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

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

MOJO-AWASH-MILLE ROAD

Final Report
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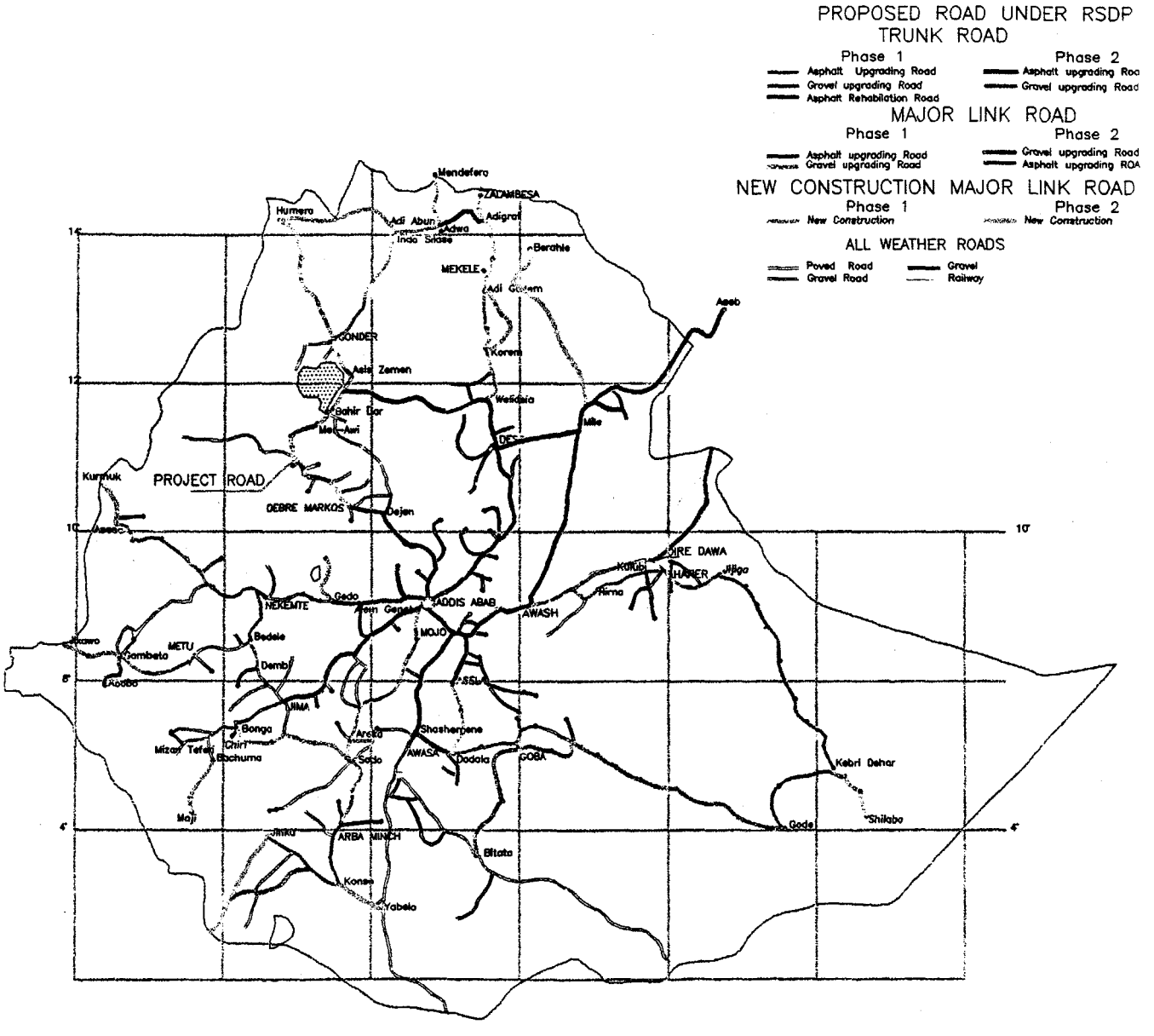
APPENDICES

ABBREVIATIONS AND ACRONYMS

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
EWNHS	Ethiopian Wildlife and Natural History Society
FA	Farmers Association
FDRE	Federal Democratic Republic of Ethiopia
IBA	Important Bird Areas
INGO	International non-governmental organization
m.a.s.l.	meters above sea level
MEDAC	Ministry of Economic Development and Cooperation
NGO	Non-governmental Organization
NPV	Net Present Value
PA	Peasants Association
RGRRO	Regional Government Rural Road Organization
RSDP	Road Sector Development Program
TCDE	Transport Construction Design Enterprise
TOR	Terms of Reference
TFR	Total Fertility Rate
TGE	Transitional Government of Ethiopia



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

EXECUTIVE SUMMARY

Background

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

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

The objective of this EA study has been to identify and quantify - to the extent possible -the likely negative and positive environmental impacts (physical, natural, human and social) 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 Mojo - Awash - Mille Road is located in the Rift Valley and is typified by long straights often ending with short bends; gradients are gentle throughout. The 442 km section between Mojo and Mille forms part of the southern import-export corridor carrying some 85 % of Ethiopia's imports and exports between Addis Ababa and the port of Assab in Eritrea. Through traffic along the corridor is mainly port traffic with imports being the predominant flow hence changes in the volume of traffic will be determined by the development of import tonnages.

The road is in quite a good condition from Mojo to Nazret and for at least the next 30 kilometres towards Awash. The remainder of the road to Awash is much worse with signs of extensive cracking and visible wheel track rutting. Between Awash and Mille there has been extensive recent maintenance by ERA including pothole patching and resurfacing of heavily

damaged pavement sections. The condition is generally fair with only light cracking and the shape of the road is still good even where the surfacing has been badly damaged.

Policy Framework

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

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

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

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

Institutional Setting

The Ethiopian Roads Authority, ERA, has the responsibility for overall planning of the national network development and maintenance and construction of trunk and major link roads while the responsibility of rural roads construction and maintenance has been decentralized and given to the regional states having their own Regional Government Rural Roads Organizations (RGRRO).

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

Major Environmental Impacts

Physical and natural environment

Since this project is a rehabilitation project, there are not many major adverse environmental impacts. The rehabilitation of the road consists mainly of putting a new asphalt layer on top of the old layers and replacement of one bridge and some culverts between Awash - Mille. The major adverse impact during construction stages are material use (rock quarry) and change in surface water hydrology and quality due to possible pollution from spill of oil, fuel and lubricant. Washing of vehicles and trucks in lakes (in this case lake Besseka) affects the water quality.

Minor adverse physical impact is the erosion at the sites where culverts and bridges will be replaced.

The construction of the detour roads will encroach on the new parts of the Awash National Park and the Yangudi Rasa Wildlife Reserve as well as on Alledeghi Plain and will require land clearings which will cause an impediment to movement of wildlife and minor and temporary destruction of wildlife habitat. Since the roads already exist no change in the existing species is expected. Some wildlife species will move out of the immediate vicinity of the road during the construction period. This temporary displacement will not have any major impacts on the wildlife. The Awash National Park personnel wanted the detour to be built along the present road or along the old Italian road going around in the north of the park as not to disturb new areas in the park.

The impact on natural vegetation would be associated with operating the quarry and borrow area and constructing detour and access road to the quarry sites. The vegetation of the area which will be disturbed comprises grasses with isolated Acacia trees in Afar areas and some agricultural lands in Oromiya.

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. Since this is a rehabilitation project, the impacts are small.

The acceptability of the project is high; the benefits of it are felt to be bigger than temporary problems during the construction.

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 100-200 workers, mainly men, to the construction camps will have several impacts to the local communities. The road construction employs 150-250 people who reside in the camps. Besides these, some 300-400 daily labourers will be hired locally for construction work. Although previously only men were hired, now also women participate in road construction works. Some local people will also be hired for the camps as cooks, helpers and cleaners, among them are women. The camp regulations require satisfactory sanitation

conditions to the workers. However, the survey area is an endemic malaria area and especially workers coming from the highlands are posed to the risk to malaria. Most construction take place during the dry season mitigating this risk. However, the risk appears during the short rainy season in between the long (dry) construction seasons.

There will be no permanent losses of the agricultural or grazing land due to the rehabilitation project; only temporary losses due to the detours, quarry and storage sites. Although ERA has the right to occupy any sites needed for the road construction, it has also the responsibility to compensate all lost property. The land is not considered as a property, but the crop or trees growing on it are considered to be property when with commercial value. All buildings outside right of way are considered as a property and entitled to compensation.

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. In the whole survey area there are no nationally known important monuments or historical sites which would be negatively affected by the project. 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.

Road Safety

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

Analysis of Alternatives

The only two alternatives considered here are the proposed rehabilitation compared to the "zero alternative" (no rehabilitation). The environmental impacts of both would be small. Anyway, having the new pavement is environmentally more sound solution; it will help the erosion problem; also the road safety will be improved when vehicles stay in better condition (although on the other hand the vehicle speeds will go high and that may cause more accidents).

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.

Mitigation and Monitoring 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 minimise 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. Washing of trucks and vehicles in Lake Besseka should be prohibited.

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

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

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

Designs and construction of detours in the national parks and wildlife sanctuaries and game reserves must be agreed by the park authorities to minimise potential damage.

Human and Social Environment

The good information before the construction should be available to all stakeholders. The Public Consultations kept along the road would be the best way to do that. Clear information about the compensation system should be given to those who might be affected. According to the previous practice ERA Compensation Committee has always been established for all road projects. The main role of the Committee is to set compensations. It should minimize the temporary losses of agricultural land. The road project will affect temporarily very small part of the grazing lands. However, the negotiations with Afars must be taken seriously due to the basic issue of traditional lands.

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 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.

To avoid conflicts between locals and immigrants, especially in Afar region Afars can be hired as guards to the camps and storage places.

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

Monitoring

It is recommended that an environmental inspector would be assigned to this project. The inspector should have a number of short term inputs from the commencement of the construction through to its completion and until cleanup has been finalised. After finalising 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 minimise impacts to the environment.

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

1. INTRODUCTION

1.1 Background

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

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

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

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

This report is the environmental analysis of the Mojo-Awash-Mille Road.

1.2 Location of the Study Area

The Mojo - Awash - Mille road commences in the rift valley some 73 km. south east of Addis Ababa and passes east and north east through important towns like Nazareth, Wolenchiti, Metehara, Awash, Gewane and Mille. The first part of the Mojo - Awash route 148 km. is passes though very intensive farm land, while the Awash - Mille part 294 km. traverses in semi arid lightly wooded land and the alignment is located completely in the Rift Valley. The route on its most stretch follow the Awash River course or else the Awash River tributaries.

