priority area covering 26,000ha. Table 3 in Appendix 8 depicts the major tree and shrub species found in the project area.

There are plantation forest along the road corridor and the dominant exotic tree species commonly planted are identified as Eucalyptus camaldulensis, Eucalyptus globulus, Eucalyptus grandis, Cupressus lusitanica, Acacia albidas, Acacia saligna, Sesbania sesban, Leuceana leucocephala, Casuarina equisitifolia, Melea azadirachta and Shinus molle.

4.3.3 Fauna

The wildlife population and native wildlife habitat have been significantly impacted by subsistence agricultural practices in the project area and this has resulted in low wildlife population diversity in the region. However, in the Simien National Park and the Shire wildlife reserve, both west of the project area, have a diverse wildlife population. Figure 4.6 shows the wildlife conservation areas located around the project road. A list of occasionally and accidentally seen wildlife species in the area are given in Table 4 in Appendix 8.



FEDERAL GOVERNMENT OF ETHIOPIA
ETHIOPIAN ROAD AUTHORITY

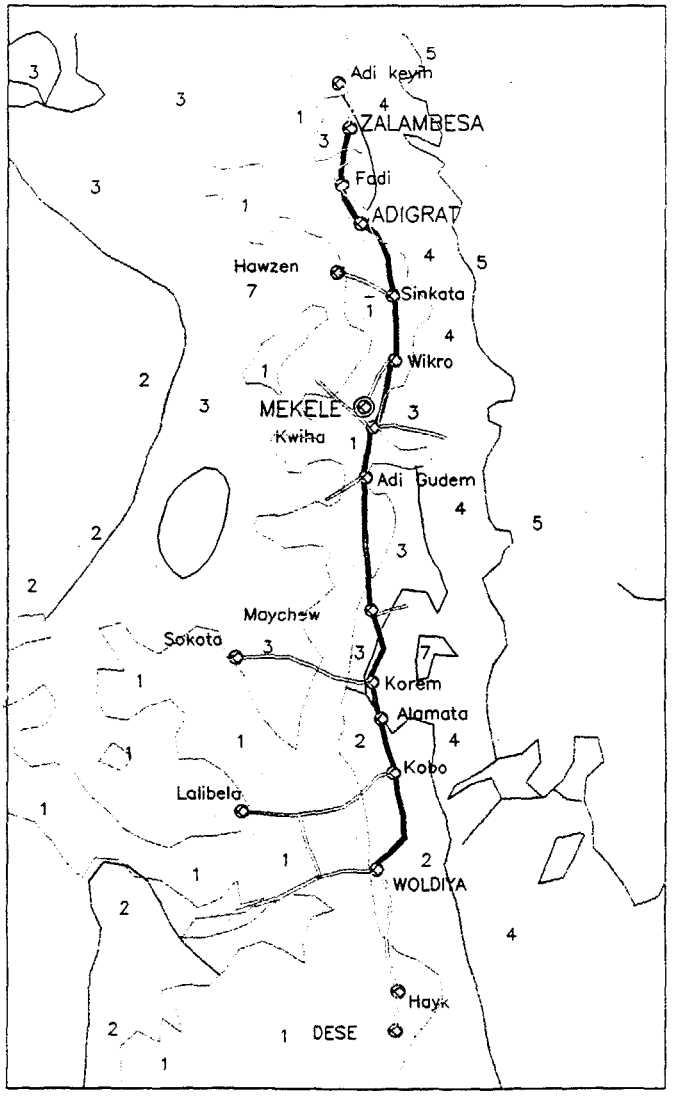
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FIVE ROADS SELECTED FOR REHABILITATION AND /OR UPGRADING

WELDIYA–ADIGRAT–ZALAMBESA

PLANCENTER Ltd. FINLAND

LAND USE

Figure 4.4 | Date



LEGEND

CONIFEROUS FOREST

1 Juniperst

2 Podocarpus

WOODLAND & SAVANNAH

3 Juniperus

4 Acacia

GRASSLANDS

5 STEPPE

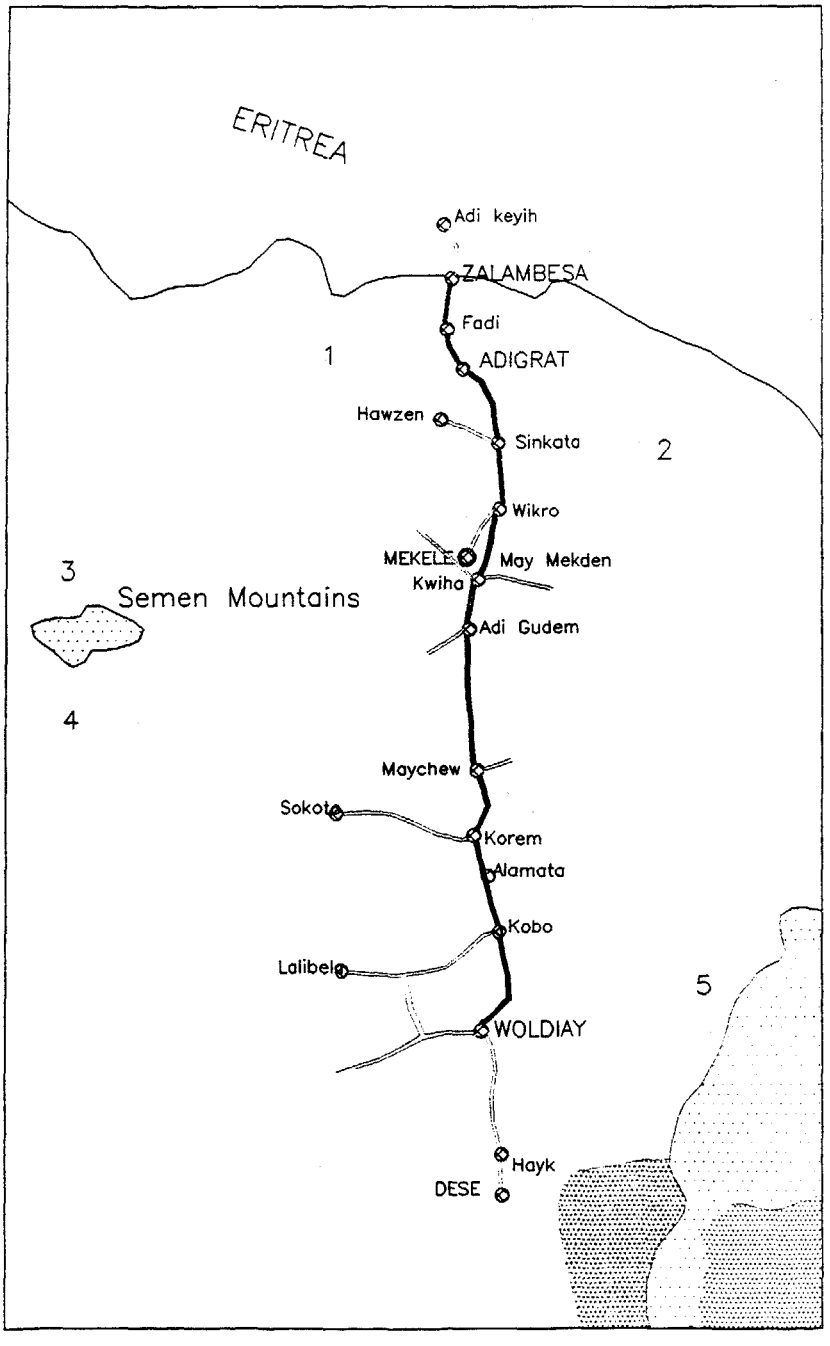
Project Road

Other Roads

Reginal City

Other Towns

FEDERAL GOVERNMENT OF ETHIOPIA ETHIOPIAN ROAD AUTHORITY	
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FIVE ROADS SELECTED FOR REHABILITATION AND /OR UPGRADING	
WOLDIYA–ADIGRAT–ZALAMBESA	
PLANCENTER Ltd. Finland	
CLIMATIC CLIMAX VEGETATION MAP	
Figure 4.5	Date