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

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

The methodology used for carrying out the work include:

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

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

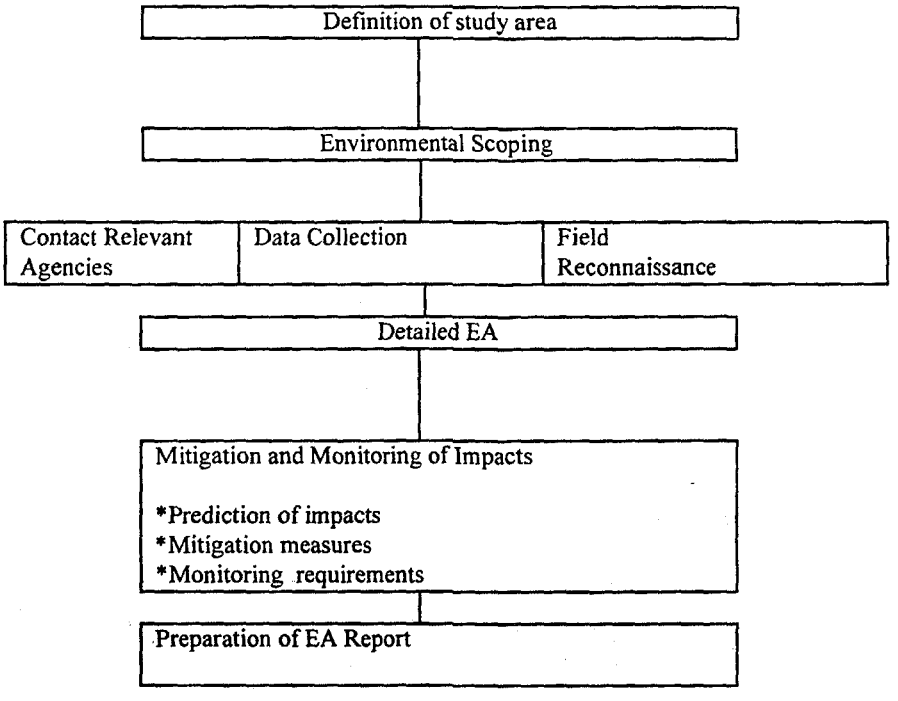
- site visits; the whole road section was studied by the team (see site visit programme; Appendix 4)

- 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 (minutes of the public consultation is presented in Appendix 5)

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

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

Figure: Process of the EA Study



1.5 Contents of the Report

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

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

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

2. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 Policy Framework

Macro Policy Framework

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

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

The Constitution

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

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

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

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

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

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

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

In sum, the Constitution of the FDRE, as the supreme law of the country, provides the basic policy framework showing the Government's commitment to environmental protection and sustainable management of the country's resources. It sets the framework upon which subsequent sectoral and cross sectoral policies, legislations 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 protection unit wchich is expected to be responsible for the carrying out of EA of road sector activities.

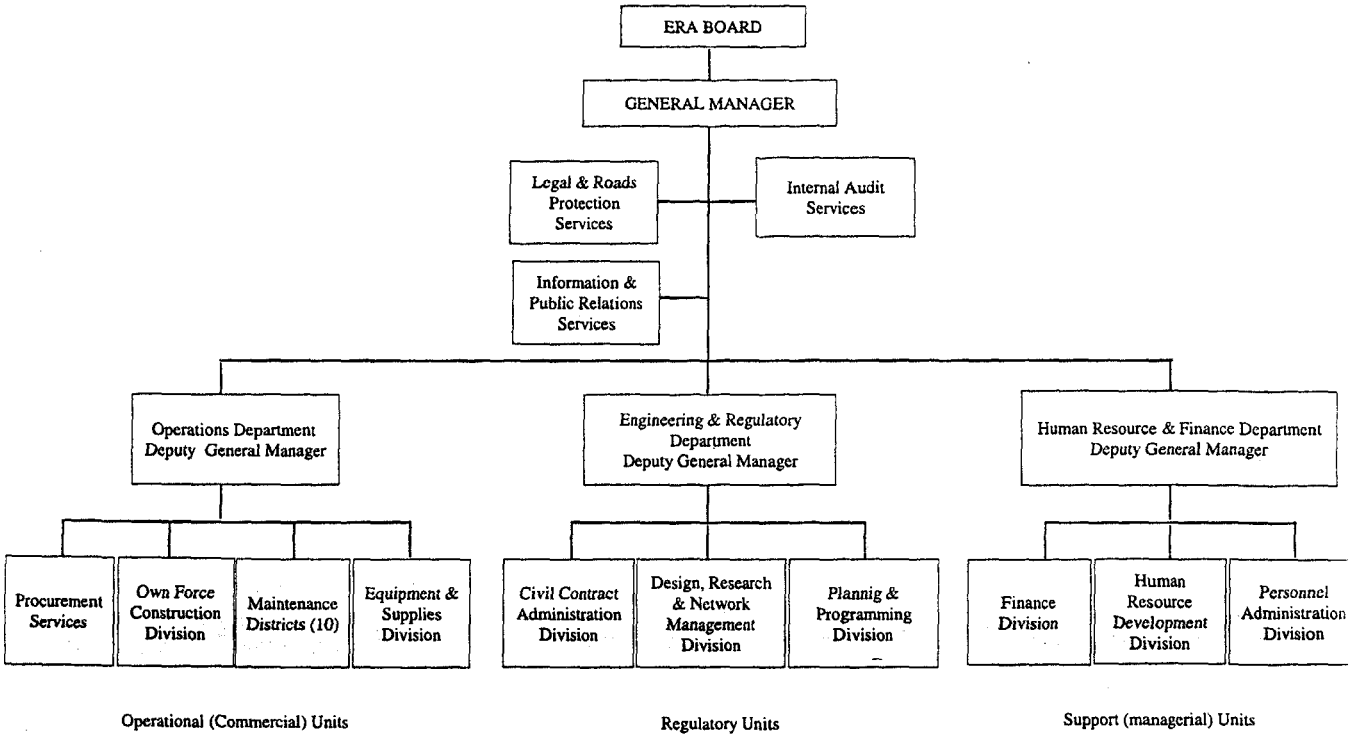
ERA's Institutional Setup

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

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

The Mojo-Awash-Mille rehabilitation project road falls under two districts namely the Alemgena district and the Dire Dawa district. Mojo-Metahara section, 109 km, is under the administration of the Alemgena District office and has two sections for the operation and maintenance activities while Metahara-Mille, 333 km, is under Dire Dawa district office.

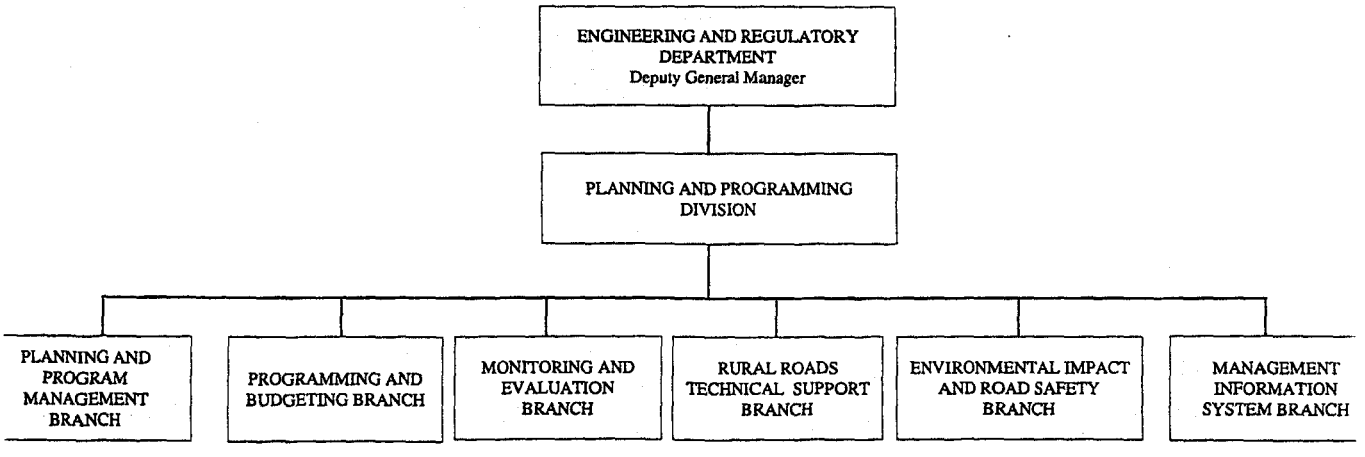
ETHIOPIAN ROADS AUTHORITY
ORGANIZATIONAL CHART



Source: ERA-REFORM STUDY REPORT, REVISED SUMMARY- MAY 19

ETHIOPIAN ROADS AUTHORITY
ORGANIZATION CHART

Planning and Programming Division



Source: ERA - REFORM STUDY REPORT, REVISED SUMMARY - MAY, 19

The Environmental Unit of ERA

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

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

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

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

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

Cross-Sectoral Coordination

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

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

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

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

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

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

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

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

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

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

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

2.4 Compensation and Resettlement

Right of Way

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

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

Compensation

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

The owners of these houses (legally or illegally 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.

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

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

ERA Compensation Committee

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

Committee includes representatives from

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

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

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

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

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

Resettlement

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

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

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

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

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

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

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

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

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

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

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

2.5 Public Consultation

The Environmental Policy of the FDRE 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 Awash - Mille road section was initially constructed by the German contractor Dr. Ing. Trapp and Company with double surface treatment under laid by crushed base material. Later on this section was rehabilitated with an asphalt concrete pavement in the year 1980 - 1983 by the then Ethiopian Transport Construction Authority (ETCA) now ERA.

The Mojo - Awash section was constructed in the early 1960's, and part of this section Mojo - Nazareth section was realigned and widened in the early 1970's. After the completion of the rehabilitation of the Awash - Mille section, the rehabilitation and widening of the shoulders of the whole section was carried out in 1983 - 1986.

The Transport Construction Design Enterprise (TCDE) was assigned to carry out pavement condition surveying and design. The field and laboratory investigation was conducted in the year 1994. Accordingly, TCDE surveyed the pavement condition, made deflection measurements and soil sampling and testing and came up with the design parameters. The design life alternatives considered during this period were 15 and 20 years. The pavement design recommended in general was a thickness of asphalt concrete overlay of about 100 mm, on top of course granular base course ranging from 100 mm to 250 mm. There were also recommendation for the realignment of 17 km for the easement of sharp curves and a section near the Meteka village, where there was the Awash River swamp.

There has been no attempt for design consideration on the section Mojo - Awash section in the past.

Condition of the road

The condition of the road is distinctively exhibited in two sections. The first portion from Mojo passing 30 km. from Nazareth toward Awash town is generally in good condition, except for some cracks and deformations. The main reason for the good condition of the road can be explained by the fact that heavy maintenance was carried out in 1995. There is also condition deference observed within the section of the two lanes, the lane toward Assab is found to be relatively in much better condition than the lane toward Addis Ababa. The second part, from Awash to Mille is in fair condition, in spite of the heavy maintenance performed including pothole patching and cold mix resurfacing on the heavily damaged pavement section. The extensively patched section of this road with cold mix gave rise to a rough riding surface. Observation on the failed pavement revealed that the overlay material is becoming very dry and that alligator cracks are frequent which accelerates the pothole formations and led to a poor condition of the road.

This road is located in the Rift Valley and is typified by long straights often ending with short bends; gradients are gentle throughout. The 442 km section between Mojo and Mille forms part of the southern import-export corridor. Between Addis Ababa and the port of Assab in Eritrea this road carries some 85 % of Ethiopia's imports and exports. Since the traffic along the corridor is mainly port traffic with imports being the predominant flow, the changes in the volume of traffic will be determined by the development of import tonnages.

Traffic frequency and means

According to the ERA traffic count censuses, the road could be divided into three sections. The volume of traffic on each section decreases from the section Mojo - Nazareth to the section Nazareth - Awash and further decreases on the section Awash - Mille. The 1994/95 traffic counts of ERA prevailed that the Mojo - Nazareth section accommodated approximately 2,500 vehicles per day of which 50% is heavy commercial tracks and large buses, while the Nazareth - Awash section was about 1,000 vehicles per day and beyond Awash the traffic further reduced to approximately to 600 vehicles per day and 90% comprised of heavy commercial tracks and large buses.

Feasibility study

The feasibility study of the Mojo - Awash - Mille road was appraised by the TecnEcon Consultant, which submitted its draft final report in May 1997. The study was done with other five roads selected for rehabilitation and/or upgrading. According to the study the road is subdivided into three sections, namely Mojo - Nazareth, Nazareth - Awash and Awash - Mille. Based on the recommended treatments, the economic internal rate of return (EIRR) for all the subsections exceeded the 12% requirement. The study considered a 20 year design life.

Detailed engineering designs

Presently, HP Gauff, a German Consultant has been engaged on the detail engineering design and preparation of tender documents for the Mojo - Awash - Mille Road. The date of the award was July 1996 and anticipated completion period May 1997. The Consultant already submitted its draft design and reports which include the geometric design report, hydrological design report, pavement report and the environmental impact assessment report for the whole of the project. According to ERA the Mojo - Awash section is found to be satisfactory, while the Awash - Mille section reports are under review by ERA and the results would be conducting additional resurveying works on this section.

Proposed Activities

Apart from minor adjustments of straights and curve easement, no realignment of the road is envisaged. Thus future rehabilitation consists mainly of putting a new asphalt layer on top of the old layers.

One bridge between Awash and Mille requires replacement.

4 BASELINE DATA

This chapter describes the road environment and the status of the environment along the road from physical, natural, human and social point of view. The description of the present road and issues/concerns are all related to the planned project to rehabilitate it. The descriptions include direct observations of the consultants and in the available/relevant literature and statistics on the impact area of this road. The issues described here were expressed also in the Public Consultation in Awash by different participants and by interviewed local people by the road.

4.1 Description of the Road Environment

The route Mojo-Awash-Mille Road, 442 km, is defined as part of the main ' Import - Export' corridor artery from Addis Ababa running to the port of Asseb in Eritrea. Part of the route (Mojo - Awash) also serve as the main link of the Awash-Kulubi-Harar Road defined as the 'Eastern Corridor' (Awash-Dewelle). Because of the nature of the road the route has an exceptionally high proportion of heavy goods vehicles.

The project road starts just outside Mojo town where the road from Arba Minch joins this, the road from Assela (Arsi) joins the project road in Nazret and after Awash (Sabat Kilo) the project road has again a junction with the road from Dire Dawa and Harar from which places there are accesses to Djibouti and Somalia. About two hundred kilometers after Mille in Dobi another paved road departs the project road and goes to Djiboti and to her harbour. All these roads are extremely important for the Ethiopian national economy and the development of the country.

The project road starts within the Oromiya Region in Misrak Shewa Zone and enters the Affar Regional State to Zone 3 before Awash town and to the Zone 1 after Gewane town. The road is trafficked mainly by trucks and trailers for export/import transportation. Between Mojo and Nazret also private cars are common on the road. Many of them go to south from Nazret to Sodore, which is a popular resort area by the Awash River.

Many towns along the road have been created by the railroad such as Mojo, Nazret, Wolenchiti and Awash. They served first as administrative centers and turned out to be commercial and industrial centers in their respective areas. However, the present road and the road junctions have had direct impacts on the development of these towns and the woredas in which they are situated. The other towns and villages along the road were created as a result of the construction of the present road and the road still has a direct and vital impact on all social and economic activities in these communities.

The first part of the road passes big and growing towns, Mojo and Nazret, the latter being one of the biggest towns in Ethiopia. The road passes by Mojo but goes through Nazret, where the asphalted part of the road is much higher than the sides, without any road shoulders; the fact that makes the movement on the road dangerous for all users.

It is not only in the towns where people complain about the missing shoulders. According to the people there is a need to construct pavements along the road for the people to walk. Not only the vehicles but also people and animals use the same road. Especially during the rainy season people are forced to come up to the asphalted road.

After Nazret the road goes further down towards and through Wolenchiti town which from time to time suffers from bad floods due to its location in a depression. The raised road is not, however, flooded, but has a very slight damming effect on floods and therefore enhance the flooding of Wolenchiti.

The road between Wolenchiti and Metahara town is narrow and lacks a good visibility which is said to be one of the major reasons for accidents. Also along this road people made remarks about the changes in the size of trucks and trailers; the old road was planned for the smaller vehicles and for smaller traffic.

The Besseka Lake near Metahara is flooding to the road and there are suggestion by some that the road should be realigned to follow the old Italian road by the hill side north of Besseka. Here the road is also badly damaged and causes many problems due to dust. The traffic is slowed down in this section. However, this section is also a source of income for local people. There are about 60 people washing the cars and trucks by the lake. Also fishing is important economic activity giving livelihood for many, including a fishing cooperative. The narrow and dusty passage over the lake and washing of cars might cause accidents polluting water and killing fish.

After Metehara and Besseka Lake the road goes through the Awash National Park. The access to the Awash National Park by tourists is easy due to the road. It is possible to enter it by car to either side. In the southern part of the park by the Awash River there is also a possibility to stay over night.

However, the transitory traffic also kills many wild animals, mainly during the night. The guards and also a representative from the park in the consultation complained that the traffic rules are not respected in the park area and as a result 50 wild animals are killed every year when they cross the road from one side of the park to the other.

The park is located to the area where people have traditionally heard their cattle. The local people if they want to take their cattle through the park have to use the road to move their cattle. If animals go to the park for grazing the guards take them to the 'animal jail' by the park gates and the owner has to pay the fines to get animals out. These incidents happen often and there are very tense feelings on either side. The road in itself is not the problem but the road sides should be much wider or special routes for domestic cattle could help the situation.

The park personnel would prefer the future detour to follow either parallel the present road or the old Italian road which go around the park in the north as not to destroy the park habitat with detour.

The present road goes through Awash (Sabat Kilo) town and here like in Nazret the asphalted part of the road is high with no shoulders and asphalt is broken from both sides. This combination has caused many vehicles to turn around from the road. There have been cases when vehicles have gone into the bars and/or destroyed other properties. Local people have made bridges to solve the problem, and named one section of the road as "danger zone" since it has turned out to be a cliff.

The representatives from Awash Administration wanted to see that detour to be built for the construction period would coincide with the future road according to the Master Plan

for Awash Town. By doing so the detour could be a good base later for a permanent resident road. However, the business people were worried about the construction period, when the detour would by-pass the town center. They were afraid that their business will die if the road by-pass the center "even for a day".

In Nazret and in Awash the road area is broad enough and there seems to be no need to demolish houses if the old alignment is followed.

Few kilometers after Awash the road turns to the north still following the Rift Valley towards Mille. After Awash the road goes through Awash Arba to Gedamaitu town after which the road area is very sparsely populated. In the area between the road and Awash River there are two towns, Melka Sede and Melka Werer, established due to the big irrigated banana and cotton plantations around them. This road as the only road is vital for transportation of the products from this area as well as for the permanent and migrant workers.

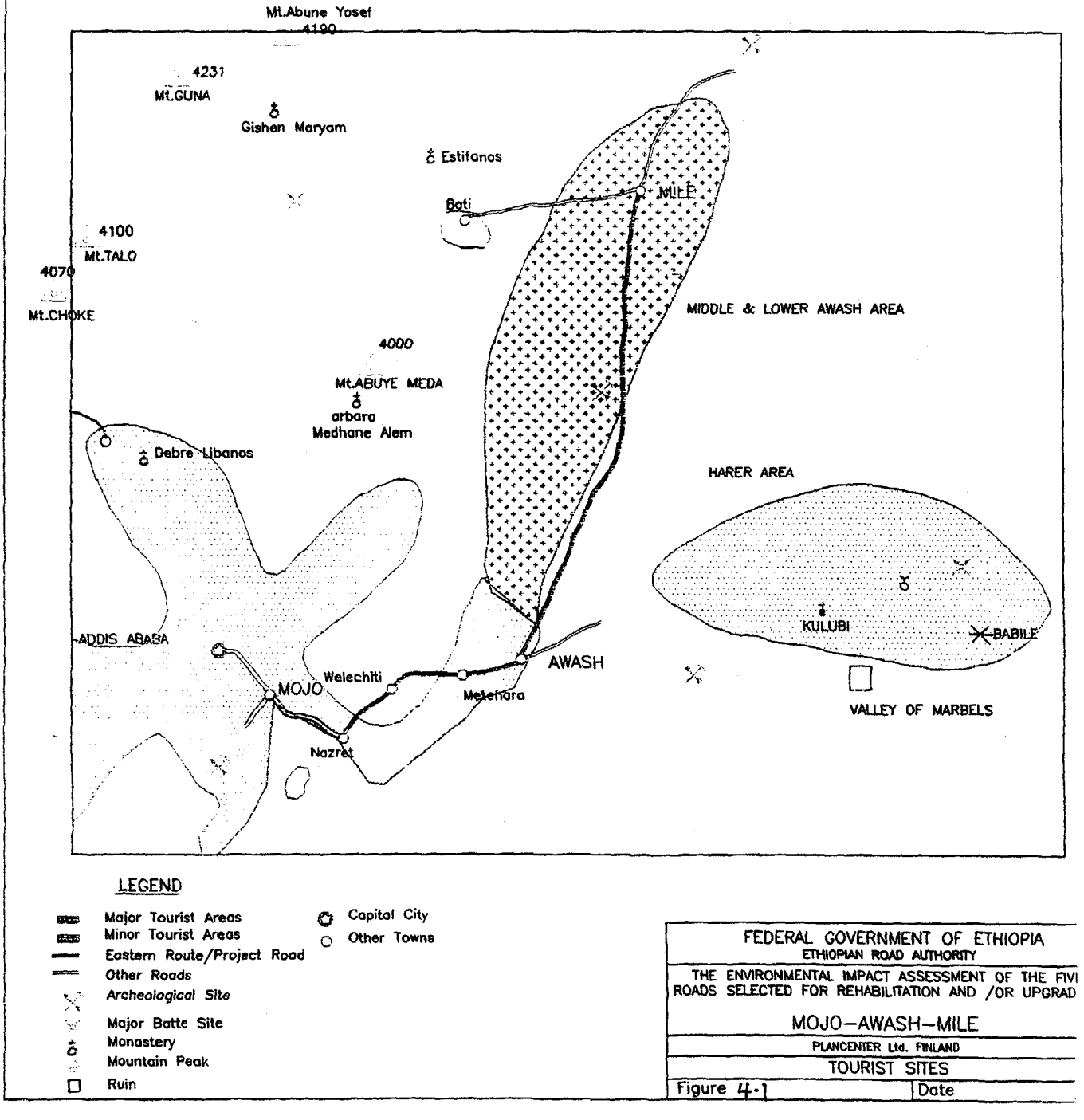
After passing this area the road goes through three towns, Meteka, Gewane and Adaitu. From Meteka a gravel road goes south-east to Mieso and in Gewane their is another road junction leading to the west to the Addis - Dessie road. Between Gewane and Adaitu there was only one small Isa village in Undufu before the road crosses the Awash River. Less than ten kilometers before Mille there is a road connecting this road through Bati to Dessie. This junction has no permanent town settlement but few houses serving transitory traffic.

In this part of the road there is also a national park, Yangudi Rasa between Gewane and Mille. The park was created for the protection of the wild ass, an endangered species and the ancestor of the domestic donkey. The natural environment is not differing from the area around it and due to the climate it is not as popular among the tourists as the Awash Park. The climate is, however, suitable to, for example, to ostriches which can be seen from the road.