LEGEND

1. PANGOLIN
2. AARDVARK
3. SIMEN FOX
4. GELADA BABOON
5. HAMMADRYAS BABOON

- NATIONAL PARKS
- NATIONAL PARKS UNDER ESTABLISHMENT
- WILDLIFE RESERVES
- CONTROLLED AREAS
- PROJECT ROAD
- OTHER ROADS
- 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

WOLDIYA–ADIGRAT–ZALAMBESA

PLANCENTER Ltd. Finland

WILDLIFE CONSERVATION AREAS

Figure 4.6 | 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. The towns and rural people are quite evenly distributed along the road. Majority of people still live in the rural areas.

However, there are about twenty towns along the road. The urbanization in the woredas along the road is quite high when compared with the other Ethiopian areas. Only in three woredas out of 12 the rate is below ten percent of total woreda population. Five out of these twelve more than one quarter are urban. Also the existing 'small' towns are considerable, the population, only in two towns the population is less than three thousand inhabitants, while six has the population over ten thousand. The biggest towns along the road are Mekele (100,000 pop.), Adigrat (40,000 pop.), Alamata (26,000 pop.), Woldiya (25,000 pop.), Kobo and Maichew (20,000 pop. each). (Table 1, Appendix 9)

In most woredas along the road nearly all urban population live in the towns which have been developed by the road. The houses are often attached to each others by the road although also in the towns the detached housing units are more common (56-57%). In the countryside villages are formed from the detached houses with the compounds around.

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 over 300,000 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 about 1,200,000 persons. The indirect impacts of the road are felt by nearly 3 million people who live in the zones by the road. (Table 1, Appendix 9).

Sex Ratio The sex ratio is balanced only in Semen Wollo Zone, in all the other zones and in all the woredas there are more women than men from 51 to 52 percent of the total population. In the urban areas the ratio is even more biased in favour of women the average being 54-55 percent of urban population from 52 percent in Woldiya and Robit to 58 percent in Alaje woreda.

Female headed households

Female headed households in the whole Amhara Region forms 20 percent of all households. In rural areas the share is little less or 19 percent, while in the urban areas the figure goes up to 42 percent. In the Tigray Region the percentage share of female headed households is higher, 31 percent of total households, 27 percent in the rural areas and 50 percent in urban areas.

This means that half of the urban households living by the road are also economically dependant on women and their income. Hotels, restaurants, bars, talla and taj houses by the road are mainly run by women (93%) many of which are heads of their families. The

better road is anticipated to increase the transitory traffic and hence benefit also these households.

Fertility and the population under 15 years of age

The total fertility rate (TFR) of 5.355 for the Tigray Region is quite high. Although the urban rate is lower it is still quite high being more than 4 even for urban areas. Also the share of population under 15 years of age is high in Tigray Region. More than half of population are under 15 years of age in Egda Hamus town near the Eritrean border. The lowest share can be found in Woldiya town where one third are below that age. The average share is also lower in Semen Wollo Zone than in Debubawi and Misrakawi Tigray Zones. Also the total fertility rate is lower. The population growth seems to be slower in the southern part of the road and quite strong in Tigray. (Appendix 9, Table 2, Table 1)

Average household size

The average regional household size is smaller in Tigray (4.3) than in Amhara (4.8) region. However in the first part of the road in Semen Wollo and Debub Tigray it is smaller being 4.1 persons per household. In the northern part the family size increases to 4.4 persons in a household. The urban families have approximately less than 4 persons (Appendix 9, Table 3).

Ethnicity

The road goes from one ethnic region to the other, from the Amhara Region to the Tigray Region. The Tigraways form a clear majority in their own national region and the Amharas in theirs. The share of Amharas decreases very rapidly after Alamata woreda towards the north and the share of Tigraways increases being nearly hundred percent in the northern part of the road (most 'Eritreans' are also Tigraways). (Appendix 9, Table 4).

There are several ethnicities, about 30, living along/by the road, most represented by few persons, some by tens or hundreds, very few with thousands. However, the Sahos and Afars do; they are indigenous (or maybe here more 'traditional') people to the east from the road in the Danakil Depression area. The Saho tribes live in the coastal depression south of Massawa and most of them have been herdsmen like Afars. Sahos' seasonal migrations have taken them up to the plateau where some have permanently settled on the eastern slopes (and many adopted Tigrigna as their language). Also the Afars' share is bigger in the north, and especially in Agula town where they form one tenth of the total population.

Religion

The Ethiopian Orthodox Christianity is the major religion along the road. Most Tigraways and Amharas are adherent to it. The share of Christians is more than 90 percent in all other woredas than Alamata where it is less than 80 percent of total population (78%). Here every fifth person is a Muslim. Also in Wukro woreda the share is more than ten present, in every other less than that. The share of Muslims is increasing, however, in urban areas, being 40 percent in Agulai town. (Appendix 9, Table 5). There are few Protestants in this area and the share of Catholics is increasing near the Eritrean border; in Adigrat and Zalambessa their share is 3 and 4 percent of total urban poulation, respectilvely.

Literacy rate

About three quarters of urban men are literate, the share increases towards the north. The share increases also in the rural areas as well as among urban and rural women. (Appendix 9, Table 6).

Migration

About half of the urban population are migrants, 52 percent of urban population in Debubawi Tigray and 48 percent in Misrak Tigray. In the rural areas, where the movements in absolut numbers is biggest, the percentage share of migrants among the total population is only 9 in the northern part and 16 percent in the southern part of the road.

In urban area 20 percent of all migrants moved to the area within one year or less before the national census 1994 shows that the growth of towns is very much dependant on migration in the whole survey area. (Appendix 9, Table 7).

Future growth of towns along the road

The growth rate for urban areas is assumed to be 3.7 percent annually and in the rural areas 2.1 percent. 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. 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

There are nearly 690,000 housing units in Tigray, out of which nearly half in the zones by the project road; and 60 percent of the urban housing units can be found in these two zones.

In urban areas of the Tigray Region nearly all houses are permanent (95%) and nearly half of the houses (44%) 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 in Tigray are traditionally built from stone and mud (72%) showing the fact that the forests have been absent for a long time. Especially the rural houses are built from stones (76%) while the urban houses are using more wood and mud (or mixture of mud/dung/teff straw) and less than a half of urban houses are of stone (48%).

Debubawi Tigray stone houses constitute 56 percent of all houses and 36 percent are made of wood and mud. The share of stone houses increases towards the north and in Misrakawi

Tigray the share is as high as 86 percent and only 10 percent are of wood and mud of all housing units.

However, in the urban houses more wood is used than in the rural areas. In the urban areas in the southern part of the road half of the houses (52%) are made of wood and mud and in the northern part one fifth (19%).

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. Iron corrugated sheets are more common in the south (24%) than in the north (13%) where most tin roofs can be seen in urban areas (82%). The iron sheets are also showing the better economic situation due to its price compared to the traditional thatched roofs. The main material used for floors is mud (81-85%).