On the whole the road runs after Awash along the Afar inhabited area and the Afars have not been the most positive supporters of the road, which they have seen mainly as a trouble maker. Most of their pasture lands stay on the eastern side of the road while the Awash river, the source for drinking water for the animals, is left on the western side. The corridors through the state farms were left for the cattle to reach the river. However, the new areas are taken under cultivation in this area and the corridors are decreasing. And due to the crossing of the trunk road with herds of camels, cattle and goats causes accidents.

Many outside people are afraid to drive along this road due to the incidents, which are told to happen on the road. Most of these are related to a driver killing accidentally an animal and its owner getting furious. Because of the behaviour of the Afars people do not want to stop on the road whatever happens. This behaviour of the people passing by without stopping and escaping is the fact that make the Afars angry according to an Afar who participated the Public Consultation in Awash. According to him there is a rating system for compensation in case of killing an animal by accident. A camel rates highest and a goat least, but there are also additional costs, highest rates being for the pregnant or lactating camels.

Along this road there are areas with no villages/towns for more than 100 kilometers. This has caused problems for drivers of transitory traffic. Since the road construction



FEDERAL GOVERNMENT OF ETHIOPIA ETHIOPIAN ROAD AUTHORITY	
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FIVI ROADS SELECTED FOR REHABILITATION AND /OR UPGRAD	
MOJO–AWASH–MILE	
PLANCENTER Ltd. FINLAND	
TOURIST SITES	
Figure 4-1	Date

camps/ERA camps have turned out to be permanent anywhere else there were suggestions that the future camps for this project should be established in these empty areas where they could develop into market centers and rest places as experience has shown elsewhere. The camps were also seen as a signs of permanent maintenance and adding safety along the road. At the present there are ERA maintenance sections only in Awash and Gewane.

Cultural and historic sites along the road

Along this road there are no special historical or nationally known important monuments which could be affected by the rehabilitation of the road. However, this road is leading (80 kilometers after Mille) to Hadar which is one of the most remarkable archeological sites in the world. It was here that the oldest evidence of human origins was found in the form of 'Lucy' or *Dinkenesh* - a fossilized skeleton of a female hominid who walked this part of the earth more than three million years ago.

However, along the road and in the consultation many people remarked about much later, but for them much more important present grave yards, which should be taken into consideration when and if the road is widened. (Due to an Afar graveyard the detour construction was once stopped for three months on this road!) There are also sacred trees or other locally/ethnically important places which should not be destroyed due to the detours.

There are no forests any more in the first part of the road although cultivated eucalyptus trees can be seen here and there. More as a cultural feature islands of indigenous trees can be seen among the fields showing the locations of the local Orthodox churches. These trees are not touched or cut down by the locals.

Traditional transportation means

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

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

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

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

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

4.2 Physical Environment

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

4.2.1 Climate and hydrology

Climate

The study area below Awash has a tropical semi-arid climate. The rainfall pattern is biannual type giving a mean annual rainfall of 560 mm although rainfall generally varies in the area considerably from year to year and seasonal variation is fairly constant.

The mean annual rainfall varies from about 1600 mm at Mojo to 400 mm at Gewane. Mojo receives about 90% of the annual rainfall during the rainy season in June - September. At Mille the same overall proportion is received during the rainy periods, distributed 30% and 60% respectively. Table 1 in Appendix 8 depicts annual rainfall for selected representative locations within the project area. In Appendix 8 also a mean annual rainfall map is presented.

The mean annual temperatures range from 20.8°C at Koka to 29°C at Dubti, with the highest mean monthly temperatures at these stations occurring in June at 23.8°C and 33.6°C respectively. The survey area is located between these two points.

The tables 2-6 in Appendix 8 give the maximum and minimum mean monthly temperatures, wind speed, sunshine hours and humidity figures.

Hydrology

The primary sources of water is rainfall and there are perennial rivers in the area (the Mojo, Mille and Awash rivers). Flow characteristics of these rivers are presented in Table 7 and water quality data of the Awash and Mojo rivers in Table 8 in the Appendix 8. The hydrogeological features of the project area shows that there is a good groundwater potential.

Except for the road section Mojo - Wolenchiti where the annual rainfall is relatively high; on the other section of the road occurrence of flooding of intermittent rivers is seldom a phenomenon. In general rivers, streams and flood paths (except Awash river) have short duration high floods during the rainy seasons. For example in the road section from Nazareth to Wolenchiti especially near Wolenchiti flooding of the area is almost a yearly phenomenon. In addition, Lake Besseka near Metehara is constantly increasing in volume of water and invading the area progressively including the road section in this area.

Surface water hydrology and quality

The main surface water hydrology problem along the road encountered are :

- Flooding of Wolenchiti town - Despite the road may produce insignificant contribution to the flooding, there is a slight damming effect of the run off by the road.
- Flooding of the road at Metehara by constant rising of Lake Besseka. The road crosses the lake, and the lake is used for washing trucks and vehicles coming and going along the road . Therefore the water quality may be affected due to spill of oils, lubricants and fuels.
- Swamp at Meteka - The road crossing the swamp causes concentration of flow and further increasing the area of swamp during high floods in the area.

Groundwater

The road traverses extensive aquifers with fracture and intergranular permeability along the route. The groundwater along the route may be confined or unconfined with static groundwater level greater than 60 metes. Around Meteka following the fault line at the left of the road numerous hot springs exists.

4.2.2 Physiography

This road is completely aligned along the young quaternary lava plain of the Ethiopian Rift Valley floor.

4.2.3 Topography and hydrography

Mojo - Awash - Mille is completely aligned in the Ethiopian Rift valley floor. Especially from Awash to Mille the road is aligned almost parallel to Awash River. It traverses very flat plains with seasonal marshes and swamps and crosses the Awash river at two places (Awash and Adaitu). The elevation of the terrain that the road traverses constantly descends i.e. from 1790 m.a.s.l (meters above sea level) at Mojo to 920 m.a.s.l at Awash and to 500 m.a.s.l at Mille.

The road is found in the Awash river basin drainage and it is crossed by few perennial and numerous seasonal rivers. The main perennial rivers crossing the road are Mojo , Awash and Mille rivers. Rivers , streams and gullies (perennial or seasonal) have a very high discharges between June to September during the main rainy reason . In addition high discharges may occur between March to May during the Belg season. At the other period of the year perennial rivers have very low flow and seasonal rivers are dry in the most of the dry period.

4.2.4 Geology

The road traverses different geological formations i.e. from Mojo to Wolenchiti Trap series of Magdala group composed of tuffs, Basalt's and ignimbrites, etc. From Wolenchiti to Awash and from Meteka to Adaitu quaternary alkaline olivine basalt, siliceous domes and flow of complex volcanoes, lava, ignimbrites at some places recent unconsolidated deposits.

From Awash to Meteka recent unconsolidated alluvial deposits of conglomerates, sand, silt and clay. The Figure 4.2 shows the geology of the area along the project road.

4.2.5 Soils and geomorphology

a) Mojo - Nazareth road section

Moderate to thin friable residual soils on step faulted plains and low plateau complex of the Ethiopian Rift with numerous fault scarps, sags and associated cones, vents and crater remnants (Figure 4.3).

b) Nazareth - Wolenchiti road section

About 10 km stretches from Nazareth to Wolenchiti thick and very friable residual soils highly erodible and the remaining section of the road traverses thick transported soils of alluvial fans (section of the road with seasonal flooding of the area).

c) Wolenchiti - Metehara road section

Rock out crops of extensive young lava flows (bare lands).

d) Metehara - Awash and Meteka - Adaitu road section

Very thin residual soils on lava platforms and plain (dominant) and intensively faulted around Meteka. At Meteka on short stretches the road crosses lacustrine sediments and swampy soils.

e) Awash - Meteka and Adaitu - Mille road section

Thick transported soils of alluvial fans and Bajadas deposits, composition varying from coarse gravel, sand, silt to clay .

Erosion

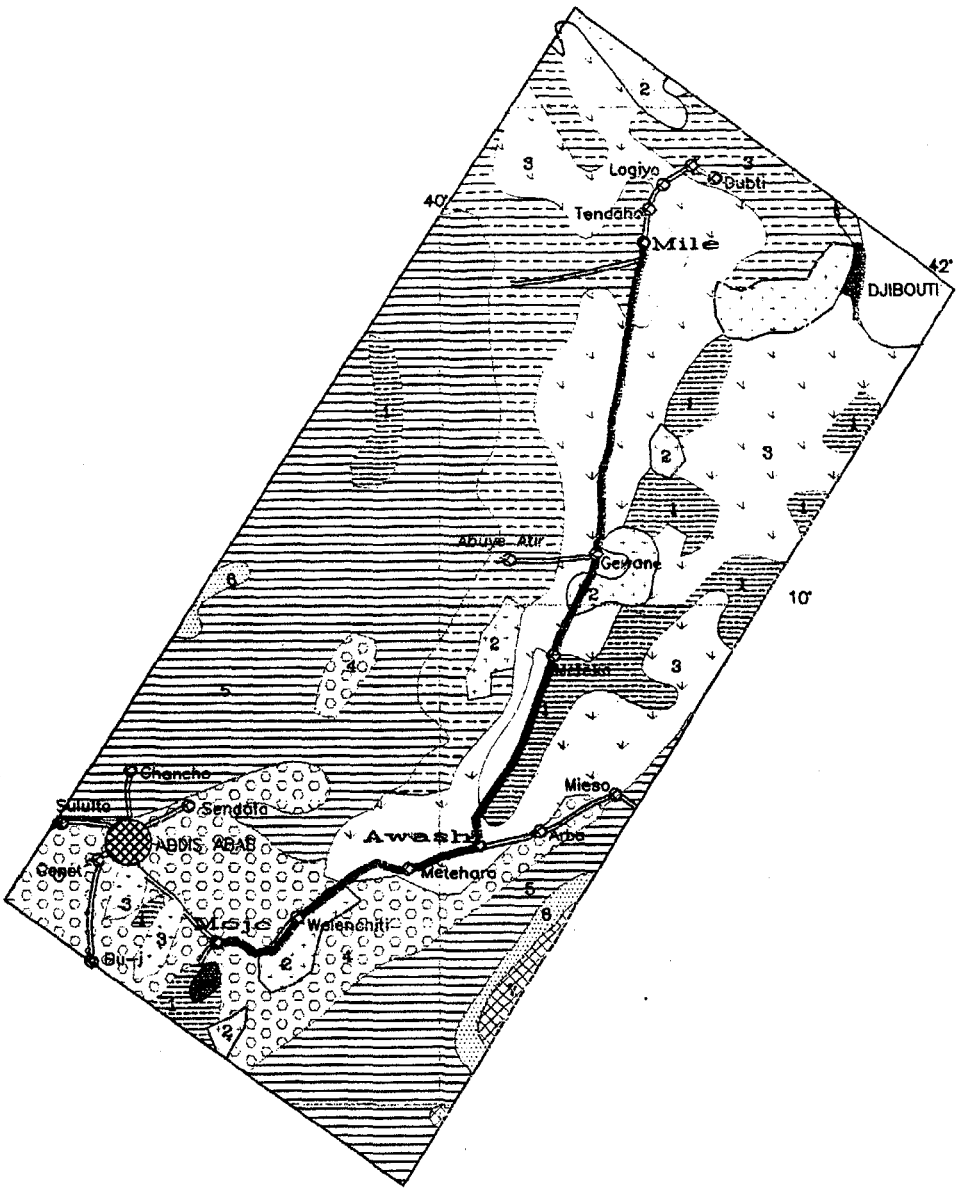
Sensitive sections of the road for erosion are on *Mojo - Nazareth, some 10 km stretches from Nazareth to Wolenchiti and Gewane -Adaitu.* Relatively steep plains composed of friable unwelded volcanic ashes which are easily eroded. On these sections of the road at some place are observed deep scouring along the side ditches and downstream of culverts and bridges.

Soil stability

There is no soil stability problem along the entire road sections.

4.2.6 Seismicity and earthquakes

The total length of the road is found in seismic and earthquake active part of the Ethiopian Rift system. Recent lava flows are characteristics of the area traversed by the road.



LEGEND

1	Quaternary Sediments		CENOZOIC
2	Basaltic flows and related Spatter Cones	QUATERNARY VOLCANICS	
3	Basaltic intermediate and felsic Volcanic	QUATERNARY VOLCANICS	
4	Magdala Group	TERTIARY VOLCANICS	
5	Trap Series		
6	Amba Aradam Formation	CENTRAL PLATEAU SEDIMENTS	MESOZOIC
	Hamanlei Series, Arandab Series, Gaberdar Series Main Gypsum	EASTERN & WESTERN OGADEN SEDIMENTS	
	Project Road		
	Other Roads		

FEDERAL GOVERNMENT OF ETHIOPIA

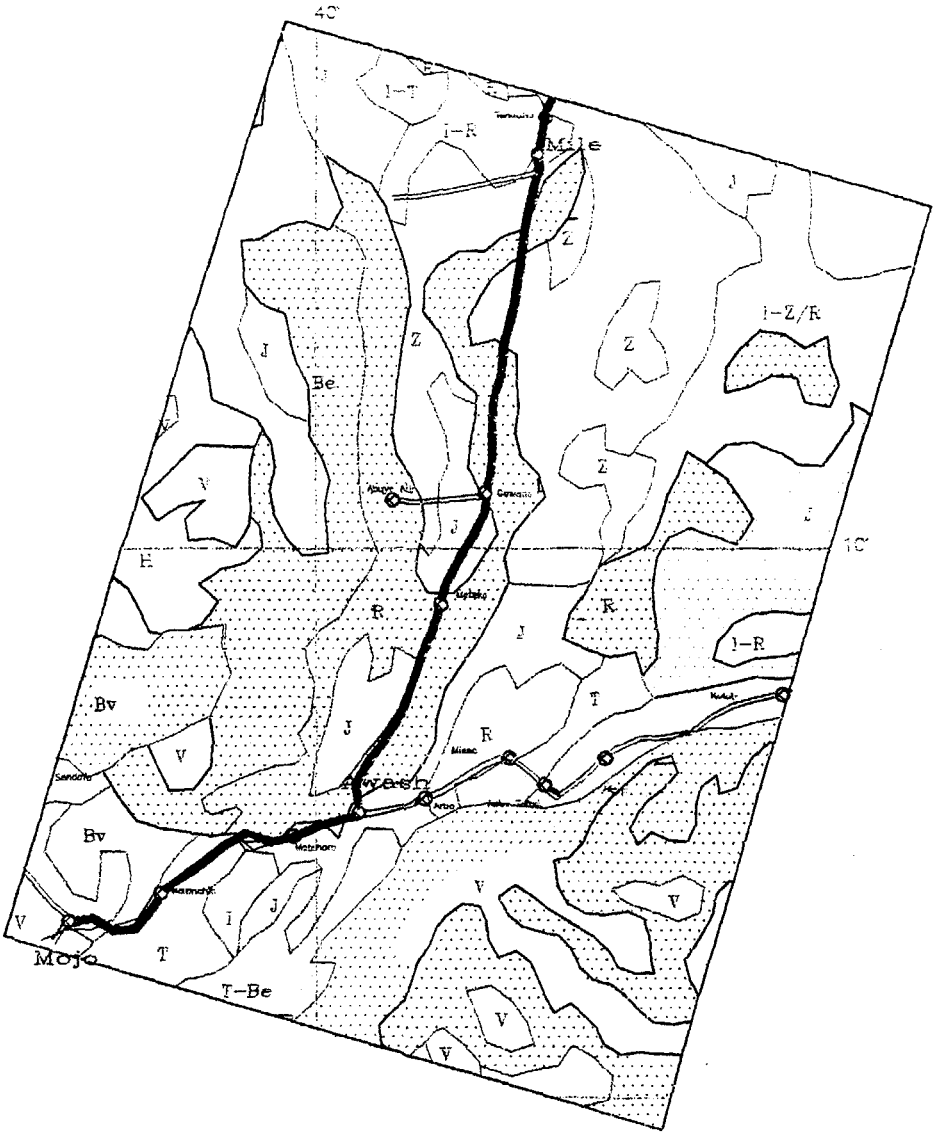
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE ROADS SELECTED FOR REHABILITATION AND/OR UPG

MOJO–AWASH–MILE ROAD

PLANCENTER Ltd. Finland

GEOLOGICAL MAP

Figure 4.2 | Date



Be	Chromic Eutric and Calcic Cambisols	T	Humic,Mollic and Vetric Andosols
Bv	Vetric Cambisols and Vetric Luvisols	V	Chromic and Pellic Vetrosols
I	Lithosols	Z	Gleyic and Orthic Solonchaks
J	CalcRIC and Eutric Fluvisols		Project Road
R	Calcaric and Eutric Regosols		Other Roads

PHASES

	Lithic
	Stoney
	Saline

FEDERAL GOVERNMENT OF ETHIOPIA

THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE F
ROADS SELECTED FOR REHABILITATION AND/OR UPGR/

MOJO–AWASH–MILE ROAD

PLANCENTER Ltd. Finland

SOIL MAP

Figure 4.3 | Date

4.3 Biological Environment

4.3.1 Land use - Land Cover

The main land using activities along the road between Mojo and Metehara is dominated by rainfed cultivation and grazing on unimproved pasture and fallow land.

Acacia woodland and grassland is the most extensive land cover and the area below Awash is used by the Afars for extensive wet season grazing of their semi-nomadic system based on mixed herds of camels, cows, sheep and goats. Apart from grazing, there are virtually no arable land agriculture in the area. Semi-desert steppe is also the dominant land use type between Gewane and Mile.

The other major category of land use in the project area include:

- Two National Parks
  - Awash National Park
  - Yangudi-Rasa National Park
- Three Wildlife Sanctuary and Game Reserves
  - Mille - Sardo Game Reserve
  - Awash West Game Reserve
  - Alledeghi Game Reserve
- Three Controlled Hunting Areas
  - Western Awash
  - Afdem-Gewane
  - Erer-Gota

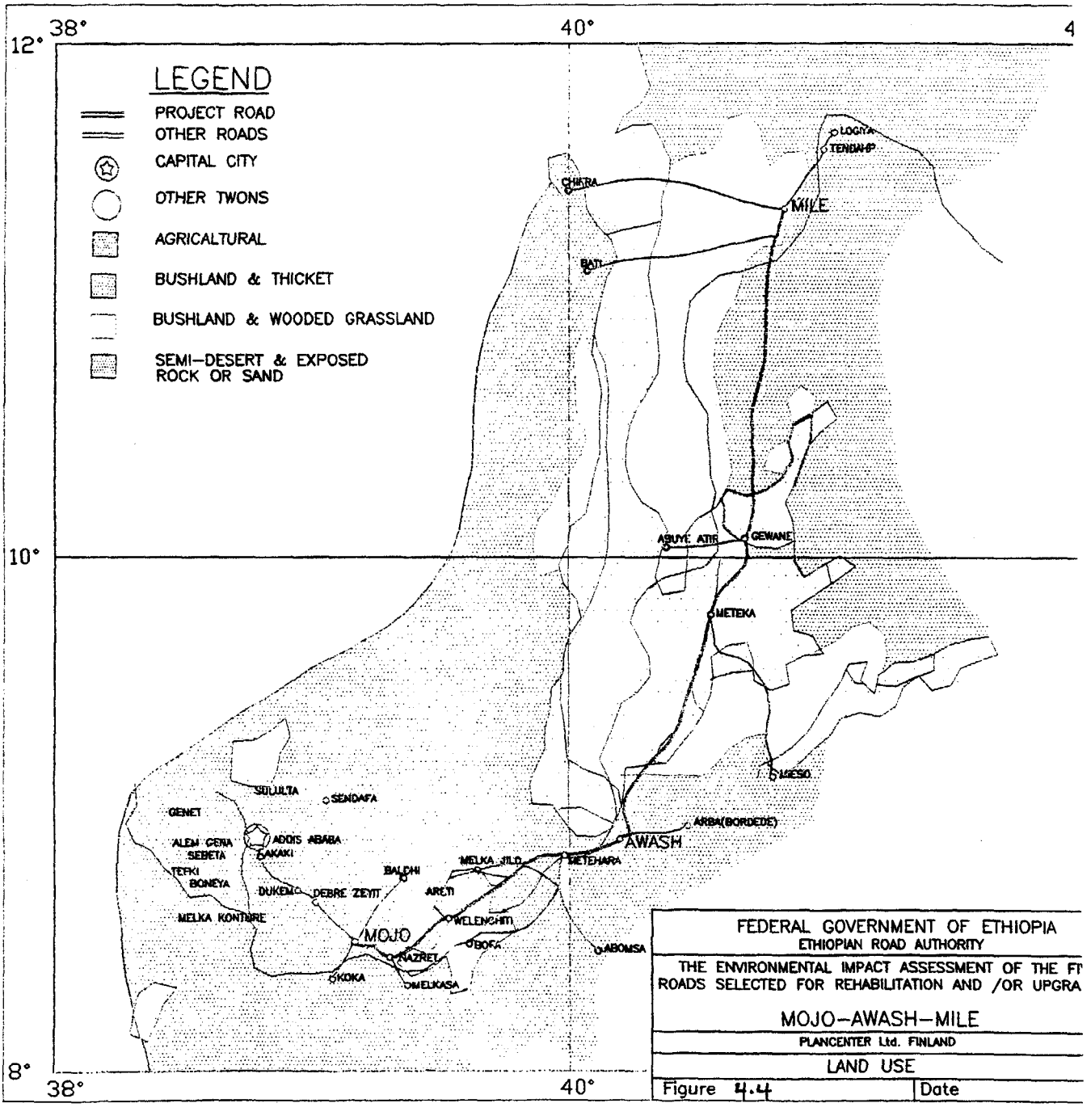
There is Lake Beseka West of Awash National Park with fish and a big variety of fish eating and other water birds readily seen. There is also Meteka wetland and associated marshes west of Gewane and south Yangudi - Rassa National Park. The wetland possesses a perennial and an annual flooded component and the area is extensively used for dry season grazing.

Figure 4.4 shows the general land use along the road.

4.3.2 Flora

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

The dominant vegetation between Awash and Mille is grass land and isolated trees. The predominant tree species is Acacia mellifera with Acacia nubica and Acacia senegal. The natural grass within the grazing areas is dominated by Chrysopogon plumulosus, Sporobolus cosimilis and Dactyloctenium aegypticum. There are a number of small tributaries of the Awash river whose courses are marked by scattered trees.