55 percent of houses in Tigray Region is one room houses and 28 percent have two rooms. the comparative percentages for Amhara Region are 70 and 22 percent, respectively.

In Tigray there are in average 4 persons per urban housing units. In big towns the average increases and also in Zalambesa near the Eritrean border. There are also more households than housing units in the whole survey area. In the whole Tigray 1.05 households in average live in one housing unit.

Bathing facilities

In the urban areas the bathing facilities are available only to 4 percent of all housing units. It is a little bit higher than regional average due to the big towns along the road. 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. The share of all toilet facilities is decreasing when going towards north.

The availability of toilet facilities is bigger in urban than rural areas. However, the share of available toilet facilities decreases with the growth of town. In the small and medium size towns the share goes up (Edaga Hamus 92%) and in the bigger towns down (Mekele 47%, Maichew 51%, Alamata 63%, and Adigrat 75%).

Electricity for lighting

Nearly half of the urban households (48%) in Tigray use electricity for lighting. The share is same in Misrakawi Tigray zone while in southern zone 58 percent use electricity for lighting.

All towns along the road have electricity. However, the distribution of its use is very uneven.

In Mekele the share is 85 percent and in Adigudem less than one percent use electricity for lighting. (Adigrat 79%, Maichew 57%, Wukro 62% and Alamata 38% of households)

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

Availability of radio, telephone and TV

Radio is more common in Tigray Zones than in Amhara Region: it is available in about 15 percent of houses in the whole Tigray and in urban areas in about 40 percent of households, and for more than half of the housing units only in Mekele. In the rural Amhara areas about five percent of households have a set and in towns about every third household has a radio

The availability of television is very rare in the survey area. In all the other towns except in Waja and Adigudem some sets can be found. Only in Mekele seven percent of housing units have a TV set.

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 morning 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.

Very few people have the access on TV sets which could be also used for traffic education and information about traffic behaviour. Now there are no programs concerned about traffic problems/ education/ behaviour.

There are telephone connections to every town along the project road. In Mekele the frequency is highest: nearly five percent of housing units has a connection. In Adigrat nearly four and Korem and Maichew about two percent have connections.

Ownership and cost of houses

Less than half of the houses in the towns in Tigray are owned by the households living in them. In Debub Tigray Zone 45 percent owns their house while only 38 percent do so in the Misrakawi Tigray Zone. The kebeles are renting very few houses in these towns; in northern part less than one percent is rented from kebele and in the south five percent. The houses are often rented from the other private households, in the north half of the households live in a house they rented from the private market and in the south nearly forty percent (38%). (Appendix 9, Table 8).

Most houses, especially in rural areas, are built from local materials, mainly stones and mud, and the material is and has been collected often by the houseowner. In the towns the wood houses are common, and 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 about 30 percent. The moderate house of hollow blocks costs about

fifteen to twenty thousand birr. 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 Tigray region is 35 birr per month. The rents, however, varies a lot in the survey area. Highest average can be found in Mekele where the monthly average for rents is 60 birr. The lowest average rents are in Waja where it is 9 birr. (Appendix 9, Table 8).

Type of fuel used for cooking

Nearly all households are using more than one type of fuel for cooking (Appendix 9, Table 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; more than half of the households use it. The share of electricity (used mainly by electric metads for injera baking) is negligible. Only in Mekele and Adigrat about five percent is using electricity for cooking. Kerosine is used by ten percent of housing units in Adigrat. In the northern towns kerosine is used a little bit more than in the southern part of the road, only in Alamata and Maichew its use is more than one percent. Dung is used for cooking, especially in Korem (30%) and Zalambessa (28%). .

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). As a rule use of fuel wood increase 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 will put more pressure to the trees and forests in the area.

The road construction with construction camps will increase the use of wood and charcoal considerably.

Drinking water

Majority of people (71-74%) in Tigray region get their drinking water from the unprotected springs, rivers, ponds and lakes. However, less people in the zones in the survey area are using unprotected water sources than what is the regional average (78%).The possible accidents with the hazardous materials/chemicals on the road/bridges might cause the pollution of water on which many people might be dependant on.

In the towns the tap water is used by 66 percent of population, in the towns in the two zones by 76 percent of urban population. In most of the towns the drinking water is supplied from boreholes.

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 subsistence farming based on the traditional farming methods. Most farms are rainfed, and if the rains are in time and last long enough the yilds are good. However, this is also the area were the shortage of food is felt easily due to the failure in crop production. There are some irrigated farms near Robit town and few plans for increased irrigation.

Crops here are typical to the highlands: teff and other grain, beans and peas, oil seeds, vegetables, and in some localities also banana and/or fruit trees are grown.

Animal husbandry

Most cattle in the survey area is needed for the crop farming system in the whole survey 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 a little over ten percent of the households keep their livestock during the nights inside the house/room where also people sleep.

Industry

In big towns there are many small industrial enterprises such as garages, different workshops etc. while bigger industry is located in Mekele, where also a new cement factory is under construction. In Adigrat a drug factory is near completion. The better road is expected to increase also industrial activities through better and cheaper transportation.

Service sector

is considerable especially in the towns where it serves mainly local needs but road is also important to the sector when transporting raw materials to the service sector enterprises and their ready made products to other localities.

Good hotels can be found in Woldia and Mekele 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 (50 percent of urban families are female headed) many more are dependant on these activities. The urban households are also served by many women who are carrying fuel and other necessities to the markets.

Economically active population and unemployment

Economical activity is higher in the countryside than in the towns where about half of the men are economically active. Men are more active than women both in urban and rural areas. The economical activities do not include reproductive work (such as fetching fire wood or water, cleaning house or making food) which partly explains the lower rate for women.

Men's unemployment rate varies from town to town, from seven in Wukro to 20 in Edagahamus where also women's unemployment is highest or 20 percent. The lowest unemployment rate, little over one percent, for women can be found in Adishehu.

Although the unemployment rates are lower to the rural areas, 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 (Appendix 9, Table 10 and 11).

The unpaid family workers form the largest status group about half of all economically active persons. Especially women work as unpaid labour for the household. Self employed and unpaid family members together is more than 90 percent of labour force, showing that family based private enterprices (shops, bars, farms) is the biggest form of ownership of means of production .

The government employees are mainly located to the towns and about one third of them are women.

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 as well as all participants in the public consultation in Mekele gave a clear acceptance to the project. The only concerns are related to the construction period. However, the longer term benefits are expected to be much bigger than the temporary problems caused by the construction period.

Both the people living by the road and those using the road for transportation/ transitory traffic see the road be vital and beneficial to their communities, local business and national economy. The project and the pavement is anticipated to increase the benefits. The project would free the local people from the biggest problem, dust, caused by the present gravel road. The improved condition of the road is anticipated to speed up the transportation, decrease considerable the costs of transportation due to less breakages and other failures, and increase the traffic safety.

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 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 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, vegetables, *nug*-oil, or whatever people have to sell.

One of the justifications to rehabilitate/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 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 an important import/export link from Eritrea to the inland of Ethiopia. Also the national and international tourism is anticipated to increase in the survey area especially with the better road.

Problems with the present road

Dust is one of the biggest problems for the locals and for the drivers. With the better roads accidents due to the dust are expected to decrease. Costs due to the poor condition of the present road are very high and the accidents common.