LEGEND
PROJECT ROAD
OTHER ROADS
CAPITAL CITY
OTHER TWONS
AGRICALTURAL
BUSHLAND & THICKET
BUSHLAND & WOODED GRASSLAND
SEMI-DESERT & EXPOSED ROCK OR SAND
38°
40°
12°
10°
8°
LOGIYA
TENDAHO
CHIFRA
MILE
BATI
ASBUYE ATIR
GEWANE
METEKA
ASEBO
ARBA(BORDEDE)
AWASH
METEHARA
MELKA JILO
SULULTA
SENDAFA
GENET
ALEM GENA
ADDIS ABABA
SEBETA
LAKAKI
TEFKI
BONEYA
DUKEM
DEBRE ZEYIT
BALCHI
ARETI
MELKA KONTURE
MOJO
WELENCHITI
BOFA
NAZRET
KOKA
MELKASA
ABOMSA
FEDERAL GOVERNMENT OF ETHIOPIA
ETHIOPIAN ROAD AUTHORITY
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FI
ROADS SELECTED FOR REHABILITATION AND /OR UPGRA
MOJO-AWASH-MILE
PLANCENTER Ltd. FINLAND
LAND USE
Figure 4.4
Date

4.3.3 Fauna

The Mojo - Awash - Mille road passes through the Awash National park and Alledeghi Wildlife reserves which, while not having the largest game population in Ethiopia, is nevertheless rich in species diversity. The location of the National Parks, Controlled hunting areas, wildlife sanctuary and reserves areas and wildlife conservation areas are indicated on Figure 4.5 and Figure 4.6.

Important larger animals of these areas include: Warthog, Hippopotamus, Salts and Phillip's, Dik-dik, Besia oryx, Mountain Reed buck, Lesser Kudu, Defarsa Water buck, Rock Hyrax, Aardwolf, Striped Hyena, Black - backed Jackal, Slender - tailed mongoos, Lion, African Civet cat, Anubis, Hamadryas, Vervet, and Nile crocodile.

The most threatened larger mammals of the region are: Beira, Antelope, Dorcas, Speke's and Soemmering's, Gazelle, Gerenuk, Grevy's Zebra and Somali Wild Ass (Ethiopian Wildlife and Natural History Society (EWNHS) 1996).

A list of commonly found wildlife in the Awash and Yangudi-Rasa (founded for wild ass) National Parks are given in Table 9 and 10 and in Appendix 8 respectively.

The project area also has two Important Bird Areas (IBA) known as Awash River Valley (IBA-012) and Yangudi - Rasa National Park (IBA-065). There are two of 69 IBA sites designated in Ethiopia in 1996 by the Ethiopian Wildlife and Natural History Society in association with the Ethiopian Wildlife Conservation Organisation and Birdlife International.

The Awash river valley and Yangudi - Rasa National Park support a conservation worthy array of birds, including migrant birds, and four birds in the "near threatened" category - Pallid Harrier, Basra Reed Warbler, Lesser Kestrel and Pallid Harrier (EWNHS, 1996)

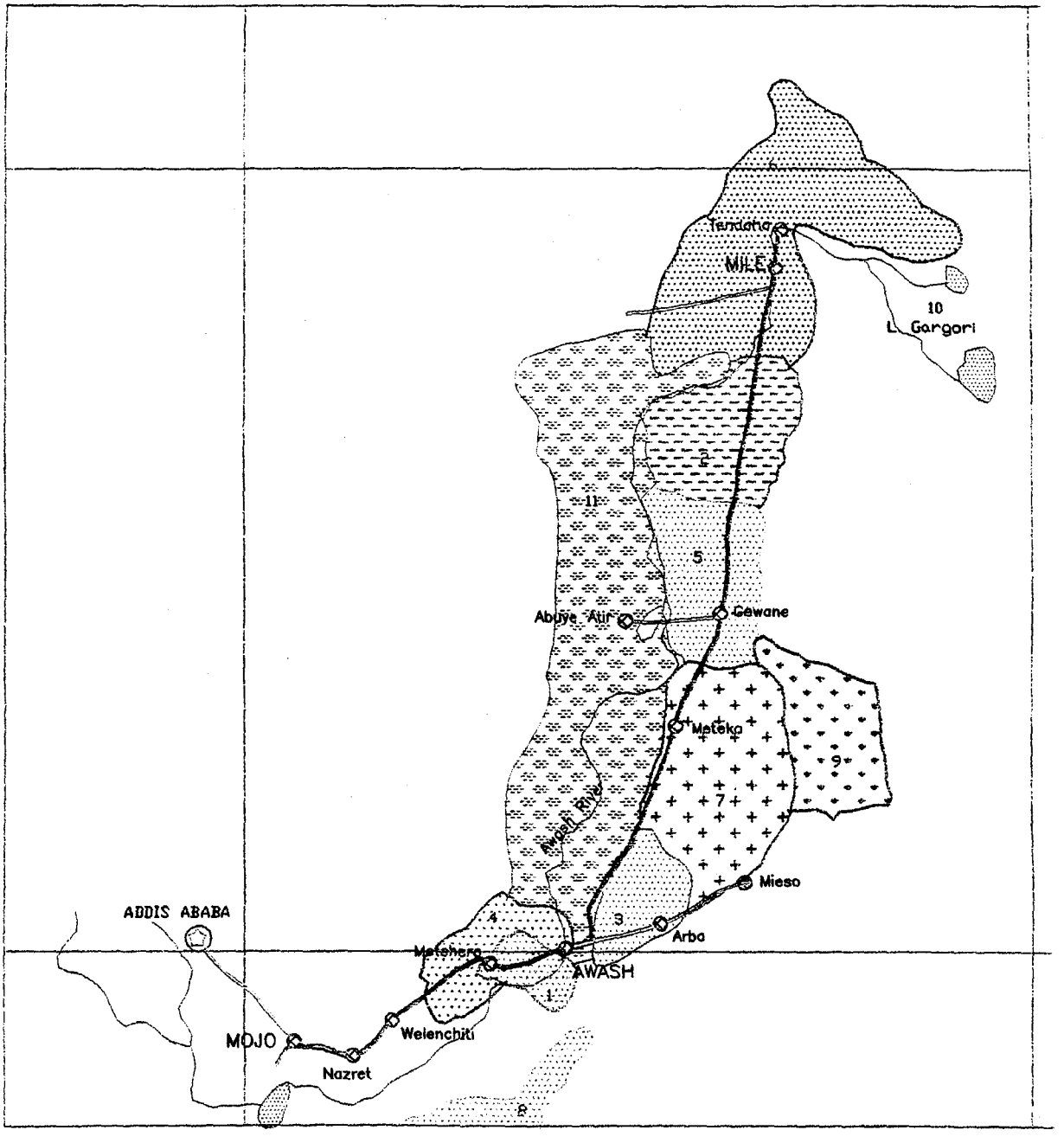
4.4 Human and Social Environment

4.4.1 Characteristics of the population living by/along the road

Settlement pattern

Many towns along the road such as Mojo, Nazret, Wolenchiti and Awash have been created by the railroad after the turn of the century. They served first as administrative centers and turned out to be commercial and industrial centers in their respective areas. However, the present road and the road junctions have had direct impacts on the development of these towns and the woredas in which they are situated. The other towns and villages along the road were created as a result of the construction of the present road and the road still has a direct and vital impact on all social and economic activities in these communities.

The distribution of the population is uneven in the survey area. There are four woredas in both region, but the population in the first four totals to nearly half a million persons or the three quarters of all, while the last four have only one quarter of the total population. This means that the area around the road is densely populated from Mojo up to Nazret and after it the density is decreasing turning out to be sparcely populated already before Awash.



LEGEND

1. Awash National Park
2. Yangudi Rassa National Park
3. Alledeghi Wildlife RESERVE
4. Awash West Wildlife Reserve
5. Gewane Wildlife Reserve
6. Mile-Sardo Wildlife Reserve
7. Afdem-Gewane Controlled Hunting Area
8. Arsi Controlled Hunting Area
9. Erer-Gota Controlled Hunting Area
10. Asaita Lakes
11. Awash West Controlled Hunting Area

Project Road
Other Roads
Regional City
Other Towns

FEDERAL GOVERNMENT OF ETHIOPIA
ETHIOPIAN ROAD AUTHORITY

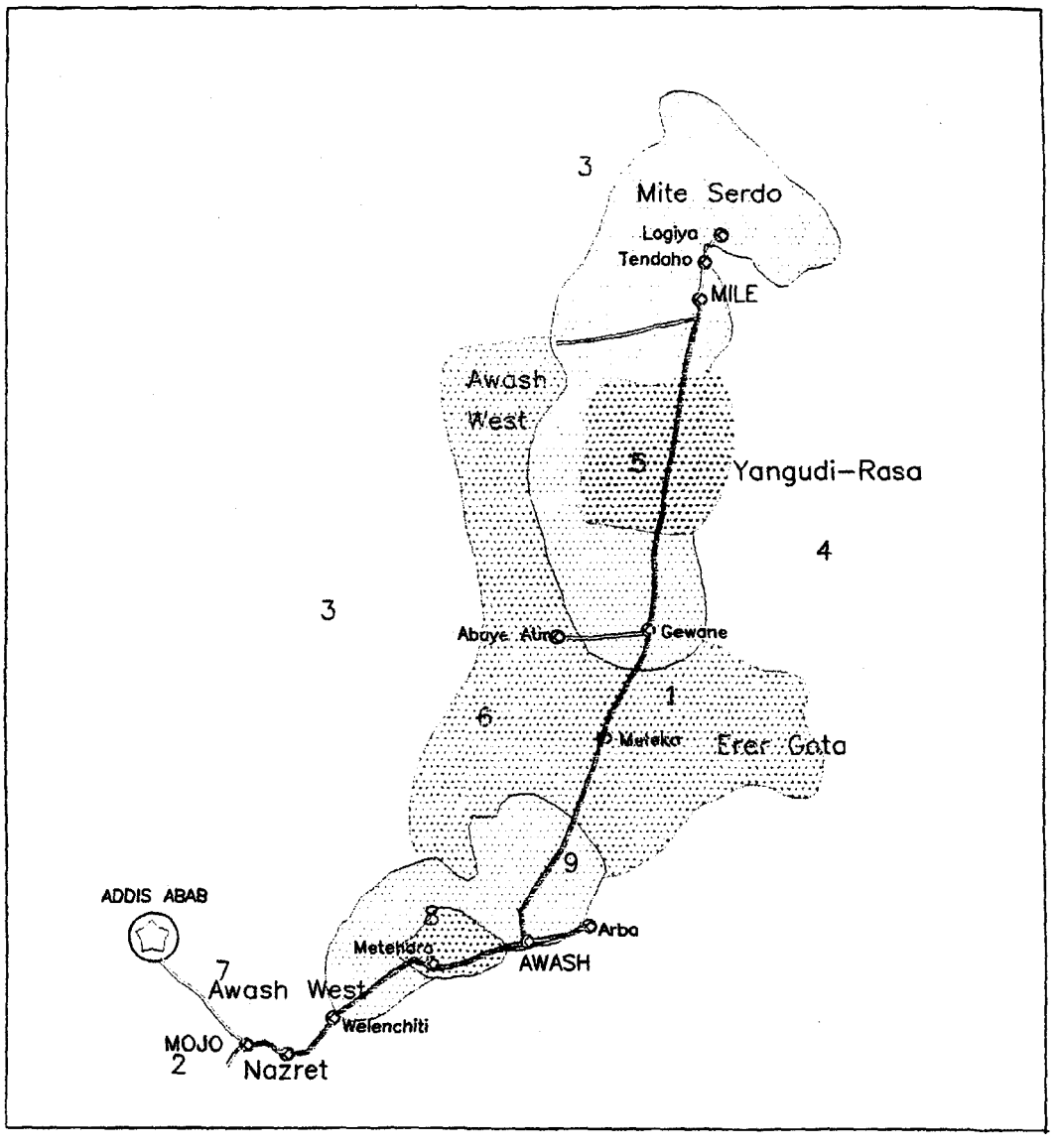
THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FI
ROADS SELECTED FOR REHABILITATION AND /OR UPGRA

MOJO–AWASH–MILE

PLANCENTER Ltd. Finland

PROTECTED AREAS

Figure 4.5 | Date



LEGEND

1. Speke's Gazelle
2. Gelada Baboon
3. Hammadryas Baboon
4. Wild Ass
5. Ostrich
6. Defassa Waterbuck
6. Caracal
7. Oryx
8. Soemmering's Gazelle

National Parks

National Parks Under Establishment

Wildlife Reserves

Controled Areas

Project Road

Other Roads

Project Road

Other Roads

FEDERAL GOVERNMENT OF ETHIOPIA
ETHIOPIAN ROAD AUTHORITY

THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE FIV ROADS SELECTED FOR REHABILITATION AND /OR UPGRAD

MOJO–AWASH–MILE

PLANCENTER Ltd. Finland

WILDLIFE CONSERVATION AREAS

Figure 4.6 | Date

There are eleven towns along, or just by the road. The biggest towns in survey area can be found before the Rift Valley proper: Nazret with more than hundred thousand and Mojo with more than twenty thousand people. In the Rift Valley the biggest towns are Wolenchiti and Metahara with more than ten thousand people and Awash (Sabat Kilo) and Gewane towns both with more than seven thousand people. Wonji, which is located some kilometers away from road and has more than ten thousand inhabitants, is also directly affected by the road. Many of these towns, and especially Nazret, are expanding rapidly.