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 *aṣbesa*/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 Woldiya - Zalambessa 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 (Table 5 summarises the identified potential constraints of the proposed quarry and construction material sites), operation of equipment's and housing of the labour force, but very few that will lead to permanent change.

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 issues 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 drainage bridges and culverts.
- Not compacted embankments and spoiled materials.

Slope stability

Clearing and grabbing by equipment and blasting of rocks for road widening will affect the slope stability. The section of the road on hilly terrain and volcanic geological formation is a relatively unstable section of the road (Alamata-Hiware).

Soil contamination by spills of hazardous material

Soil contamination can occur due to 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 and Borrow Pit Sites

Inspected Borrow Pit Location (km)	Constraints				
	Quantity Available (M^3)	Agricultural land	Terrestrial Vegetation	Private/ public Property	Access road
RQ-01-04+500	100000	No effect	No effect	Telephone and electric line	NR
SB-01-08+500	75000	No effect	No effect	No effect	NR
BM-01-10+000	30000	Minor effect	No effect	No effect	NR
BM-02-24+670	30000	No effect	No effect	No effect	NR
SB-02-26+000	40000	No effect	Isolated trees	No effect	NR
BM-03-37+100	350000	No effect	No effect	No effect	NR
RQ-02-37+500	100000	No effect	No effect	No effect	Required
SB-03-39+700	50000	No effect	Bush land	No effect	Required
BM-04-50+500	150000	Minor effect	No effect	No effect	Required
SB-04-50+600	500000	Minor effect	No effect	No effect	Required
RQ-03-53+000	125000	No effect	No effect	No effect	Required
BM-05-66+500	100000	No effect	No effect	No effect	Required
SB-5-79+900	800000	No effect	Grazing and bush land	HT electric line	Required
RQ-4-79+900	50000	No effect	Grazing and bush land	No effect	Required
BM-6-80+200	100000	No effect	No effect	No effect	NR
SB-6-91+400	60000	Close to agri-land	No effect	No effect	NR
BM-7-93+200	50000	minor effect	No effect	No effect	NR
BM-8-100+600	200000	No effect	No effect	No effect	NR
SB-7-105+400	60000	No effect	No effect	No effect	NR
BM-9-112+800	40000	No effect	No effect	No effect	NR
SB-8-114+700	300000	No effect	Grazing and trees	No effect	NR
BM-10-123+350	30000	No effect	No effect	No effect	NR

RQ-5-129+500	100000	No effect	No effect	No effect	NR
BM-11-134+800	50000	No effect	No effect	No effect	Required
SB-10-142+200	30000	No effect	No effect	No effect	Required
BM-12-145+700	70000	No effect	No effect	No effect	NR
RQ-6-155+300	150000	No effect	No effect	No effect	Required
SM-11-156+000	30000	Close to agri-land	No effect	No effect	NR
BM-13-160+400	150000	No effect	Grazing land	No effect	NR
SB-12-167+500	70000	No effect	No effect	No effect	NR
BM-14-173+500	10000	No effect	No effect	No effect	Required
SB-13-179+200	90000	No effect	Grazing land _	No effect	NR
QM-7-183+600	3000000	No effect	Bush land	No effect	Required
BM-15-185+300	900000	No effect	No effect	No effect	NR
SB-14-187+800	100000	No effect	Eucalyptus tree	No effect	NR
BM-16-202+150	75000	Major effect	Grazing land	No effect	Required
BM-17-215+100	50000	Major effect	No effect	close to houses	Required
SB-15-215+600	80000	Minor effect	No effect	close to houses	NR
BM-18-227+400	30000	No effect	No effect	No effect	NR
SB-16-229+400	100000	No effect	No effect	No effect	NR
RQ-8-231+900	200000	No effect	No effect	No effect	NR
SB-17-239+100	150000	No effect	No effect	No effect	NR
BM-19-241+500	45000	No effect	No effect	No effect	NR
SB-18-255+300	140000	No effect	No effect	No effect	Required
BM-23-302+600	80000	No effect	No effect	No effect	NR
SB-21-310+000	120000	Partially on agri-land	Grazing and bush land	No effect	NR

* *RQ - Rock Quarry*
SB - Sub-base Material
BM - Borrow Material
NR - Access not required

5.1.2 Hydrological conditions and water quality

Water resources and water quality

Along the road perennial rivers which can be used during construction are few and far apart (Golina, Illala, etc.). There are small springs and streams with small discharges during the dry period of the year which are used by the local people for water supply and irrigation. The use of these streams and springs will completely deplete them and may lead to a situation where there is no flow downstream. Replacement and new construction of additional drainage's bridges and culverts will discharge cement slag, oil spill hazard (especially during dry season minimum flow). Temporary cut-off flow during construction of bridge piles in rivers will change the regime flow of the river, which affects the water quality (increased turbidity).Constraction of flow at culverts and bridges will change the regime flow of the river (increased velocity).

Quarries and borrow pits can be used for water harvesting after the construction of the road if the geological condition and the topography are favouring.

Upgrading and/or rehabilitation of the road shall not cause substantial effect on the water resources and water quality along the road route. There may be a positive impact due to addition of culverts and energy dissipaters maintenance and providing which will decrease the velocity of the water and decrease the turbidity of the water downstream (improving the water quality).

Highway runoff pollution has insignificant adverse impact, since highway runoff occurs during rainy season when the streams and flood path have high floods. Therefore, the dilution effect is significant.

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. 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 and rock quarry sites.

Except the Gumburda Grakas National Forest Priority Area, there are no other significant areas of natural or semi-natural forest all along the project area.

5.2.2 Destruction of wildlife habitat and impediment to movement of wildlife

There are no major wildlife communities in the project area that will be affected by the construction of the project.

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 and organizations by the road and by the participants in public consultation in Mekele. 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

According to the interviews/public consultation the 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 causes problems/damages but if mitigation plan is integrated to the planning the problems can be minimized.

5.3.2 Resettlement/displacement of people

There will be some people who will be displaced from their present houses and the resettlement question arises due to the project.

According to the project design there will be some new alignments on the present road. In the northern end of Robit town some houses will be removed due to the new bridge which is crossing the river east of the present road. Also in Frewoine town before Adigrat many

houses are already marked to be demolished due to the road. There are no rural/agricultural farm houses which must be displaced.

In Robit the new road alignment goes out of ERA's Right of Way, while in some other places many houses have been build within it. Either legal or illegal buildings the people living in these houses must find a new place to live. In practice the community has helped to find a new place to live.

In most towns in the country kebeles own and rent out quite a considerable number of houses/rooms. In the case of resettlement it is easier to kebele if it has houses of it own. However, along this road there are very few kebele owned houses (as compared to other four studied roads).

In Robit 8 percent are rented from the kebele when 83 percent of houses are owner occupied. This share is highest on the project road. In Freweyni less than one percent of all houses is rented from kebele, and 45 percent from other private households, one third owns the house they live in.

Especially in Frewoine, many displaced people would be private tenants.

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. Especially in the northern part of the road the share of women and young population is very high. The present growth and other trends continue with and without the project, there will be no dramatical demographic changes due to the road project.

5.3.4 Change in way of life

The changes due to the rehabilitation 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 are 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 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 affect especially women who are often worse-off than men.

In the places where the houses will be demolished, the resettlement of women headed households should get a special attention. Especially in Frewoine 45 percent of the households have rented the houses from the private other households. Since the female headed households in urban areas constitute half of all households and especially these women are engaged in the road side services (bars, hotels etc) very often on the tenant basis, there should be careful monitoring that also these families are included in resettlement plans.