The rural settlement pattern before the valley is typical to the agricultural hill areas: the houses and compounds around them are separated from each others by fields and pasture lands. There are also some 'new' villages built during the previous government. After Wolenchiti the peasant agriculture by the road is minimal and the lands are used mainly as animal pastures by nomads and semi-nomads. The seasons affect the settlement pattern for these people.

Size of Population along the road

The road has direct and daily social and economic impacts to the eleven towns along the road with more than 270,000 inhabitants. Direct and indirect impacts are affecting also the 8 woredas through which the road goes. The total population of these woredas totals to 650,000 persons. The road has also vital impacts to the surrounding zones with more than two million people. Table 1 in Appendix 9 give the figures for the distribution of the total population by sex, by regions, by woredas and by towns in the survey area.

Sex Ratio

The sex ratio for the whole Oromiya Region is balanced, while in the Afar Region ratio for women is as low as 43 percent of the population. Despite of the regional balance, all woredas along the road in Oromiya Region have less women than men just like in the woredas in Afar Region. The share of women goes up in urban areas. In all the towns from Mojo to Awash there are slightly more women than men (Mojo 53, Nazret and Wonji 52, Metahara and Awash 51). Also in the towns after Awash the share of women goes up but does not reach men's share (Awash Arba and Mille 49, Meteka 48, Gewane 46). Especially among Amharas the urban women's share is very high (in Metahara 56 and Nazret 55)

Female headed households

The head of the household is female in 33 percent of the urban households and 20 percent of the rural households in Oromiya Region.

In Afar Region 26 percent of the urban households are female headed and 14 percent in the case of rural households.

Fertility and the population under 15 years of age

Total fertility rate (TFR) in the first part of the road in the survey area is lower than the regional average (4.9). In the urban areas it is considerably lower (2.8) and in the rural areas much higher than regional averages. In the towns along the road the fertility is even lower than urban average being 2.6 in Mojo, 2.0 in Nazret, and 2.3 for Metehara. Only in

Wolenchiti it is higher (3.3). In Afar Region TFR is only a little over 3 and the difference between urban and rural areas is very small (being 3.1 and 3.2) (Table 2, Appendix 9).

The population under 15 form 47 percent in the whole Oromiya Region and share goes down in Misrak Shewa to 45 percent. The share goes even more down in the woredas along the road being 43 percent in Boset, Fentale and Lome woredas and 39 in Adama. In the towns the share of population under 15 is even lower, In Mojo and Metahara 35 and in Nazret with 33 percent.

In Afar Region the share of population under 15 years of age is 46 percent, but the share in the woredas along the road varies: in Gewane and Mille woredas 47 percent, in Awash Fentale and in Amibara woredas 38 and 39 percent, respectively. In the town the share varies between 31 (Awash) and 38 (Melka Sedi) percent in other than Gewane town where the 47 percent share is highest in the whole survey area.

The average household size

The average household size in the Oromiya Region is 4.5 persons per urban and 4.9 persons per rural households. In Misrak Shewa the respective averages are 4.6 and 4.9.

In the Afar Regional State the average household size is 4 persons per urban and 6 per rural households.

Ethnicity

The acknowledged indigenous people in the survey area are Oromoes and Afars, both having the national regional state by their name. 85 percent are Oromos and 92 percent Afars in their respective regions. Amharas, not being 'indigenous' but 'traditional' constitute 9 percent of the population in Oromiya Region and 4.5 percent in Afar Region (10 percent in the Zones 1 and 3).

In the Misrak Shewa Oromos form 70 per cent of population, out of which only 13 percent are living in the urban areas. The Amaras are the second in number forming 17 percent of population but their share of urban population is 60 percent. There are 86000 Guragies forming 5 percent of total population. The other big groups are Kembata (33000), Wolaita (29000) and Tigraway (20000). All together there are more than 50 ethnicities living in this zone.

Also in Afar Region there are also more than 50 ethnicities. Many of them are represented by few persons, many by hundreds, while some such as Amharas (49600), Argoba (10100), Tigraway (9000), Oromoes (8500), Welaita (4990), Hadiya (2070) and Kembata (1500) form considerable minorities. Especially Welaita, Hadiya and Kembata people, majority of the men, work in the state farms in Melka Sedi and Melka Werer between the road and Awash River.

Besides the Afars there are also some other indigenous ethnicities such as Argobas who live in the area from Metahara up to Ankober. Many Argobas are, however, acculturated and assimilated with Amharas and most of them are engaged in agriculture. Most other ethnicities are migrants from all over the country.

Especially the towns along the road have a long tradition to absorb many ethnicities through migration. In Oromiya region the share of Oromos in towns go down to 54 percent while the share of Amharas goes up to 29 percent. Guragies form 8 percent of the urban population.

In the four woredas in Oromiya Region the share of the urban Oromos is lower than regional average: in Boset and Fentale their share is ten percent, in Lome 21 and in Adama 37 percent. The share goes up in the big towns in these woredas, but does not reach Amharas which form the biggest ethnic groups in all these towns.

Most Afars still live in the rural areas as nomads or semi-nomads, less than 3 percent are urban, while the regional urban average is 7.8 percent of population. 43 percent of the urban population are Amharas and they also form the biggest ethnic groups in Awash and Meteka. Only in Gewane town Afars form a clear majority or 85 percent of population. In Awash Arba Afars is the biggest group (42%) and second biggest in Meteka (34%) after Amharas.

There has been many problems with and for Afar nomads due to the road. The trucks and cars kills their animals, which is not easily tolerated, but they also benefit from the road. They are engaged in animal trade and use the trucks for cattle transportation. They also use the road to reach the health centers and other services. Although they cultivate crop it is not enough for their consumption and their buy millet and other grains from the farmers, while the milk products is one of the basic diet item for them.

The ethnicity figures by woredas and towns along the road are given in Tables 3 and 4 in Appendix 9.

Religion

Most people in Misrak Zone are Orthodox. The woredas along the road are also predominantly Christian Orthodox. However, the 94 percent share in Lome woreda is coming down to 78 in Adama and Boset woredas and further to 39 percent in Fentale woreda. The share of Muslims is increasing along the road: in Lome woreda 2, Adama and Boset 14, and Fentale woreda 35 percent of people are Muslims. Going further the road towards Mille the share of Muslims still increases and 95 percent of people in Afar Region are Muslims and only 4 percent are Christian Orthodox. In the towns of Mojo 8, in Nazret 18, in Wolenchiti 7, and Metehara 27 percent of populations are Muslims. The share of Orthodox people in the towns in Afar Region is bigger than regional share due to the considerable shares of Amharas in urban areas.

Literacy rate

In the Misrak Shewa Zone the literacy rate in urban area is 77 percent for men and 40 percent for women. In rural areas 23 percent for men and 9 percent for women. In the big cities the literacy increases; the highest rate can be found in Nazret being 86 % for men and 74 % for women.

In Afar region the literacy rate in urban areas is 63 % for men and 43 % for women. In rural areas four percent of men and one and a half percent of women are literate.

Migration

In the Misrak Shewa Zone 23 percent of total population are migrants. Migration has been mainly to the urban areas where migrants form nearly half of all population (49.3%) In Mojo and in Nazret in-migrated population form 53 percent of population and in Metahara women's share is even bigger being 61 percent. Women form over half (or 54.4%) of migrant population. However, the share of women among the in-migrants have been decreasing within the last years.

Among those migrants who have resided more than ten years in the present place, women constitute 57 percent. Despite the decrease, 52 percent of migrants were still women during the previous year before the 1994 Census. During the same period women's share was as high as 63 percent to both Wolenchiti and Mojo among all in-migrants.

To Wolenchiti, Wonji and Metahara majority of migrants come from the countryside, while majority of migrants, and especially women is coming from other urban areas to Nazret and nearly half to Mojo.

Information about migration in the Afar Regional State is not available but the ethnicities shown in the population census indicates that most of the permanent inhabitants have moved to work to the state farms from other parts of the country; many come from the Hadiya, Kembata and Woleita areas. Many more people migrate seasonally to this area to pick cotton. The road is, of course, making the labour movements easier.

Future growth of the settlement/towns along the road

Total population in the Oromiya Region is estimated to grow by 2.29 percent annually by the year 2000. This means that there will be nearly two million people more. If the same growth rate is used only for the Misrak Shewa Zone the growth will be about 233 000 persons by the turn of the century.

Population growth in the Affar region is projected to be 2.2 percent annually and the total population by year 2000 would be 108 000 persons more (or 1215255 persons in the year 2000.

However, if new plantations will be opened the migration from other parts of the country will easily increase the population more than what is projected. There is at least one irrigation scheme of 60,000 hectare after Mille already identified. If this will be realised the anticipated migration labour force would be considerable.

It seems probable that urban areas have bigger growth rates compared to the rural areas, and also the (new anticipated) agricultural workers will settle down to the urban type of settlements. The road will have significant role in the development of the towns and local economies.

Health status and facilities

Vector borne diseases are endemic and cause permanent health problem in the project area. Among these, malaria is the most prevalent disease and the primary health care challenge throughout the project area. The capacity of the primary health care centres to prevent and

control communicable diseases is limited. There is general shortage of health manpower (doctors, nurses, health officers and sanitarians) and in most cases the health facilities are inadequate as well. According information obtained, the nearest referral centres for the health units in and around the project area are at Nazareth, Wonji, Metehara and Addis Ababa.

4.4.2 Housing situation

Most houses in the towns along the road are permanent, only in Nazret the share of permanent houses go down to 95 percent of all housing units, while at the same time 40 percent of the houses have constructed floor, not mud floors which are otherwise common also in the towns.

In Afar Region the permanent houses in urban area constitute 97-98 percent of all housing units.

Bathing facilities are available only to about ten percent of people in both regions. In Nazret the access to this facility is biggest being only 89 percent.