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

5.3.6 Impacts on indigenous peoples

The project area in the south is traditionally Amhara area and in the northern part the Tigraways are indigenous or traditional. There are some other 'traditional' ethnic minorities such as the Afars and Sahos. Many other ethnicities which are not big in number live in this area more as individual migrants than as ethnic minorities. The road is not bringing any new or different impacts on these people. They will be served by the road in the same manner than it serves Amharas and Tigraways.

5.3.7 Induced development

Maybe one of the most common example about the induced development due to the construction of road 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 are moving in it. 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 continue to 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 employment possibilities also to the local people. Possible ethnic conflicts are small, if any at all, in the hills where camps can be located any place, because in all localities people expect to be hired as semi-skilled or daily labour. Skilled labour would come from outside and reside in the camp while locally hired labour will not.

Usually the workers stay in the camp for four 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.

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.

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 Human and Social Environment: Economic Issues

5.4.1 Loss of agricultural lands

Because the upgrading follows the old road, not very much agricultural lands will be permanently lost. The temporary losses will be in the places, where the detours will be constructed. In these cases, however, the losses are only temporary and therefore there will be no compensation for lost lands. However, if the land has been used as a detour for a year, it will take time before that land can be used as agricultural land.

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 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

Few houses will be lost in Robit town and quite many in Freweyni towns due to the project. In Robit town the houses are made of wood and mud and will be compensated because of the new alignment. Compensation is paid based on the value/costs of a new similar house. However, the consultants recommend that the compensated value would cover the costs of a new hollow block house due to environmental reasons. The hollow block houses are not very much more expensive, and would save trees. The price of wood and mud house is about 800 birr per square meter while the hollow block houses cost about 1200 birr per square meter. In Frewoine houses to be removed are built of natural stone, and can be compensated as stone or hollow block houses.

According to the practice, compensation depends on the location of the houses, either inside or outside the Right of Way. Compensation should be paid for displaced houses if legally or illegally built.

The owner of the house will receive the compensation regardless of the fact if he/she lives in a house or it is occupied by the tenants. In Robit 83 percent of the houses are owner occupied and in Frewoine 36 percent.

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 happen 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 and fuel demand/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 important trunk road connects Addis Ababa to the northern part of the country. The road is also an important import/export road between Ethiopia and Eritrea. The increasing industrial ization in Mekele and Adigrat using this road benefits national economy in the form of new employment possibilities. With the better road and quicker transportation for agricultural inputs and outputs are expected to inrcease the agricultural production.

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 Mekele with an international airport under construction, but these flights will also in the future serve mainly passengers.

The condition of the cars will be improved / breaking less due to the better service will save imports of spare parts. On the other hand the imports of the cars/trucks will increase.

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 Gobiye to Mekele is rated as one of the scenic routes in the country. Foreigners are also interested in the country's unique natural environment. 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. 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.

The less known sites such as graveyards or other holy places to the locals might be affected unless negotiated with the locals.

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. (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.

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

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.

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. The rainy season is a dangerous time for the transitory traffic due to the slippery nature of the present road and better surface will make the road safer.

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 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 alike will be diminished; reduced dust problem improves the living standards and health status especially in the towns

- the problem of vehicles tending to change their courses of driving from the carriage way to shoulders and ditches and sometimes outside of the road itself, will be solved by upgrading/rehabilitating the road

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

- the problem of flooding to the road near Robit town will disappear with the new bridge

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 the 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.
- 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 and water quality

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.

7.1.5 Construction spoils

Once the construction of the Woldiya - Zalambessa 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 minimise erosion and to provide a more aesthetically pleasing appearances to the visible project facilities.

All sites will be inspected by ERA Environmental Protection Unit staff and the site clean-up approved before the contractors are allowed to abandon the site.

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 achieving 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

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.

Cost of the mitigation measures

At the present the resettlement does not cost anything to the contractor or ERA.

The costs needed for proper negotiations for the resettlement of displaced people by ERA compensation committee -- paid by ERA

Possible adequate assistance from the state -- by the Government

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

Although the road upgrading does not bring any new negative impacts on these people, it could, however, benefit them and their animals if some new water sources/boreholes are needed for the project and left to their use in the valley area.

Also the animal crossings could be negotiated with the locals for better road safety for all parties.

7.3.7. Induced development

To induce planned development the camping 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 built 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.

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 must 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 must be held about the location of camps and other construction sites. The seasonal migration must be taken into consideration. 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 must include 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. In Robit due to the new alignment some fruit trees and other permanent crops will be lost and must be compensated.

Consultations with the local administration to minimize the removal of houses. 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 with the cooperation with 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. To minimise the potential health risk 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 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	Less than hundred will be resettled 48 000 Birr /hollow block house
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/minimize the temporary losses of grazing land. * After the project the contractor is responsible to rehabilitate the used sites to their previous condition.	ERA Contractor	
	4.2 Loss of property	* The needed areas for construction should be planned as to minimize the effects on the growing crop, coffee plants, and trees * The value of the lost crop should be estimated according to market prises. * Demolished houses are compensated by ERA according to the costs of a new house. Due to the environmental reasons it is recommended that wood & mud & thatch houses are compensated according to the costs of a hollow block house	ERA ERA Compensation Committee	(units of coffee plants and eucalyptus trees) Price/sq meter: hollow block house about 1200 Birr (wood & mud & thatch houses about 800 Birr)

5 Human and Social Environment; Other Issues			
5.1 Cultural, religious and historic areas	* Negotiations with Ministry of Information and Culture and UNESCO about Tiya and other archeological sites. * 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. * The destruction of locally important sites can be avoided in cooperation with local elders/administration.	ERA/Contractor	
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.	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 and Tigray Administrative Region. The Department of Forestry will determine which types of forest stands should be planted and implemented 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 Agriculturist 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 resettlement and compensation 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 its 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

Proclamation No. 94/1994 Forest Conservation and Development Conservation (MOA to be requested)

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a) Kulubi - Mieso, Eng. Report (1994)
b) Alemgena - Hossana - Sodo Eng. Report, Volume I & II (1995)
c) Awash - Mille Eng. Report , Volume I (1994)

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Volume I	Policies, Procedures and Cross Sectoral Issues
Volume II	Sectoral Guidelines
Volume III	Guidelines for Environmental Assessment of Energy and Industry Projects

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The World Bank 1994: Roads and the Environment: A Hand Book

The World Bank 1994: Road Maintenance and the Environment

The World Bank 1995: Operational Policies 4.04 on Natural Habitats

The World Bank 1995: Papers on Social Assessment

The World Bank 1995: National Environmental Strategies: Learning from Experience

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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Gouin P. 1976: Seismic zoning of Ethiopia. Bulletin of the Geophysical Observatory, Ethiopia.

Tesfaye Chernet 1982: Hydrogeological map of Ethiopia. Scale 1:2,000,000. Ministry of Mines and Energy

Soil and Geomorphology map of Ethiopia. Scale 1:2,000,000. Ministry of Agriculture, 1982.

Mean annual rainfall map of Ethiopia.Scale 1:2,000,000. National Meteorology Service Agency 1982

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- Results for Oromiya Region
  - Volume I: Part I. Statistical Report on Population Size and Characteristics, April 1996, Addis Ababa
  - Volume I: Part II. Statistical Report on Education and Economic Activity, April 1996, Addis Ababa

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  - Volume I: Part III. Statistical Report on Migration, Fertility and Mortality, April 1996, Addis Ababa
  - Volume I: Part IV. Statistical Report on Housing Characteristics, April 1996, Addis Ababa
- Results for Harari Region
  - Volume I Statistical Report, September 1995, Addis Ababa
- Results for Dire Dawa Provisional Administration
  - Volume I Statistical Report, October 1995, Addis Ababa
- Results for Tigray Region
  - Volume I Statistical Report, November 1995, Addis Ababa
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  - Volume I: Part I. Statistical Report on Population Size and Characteristics, December 1995, Addis Ababa
  - Volume I: Part II. Statistical Report on Education and Economic Activity, December 1995, Addis Ababa
  - 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
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  - 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

MINUTES OF MEETING

Public Consultation due to the Upgrading/Rehabilitation of the Woldia -Adigrat - Zalambessa Road

Place	Mekele	
Date	June 26, 1997	
Time	9:00 - 12:00	
Coordinator	Ato Tsadek Lemma	
Facilitators	Ato Tadele Debele,	ERA HQ, Chairperson
	Ato Dejene Wolde Mariam	Plancenter
	Ato Atnafe Beyene	Plancenter
	Ms. Ulla Mustanoja	Plancenter

Agenda

1. Introduction by ERA representative
2. Introduction of the Plancenter Consultants
3. Discussion on the issues raised by the introductions

1. Introduction by ERA representative

The representative of ERA explained the purpose of the public consultation and the Road Sector Development Plan (RSDP) in general and specifically the Mojo - Awash - Mille road rehabilitation works that ERA will undertake. In the introduction outlined following issues:

* Environmental Assessment is an essential part in planning and designing roads
* Environmental impact issues are global by nature and environmental problems crosses national borders. Problems such as ozone layer depletion, soil erosion, forest depletion etc. have become major concern in the world.
* Development activities should not disturb the environment and hence mitigation plans must be included already in the planning process.
* Benefits of the road and use of natural environment should be harmonized in road construction
* Public consultation is a new approach in the road sector and it is believed that it contributes a lot in the designing of the roads.
* The public can use this forum to express their ideas regarding the present problems and benefits of the road.

2. Introduction by the Plancenter consultants

The consultants of Plancenter explained about the general framework of the environment impact assesment (EA) study, the objective of the public consultation meeting and why public participation is necessary. It was stated that road construction have different impacts on the social and physical environment. The environmental impacts can be classified as

Physical and natural environment
- Soil erosion
- Water
- Air quality
- Flora and fauna

Human and social environment
- Community life and economic activities
- Land aquisition and resettlement
- Indigenous and traditional populations
- Cultural heritage
- Aesthetics and landscape
- Noise
- Road safety

Managing road works and traffic operations
- Construction and offsite activities
- Rehabilitation and maintenance practicies
- Risks associated with road works and traffic operations

It was explained also that public consultation is part of the EA study and the objectives are

* Delivering information about the project
* Collecting information, opinions and concerns about environmental issues related to the road project
* Give different parties of the communities along the road the possibility influence the methods of avoiding, limiting and compensating the possible negative impacts of the road project.
* Have discussions abot possible alternative routes or alignments and e.g. temporary by-passer and work sites during road construction

The introduction included also that

* Participants should mention the problems and benefits that are unique to this road
* The consultants would like to hear from the participants different issues regarding the project and what the public says about this road.
* The upgrading and rehabiltation works will be on existing road and there will be few alignments in some sections of the road.
* In the past there were damages to properties and farm lands and in some areas people reacted negatively and it was difficult to implement road and other projects.

Minutes of Meeting

The need and importance of public participation was also stressed

* Participation guarantees sustainability
* Participation engourages a sense of responsibility
* Participation ensures that things are done in the right way

Participants were reminded to include into the discussion

* the social problems on the existing road
* what should be done in the future to avoid problems that might appear
* the beneficiaries of the road
* for what purpose the road is used
* what mechanism should be used to involve the public in road construction
* compensation experiences for the loss of property in the region
* resettlement experiences as a result of development activities in the region and how they have been handled etc.
* other social and economic issues they consider important

3. Discussion: Highlights of meeting discussions

* The road was built during the Italian occupation and no proper maintenance since then.
* The road is the life line of the region since manufactured goods come on this road from both outside and other parts of the country. Aid items are also transported using this road.
* Previous government had negative attitude to the region
* Discussing the benefits of the road and the damages it makes during construction is ridiculous and redundant since the benefits outweigh in all circumstances. Transportation cost has increased very much and for example one quintal of cement cost 100 Birr in Tigray and 50 Birr in Addis Ababa. Cost of transportation is 50-60 Birr per one quintal
* Vehicles are deteriorating very soon before serving long
* The region is draught prone and many people died earlier due to the lack of roads
* It is known that roads destroy farm lands and other natural resources but compensation should be dealt carefully. This has to be handled according to govenrment rules
* Cost of living is becoming high due to the road condition
* The roads should be built as soon as possible. Road is useful for administration, social and economic activities etc.
* The road near Waja should be given special emphasis since it is flooded every year blocking the traffic for hours.
* Constructors do not give emphasis to traffic and constructing detours and this should be handled from all aspects.
* Quarry sites should be rehabilitated since constructor do not give attention after using them.
* Towns are along the road and if a house is demolished compensation can not be paid by the community. Other bodies should cover the cost
* Some towns have master plans and this project should consider these plans
* Detour construction betwen Alamata town and Betmara is impossible due to the steep physical feature of the land and should be considered during construction not to block the normal flow of traffic to the region
* The road construction should be rerouted to avoid Eritrean land near Zalambesa
* Road construction should be handled carefully and the aim should not only be cost saving since

gullies are created in many areas
* Natural drainage should be followed as much as possible to avoid load on some drainage trenches
* Secondary ditches should also be constructed carefully to avoid soil erosion
* Buss tyres are worn out every three monthh and this cost up to Birr 20000.

* Road side is not comparable to the vehicles size and load capacity and sometimes some vehicles are not allowed to enter the country
* Maintenance of the future upgraded road should be planned now and has to be integrated in the design.
* Planting of trees 10 meters off the road should be considered like in Addis-Debre Zeit road.
* Drainage system specially in the towns should be carefully done to avoid negative health impacts. They should not be open and have to be covered or use cement piper (closed drainage).
* Bridges should be wider and the drainage should be constructed properly
* The road between Alamata and Betmara is narrow and when detour are constructed (even during the construction of the road) poles installed for telecommunication and other purposes should not be affected since they are important for the dayly activities of the region.
* Traffic signs are missing in most places and this has to be considered in the planning of the future road
* There is a safety problem since the road is narrow and steep
* Accidents are caused due to the drivers, road and vehicles interaction and the main cause should be identified. For example, old vehicles, sharp curve, drivers situation and slippery roads are causes for accidents.
* The road maintained by a contractor mainly between Woldia and Maichew is narrow and slippery during the rainy season.
* The dust has been the major cause for accidents since it blocks visibility for drivers.
* Conclusion: Road is built to be used by human beings and should not destabilize their normal activities.
* The public consultaion will be an important input to the road construction.
* Such fora are also useful for rural roads construction and should be adapted in the future.
* The business community would not like the traffic to be delayed or stopped for a day.
* Consumption and development goods come from Addis and the port along this road.
* Zalambessa case should be settled by higher authorities
* Quarry sites, drainage, material sites should be taken care of and dealt properly.
* Compensation - who should be responsible? The budget should be allocated from the beginning.
* Care should be taken not to destroy trees during the construction.
* The region should participate in the design review of the project.

Participants of the Public Meeting

Representatives from

Alamata Administrative Council	Alamata
Southern Zonal Administration	Maichew
Regional Administration	Mekele
Regional Administration	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 Administration	Mekele
Rurala 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

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: Woldiya - Adigrat - Zalambessa

	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			
	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	

Baseline Data/Physical and Natural Environment

Table 1 Annual Rainfall for Selected Location In The Project Area

Month	Locations				
	Woldiya	Alamata	Michew	Mekele	Adigrat
January	28.6	37.7	26.4	2.7	19.2
February	49.0	49.9	40.3	7.3	21.4
March	85.1	66.2	74.2	26.1	47.1
April	97.1	79.5	71.7	42.9	54.8
May	96.8	51.4	76.3	32.7	50.4
June	35.0	29.9	44.4	31.4	46.1
July	160.1	71.7	120.6	214.8	108.4
August	217.5	95.0	162.8	222.1	105.5
September	100.1	45.5	80.3	36.2	33.4
October	59.8	40.3	54.1	6.3	23.3
November	29.6	23.5	24.8	4.8	16.4
December	29.2	37.1	23.0	1.3	13.7
Annual	**987.8**	**624.2**	**798.9**	**615.9**	**539.7**

Table 2 Mean Monthly Temperature for selected Towns (°C)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Woldiya	14.3	15.4	16.3	17.0	18.8	19.6	17.7	18.3	17.7	16.6	15.3	14.7	18.8
Kobo	18.6	18.7	21.5	22.1	22.5	21.0	24.8	-	-	21.6	19.5	19.4	21.0
Alamata	19.5	20.3	21.9	22.5	23.9	25.8	24.5	22.8	22.8	22.1	20.7	19.6	22.1
Miechew	14.0	14.9	15.8	17.2	18.1	18.9	17.9	17.7	16.6	14.7	14.5	13.9	16.2
Mekele	16.0	16.9	18.2	19.3	20.0	20.4	17.9	17.5	18.1	17.3	16.1	15.4	17.8
Adigrat	12.1	13.8	14.7	15.3	15.5	16.0	15.0	14.5	14.4	13.7	12.8	12.1	14.1

Table 3 The Major tree and shrub species found in the project area

Vernacular Name	Scientific Name
Ekhi	Cordia africana
Tambush	Croton macrostachyus
Indrur	Balanites aegyptiaca
Meger	Boswellia papyrifera
Humer	Tamarindus indica
Kontib	Acacia senegal
Tseada-chea	Acacia seyal
Tsimmkuya	Grewia ferruginea
Geba	Zizyphus spina-christi
Aira	Diospyros mespiliformis
Bamba	Ficus sycomorus
Anqwa	Commiphora africana
Kommer	Adansonia digitata
Kummel	Mimusops kummel

Source: *Tekeze River Basin Integrated Development Master Plan Reconnaissance Phase Report, Vol. I*

Table 4 Mammals of the Project Area

Common Name	Scientific Name
Leopard	*Panthera pardus*
Anubis Baboons	*Papio anubis*
Klipspringer	*Oreotragus oreotragus*
Abyssinian Hare	*Lepus habessinicus*
Bat-eared Fox	*Otocyon megalotis*
Spotted hyaena	*Crocuta crocuta*
Striped hyaena	*Hyaena hyaena*
Pangolin	
Asrdwark	*Orycteropus afer*
Simen Fox	
Gelada Baboon	
Hammadryas Baboon	*Papio hamadyas*

Table 2 Total Fertility Rate for Regions and some Towns

	Total	Urban	Rural
Amhara Region	4.275	2.725	4.475
Semen Wollo Zone	4.080	3.135	4.165
Tigray Region	5.355	4.190	5.580
Debudawi Tigray Zone	5.430	3.950	5.935
Misrakawi Tigray Zone	5.115	4.060	5.320

Woldia	3.230
Kobo	3.820
Alamata	4.500
Korem	3.340
Maichew	3.160
Mekele	3.905
Wukro	4.280
Adigrat	3.620

Table 3 Average Household Size in the Regions and Zones along the Road - persons per household

	Total	Urban	Rural
Amhara Region	4.8	4.2	4.9
Semen Wollo Zone	4.1	3.8	4.1
Tigray Region	4.3	3.8	4.5
Misrakawi Tigray Zone	4.4	3.9	4.5
Debudawi	4.1	3.9	4.2

Table 4 The Percentage Share of the Biggest Ethnicities in the Survey Area by Zones, by Woredas and by Towns (%)

	Semen Wollo		Debubawi Tigray		Misrakawi Tigray Zone	
	Total	Urban	Total	Urban	Total	Urban
Tigraway	<1	66	92	23	95	15
Amhara	99	7	5	42	1	87
Saho	-	-	<1	-	3	6
Afar	-	-	<1	-	1	17
Agew	-	-	1	15	<1	-

	Tigray	Amhara	Other ethnicities
Woldia woreda	4	94	
- Woldia	4	94	
Kobo woreda	1	99	
- Gobiye	1	99	
- Robit	1	99	
- Kobo Waja	5	94	
Alamata woreda	62	34	Oromo 2; Agew 1
- Waja	11	86	
- Alamata	65	29	Agew 2; Afar 1
Ofla woreda	89	3	Agew 7
- Korem	73	21	Agew 5
Endamehoni	98	1	
Maichew	94	4	Agew 1
Alaje woreda	98		Agew 1
- Adishehu	99		
Hintale Warija woreda	99		
- Adigudom	99		
Mekele woreda	96	1	Eritreans 1
- Mekele	96	1	Eritreans 1
Wukro woreda	99		Afar 1
- Agulai	88		Afar 11
- Wukro	98	1	Afar 1
Saesi Tsaedaemba woreda	95		Afar 2; Saho 2
- Frewoini	99		
- Edagahamus	95	4	
Ganta Afeshum woreda	98		Saho 1
- Adigrat	95	1	Saho 2; Eritreans 1
Gulomahda woreda	96		Saho 2; Ertireans 1
Zalambessa	78		Eritreans 19; Saho 1

Table 5 Religions represented along the Woldiya-Adigrat-Zalambessa Road (%)

	Total			Urban		
	Christian	Muslim	Catholic	Christian	Muslim	Catholic
Amhara Region						
Woldia woreda	80	19		80	19	
- Woldia	-	-		80	19	
Kobo woreda	86	16		86	13	
- Gobiye	-	-		72	28	
- Robit	-	-		88	12	
- Kobo Waja	-	-		87	13	
Alamata woreda	78	21		78	21	
- Waja	-	-		76	23	
- Alamata	-	-		78	20	
Ofla woreda	95	5		90	9	
- Korem	-	-		90	10	
Endamehoni woreda	95	3		95	5	
- Maichew	-	-		95	5	
Alaje woreda	99	1		98	2	
-Adishehu	-	-		97	3	
Hintale Wajira woreda	99	1		94	5	
-Adigudom	-	-		92	8	
Mekele woreda	91	7		91	7	
- Mekele	-	-		91	7	
Wukro woreda	95	5		85	15	
- Agulai	-	-		60	40	
- Wukro	-	-		89	11	
Saesi Tsaedaemba woreda	95	4	1	94	5	
- Frewoini	-	-		95	5	
- Edagahamus				95	4	
Ganta Afeshum woreda	98	1		93	4	
- Adigrat	-	-		93	4	3
Gulomadha woreda	99	1		95	4	
- Zalambessa	-	-		95	-	4

Table 6 Literacy Rate - in percent

	Urban		Rural	
	Men	Women	Men	Women
Amhara Region	74	52	19	7
Semen Wollo Zone	64	43	15	5
Tigray Region	71	46	21	7
Debudawi Tigray Zone	73	47	17	5
Misrakawi Tigray Zone	75	50	29	10

Table 7 The Migration Pattern by Zones along the Road - in percent

	Semen Wollo	Debub Tigray	Misrak Tigray
Urban - Urban	13	27	27
Rural - Urban	18	24	20
Rural - Rural	53	35	29
Urban - Rural	16	14	24

Table 8 **Average Monthly Rent and Percentage of Rented Houses along the Woldiya-Adigrat-Zalambessa Road**

I Average monthly rent per housing unit
II Rented from kebele - percent of all housing units
III Rented from private household - percent of all housing units
IV Owner occupied - percent of all housing units

	I	II	III	IV
Amhara Region	17.8	20	22	50
Semen Wollo Zone	17.60	19	17	56
Woldia woreda				
- Woldia	19.71	30	25	34
Kobo woreda				
- Gobiye	5.35	15	7	71
- Robit	8.25	8	8	83
- Kobo Waja	22.01	7	12	72
Tigray Region	35.27	3	41	45
Debubawi Tigray Zone	38.15	5	37	47
Alamata woreda				
- Waja	8.95	15	14	66
- Alamata	20.59	12	23	56
Ofla woreda				
- Korem	9.75	26	24	36
Endamehoni woreda				
- Maichew	23.50	4	42	44
Alaje woreda				
-Adishehu	18.47	3	55	32
Hintale Wajira woreda				
-Adigudom	18.24	<1	38	54
Mekele woreda				
- Mekele	59.74	2	43	44
Misrakawi Tigray Zone	34.05	<1	50	38
Wukro woreda				
- Agulai	18.91	-	50	42
- Wukro	25.28	2	39	44
Saesi Tsaedaemba woreda				
- Frewoini	18.72	<1	45	36
- Edaga Hamus	28.57	-	64	22
Ganta Afeshum woreda				
- Adigrat	42.17	<1	55	36
Gulomadha woreda				
- Zalambessa	45.60	5	46	36

Table 9. Energy used by a household for cooking in towns along the Woldiya-Adigrat-Zalambessa Road

I Firewood only or with other fuels - percent of all housing units
II Charcoal only or with other fuels - percent of all housing units
III Dung only or with other fuels - percent of all housing units
IV Kerosine only or with other fuels - percent of all housing units
V Electricity only or with other fuels - percent of all housing units

	I	II	III	IV	V
Amhara Region	93	14	29	7.4	1
Woldia woreda					
- Woldia	86	11	12	26	1
Kobo woreda					
- Gobiye	96	11	46	0.7	-
- Robit	98	12	27	0.2	-
- Kobo Waja	96	14	24	3.4	0.1
					2.4
Alamata woreda					
- Alamata	92	45	6.7	1.1	-
Ofla woreda					
- Korem		54	30		-
Endamehoni woreda					
- Maichew	94	77	0.4	1.4	0.2
Hintale Wajira woreda					
-Adigudom	91	42	44	0.3	-
Mekele woreda					
- Mekele	82		4.5	3.5	5.4
- Wukro	94	87	3.8	0.5	1
Saesi Tsaedaemba woreda					
- Frewoini	95	65	13	1.3	-
Ganta Afeshum woreda					
- Adigrat	84	66	7	10.7	4.9
Gulomadha woreda					
- Zalambessa	94	59	28	0.3	-

Table 10a The Activity Rate

	Urban		Rural	
	Men	Women	Men	Women
Amhara Region	59	42	90	77
Semen Wollo	63	44	92	78
Tigray Region	52	35	81	69
Debudawi Tigray	47	30	72	65
Misrakawi Tigray	53	33	82	56

Table 10b Unemployment Rate

	Urban		Rural	
	Men	Women	Men	Women
Amhara Region	12	12	.27	.39
Semen Wollo	8	8	.20	.32
Tigray Region	10	10	.59	.89
Debudawi Tigray	10	10	.77	1.57
Misrakawi Tigray	15	12	1.06	1.53

Table 10d Status in Employment in Amhara and Tigray Region by Sex

	Amhara Region		Tigray Region	
	Percent	Women*	Percent	Women*
Self employed	36	21	43	31
Unpaid family workers	58	62	49	62
Employers	3	16	2	30
Government employees	0.3	35	2	32
Private employees	2.4	19	2	35

* out of which are women

Table 10 e Status in Employment in urban and rural Tigray Region

	Urban	Rural
Self employed	46	42
Unpaid family workers	10	53
Employers	4	2
Government employees	21	0.4
Private employees	11	1

Table 10c Activity Rate and Unemployment Rate in the Towns Along the Woldiya-Adigrat-Zalambessa Road

	Activity rate		Unemployment rate	
	Men	Women	Men	Women
Amhara Region				
Woldia woreda				
- Woldia	62	38	10.94	11.24
Kobo woreda				
- Gobiye	66	38	3.14	0.97
- Robit	70	65	0.80	-
- Kobo Waja	65	43	6.17	8.38
Alamata woreda				
- Waja	64	26	12.22	17.82
- Alamata	56	34	10.96	9.44
Ofla woreda				
- Korem	55	44	9.78	10.90
Endamehoni woreda				
- Maichew	48	28	9.89	10.04
Alaje woreda				
-Adishehu	53	46	7.47	1.39
Hintalc Wajira woreda				
-Adigudom	60	41	4.33	13.96
Mekele woreda				
- Mekele	49	30	11.73	11.47
- Agulai	50	22	26.08	2.06
- Wukro	42	30	6.96	10.24
Saesi Tsaedaemba woreda				
- Frewoini	54	50	16.22	15.15
- Edagahamus	53	32	19.90	20.03
Ganta Afeshum woreda			19.90	20.03
- Adigrat	42	22	20.91	19.03
Gulomadha woreda				
- Zalambessa	50	25	18.06	12.16

Table 11 **Economically active population ten years and over by sex and major industrical divisions (Amhara Region and Tigray Region).**

	Amhara Region		Tigray Region	
	Total	Women %	Total	Women %
Economically active	7 647 025,00	45	1 476 129,00	47
Agriculture, hunting, forestry&fishing	7 108 910,00	41	1 324 445,00	46
Mining and quarring	1 606,00	20	625,00	17
Manufacturing	130 494,00	61	21 056,00	46
Electricity, gas and water supply	2 435,00	14	907,00	20
Construction	9 887,00	9	6 615,00	15
Wholesale and retail trade, repair of				
vehicles, personal and household goods	90 243,00	46	25 804,00	48
Hotels and restaurants	107 328,00	94	21 090,00	93
Transport, storage & communication	24 674,00	21	7 033,00	17
Financial inter-mediation	761,00	20	201,00	16
Real estate, renting and business activ.	794,00	24	353,00	17
Public administration and defence,				
compulsory social security	41 747,00	21	17 110,00	30
Education, health and social work			12 058,00	38
Other social , cultural, personal and				
household activities	15 411,00	29	7 358,00	46
Private households with employed				
persons	40 090,00	90	6 045,00	84
Extra territorial organization and bodies	237,00	17	109,00	9
Not stated	36 460,00	54	25 320,00	59