Toilet facilities in urban areas along the road vary from 36 percent in Boset Woreda to 72 in Adama woreda. In the rural areas availability of toilet facilities reach no more than five percent in all Afar region and in Lome and Boset woreda.

Electricity for lighting is available along the road and used mainly for lighting in the towns. The share of the housing units with electric lighting is biggest in Nazret (93%), Mojo (90%), Metahara (89%) and Wolenchiti (84%). In Afar zones electricity is used by less than 60 percent of households.

Availability of TV, radio and telephone. Television is available only to few households. Zonal averages for urban areas are 7 percent in Misrak Shewa and 2 percent in Afar zones. Only in Nazret the share goes up to ten percent.

About half of the households in both regions have a radio in urban areas and over ten percent in rural areas. At least half of the town people have an access to the weekly half an hour program for/about the road safety and behaviour. In Nazret 14 percent of housing units have a telephone the zonal average being 8 percent.

In the Affar Region *average number of persons per room* in the urban areas is 2.2 and for rural 5.3, and the persons per housing unit 3.8 in the region.

Cost of houses

The construction costs of the houses varies a lot depending on the construction places. In the rural areas the houses are usually made out of (eucalyptus) wood poles covered with mud, cow dung and teff-straw mixture, which, if well done, will last for years. The costs depend on the available local resources, ownership of trees and cows etc. The work is very often done by the owner himself. However, the rural farmhouses will not be affected by the proposed project.

The costs of the houses in the towns vary as well. Most houses also in the town are wood and mud houses and the costs are approximately 800 Birr per square meter without any

considerable transportation costs. However, in many places the wood poles must be transported to the construction site and transportation may add the cost of a house about ten percent. In the towns along the road there are also some brick houses and their approximate square meter price is 1,500 Birr including the labour used for construction. The transportation costs of cement from Addis add about 30 percent to the cost of the ready house. (The cement factory in Dire Dawa has some trouble in their production.)

The construction of the hollow block houses is increasing especially in bigger towns. Hollow blocks are also produced locally in many places due to simple production methods which due not include very high investment capital. The cost of the square meter is around 1,200 Birr plus transportation costs of cement adding 30 percent to the cost of the ready house.

The average monthly rent per housing unit in the Misrak Shewa is 22.12 Birr. Only in Nazret the average is more, being 27.74 Birr, and in Mojo 19.55 Birr and in Wolenchiti 17.40 Birr. In the towns by the road from one quarter to one third the housing units have been rented from kebeles.

For the Afar Region the information is only by zones, the figures show the shares for urban areas. The rents are much higher in the second part of the road and the houses are rented more from the private sources than from the kebeles. Also the share of owner occupied houses is bigger than in the towns on the first part of the road.

The ownership of houses and percentages of renting are given in Table 5 in Appendix 9.

The rehabilitation of the road will not affect the present houses. There is no need to demolish them even in the towns because the road area is broad enough. Due to this reason there will not be any negative impacts on the housing situation.

Type of fuel used for cooking

The most common fuel for cooking in the rural and urban areas is still fuel wood. It is also one of the daily trade items and also this road is used to fuel wood transportation. Especially women are carrying wood to the towns to the markets but also donkeys and camels are used when possible. The charcoal is more expensive and most of the marketed charcoal is illegally produced and sold. For that reason it is also sold often outside the towns by the road to the people passing by. The electricity is available in the towns along the road but used only by few households. Also dung is sold and used for cooking in the towns. (In Lome woreda 58 households report that they use dung, and only 41 percent uses fuel wood!) Electricity is used only in big towns and mainly for electric *metad* (cooking plate).

Statistical figures for energy used by a household for cooking in Mojo, Nazret, Wolenchiti and Metahara are given in Table 6 in Appendix 9.

The fuel wood consumption is increasing with the increasing population in urban and rural communities. The alternative fuels such as electricity and gas are not decreasing fuel wood consumption, since the households using electricity/gas also increase their fuel wood consumption. The change to the alternative fuels is not very quick (due to the increased price of electricity and non-subsidized kerosine).

Drinking water/Water sources of the households

In the towns in the first part of the road nobody is reported to use water from lakes, rivers or ponds. The shared taps are the most common source for drinking water. However, in the rural areas in the woredas along the road these are still common sources for drinking water for the households (Lome 48%, Adama 22%, Boset 56%, and Fentale 37%).

In Affar Region 14 percent of households get their drinking water from rivers or ponds and additional 13 percent from unprotected wells/springs. The people living in the towns are using mainly tapped water. All towns except Awash get their water supply from boreholes. In Awash town the tapped water is taken from the Awash River but not treated at all. From the adequacy point of view only Mojo town has adequate supply and Nazret town water supply from Awash river is under construction with treatment plants. To one small Isa/Somali settlement in Undufu between Gewane and Adaitu the drinking water is transported by a tanker from Arba town. The empty benzin tankers take water to their empty tanks when going north to the ports and where they are filled with gas/benzin. Water costs Birr 500 per tanker.

Many people are dependant on the water near the road and the hazardous materials if either carelessly used in construction or stored by the roads may poison the water. The traffic accidents on the road with big tankers carrying hazardous materials if leaked to the ground may also cause health risks to the people using water from near places.

Sanitation coverage (pit latrine) in the towns is generally poor. For majority of the residents, areas around the household plots are used for defecation and waste dumping. However, a small percentage of the population use pit latrine and garbage pits for solid waste disposal.

Other water harvesting and drainage

The only sources for water harvesting along the road are surface water (perennial and seasonal rivers) and ground water. No town along the road have drainage system.

4.4.3 Local economic activities by the road

The economical activity is much stronger and varied/manysided by the road from Mojo to Awash than by the road from Awash to Mille. This is due to the different natural environment and difference in the settlement patterns.

Agriculture. The first part of the road from Mojo to Nazret is mainly good agricultural land producing all kind of grain (and good teff), oil plants and other farm products. Besides the numerous small individually run farms there are also big irrigated plantations/state farms near the road such as sugarcane plantations in Wonji, south off Nazret, and in Metahara near Awash and fruit plantations north of the road near Awash Arba town. The agricultural lands decreases after Wolenchiti when the road enters more arid and hot part of the Rift Valley.

The second part of the road from Awash to Mille runs along arid and hot plains with very few private farms. The land here is fertile but the shortage of water/rains does not allow cultivation. There are, however, big irrigated banana and cotton plantations/state farms between the road and Awash River in Melka Sede, Melka Werer and Gewane.

Animal husbandry. Cattle, goats and sheep can be found all along the road and camels on the second part of the road. However, the animal husbandry differs along the road. In the agricultural area animals are an integrated part of the farming system, while the economies based solely on animal husbandry also differ. Especially near Nazret and Wonji/Gefersa there are big cattle fattening farms, both private and state owned, based on the modern methods. In the areas towards Awash and especially after it up to Mille animal husbandry is more characterized by traditional nomadism or semi-nomadism.

The live animals from the cattle fattening farms are transported by animal trailers to the capital or to the ports to be exported. The animals are sold also by the nomads along the road and there are rest places for animals to rest before transportation or exports. Many animals are also taken by the road to towns and especially before Christmas and Easter holidays the road may be blocked by thousands of animals walking to capital.

Industry The big towns such as Mojo and Nazret have also big industrial enterprises. In Mojo there exist factories such as a tannery (another is located south of the town), a textile and soft paper factories and small industrial enterprises/garages. Industry in Nazret includes such as a soap factory, a flour mill, two edible oil factories and a tractor factory. South of Nazret there is also a big paper factory in Gefersa. In both places there are many more small scale industrial enterprises serving the local towns but also transporting their products to Addis and other parts of the country and bringing in the raw materials.

Service sector is considerable especially in the big towns mainly serving the local needs but the road is important also for them transporting articles and raw materials to the shops or to service sector in general.

By the road, and especially in the towns, there are also bars and restaurants and hotels, mainly run by women, and gas stations and garages serving the transitory traffic.

The road side trade is common also on this road. Farm products, animals, fuel wood and charcoal sellers can be found along the whole road. Also as a unique feature to this road can be found already before Mojo where people sell water containers for the truck drivers entering the Rift Valley.

Salt trade Salt trade by the Afars may not be any more the most important source of money to the local people, 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 a '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.

Economically active population and unemployment

In Misrak Shewa 79 percent of men and 56 percent of women are counted as economically active. In urban areas economic activity decreases being 61 for men and 34 for women. In big towns, however, the share of economically active women is still decreasing being 32 percent in Nazret. (However, the reproductive work done by women is not counted as active.)

Unemployment for the whole Misrak Shewa Zone is 5.5 percent for men and 6.3 to women. The share of unemployed is bigger in urban areas: 22 percent of men and 28 percent of women are unemployed. However, in towns by the road unemployment is below urban average. In Mojo town 14 percent of men and 25 for women, In Nazret 16 for men and 37 for women, Wolenchiti 8 percent for men and 10 percent for women, and in Metahara 18 percent for both sexes.

In Afar Region the share of economically active population is lower than in Misrak Shewa: 65 percent of all men and 46 percent of all women. Urban unemployment for the region is 12 for men and 9 for women (table 7, Appendix 9).

Along the whole road area hotels and restaurants are mainly run by women, although the other type of business work is mainly run by men. The category 'private households with employed persons' is another activity where women have bigger rates than men.

The women are especially active in manufacturing in Afar Region where they form over half of manufacturing labour. Women are also running hotels, bars and restaurants. Most of this business is very much dependant on the road and its transitory traffic. Since one quarter of households are women headed these activities are important also for their dependants.

The state farm labour is mainly migrant labour (however permanent) while the Afar themselves are not inclined to take farm labour. They are, however, often employed as guards for different purposes.

4.4.4 Social acceptability of the project

All people and organizations interviewed as well as the participants in Awash Public Consultation gave a clear acceptance for the project to rehabilitate the present road. Many benefits and problems were described, but also recommendations for the future construction were given (Appendix 5). Especially the committee formed from all stakeholders was seen necessary for this road. Although very few changes will affect permanently the people living by the road, the detours, camp and quarry sites and possible losses of agricultural or pasture lands were accepted to rise.

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 certain local facilities is more important than long distance mobility. Road is extensively used for many social and economic activities as well as for local transportation needs, very often using traditional methods.

The road gives better access to health and education facilities and other services and to administrative centers. The buildings for these institutions are usually by the road due to the accessibility by motor vehicles. People living by the road are also using it for walking to and from markets.

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 dark times and better road is seen to be also safer road. Many women are also moving to the road side to the relatives or familiar households by the road for better and quicker access to the clinics for delivers. The school attendance by girls is also bigger in the towns by the road and better roads are anticipated to increase it.

One of the justifications to build or rehabilitate the roads 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 for outputs for transporting the farm products to the other areas.

The road is important for local economic activities. Many shops and industrial enterprises are dependant on the road for their raw material imports and transporting ready made products to other parts of the country.

Local economic activities along the road are various. Many people get their livelihood by selling their products by the road side. Charcoal, fuelwood, animals, vegetables or whatever people have to sell are sold. Especially in the town areas where transitory traffic stops, hotels, restaurants and bars are serving the drivers and passengers. Most of these services are run by women who have family to feed (one third of families are female headed)

Benefits for the transitory traffic

The road is vital export/import road and the economic benefits are especially important to the national economy. Even if the importance of the Assab port will decrease the road has many junctions with important roads to other directions and the rehabilitation of the road benefit also the traffic along this road to Dobi town from where the road goes to Djibouti port.

The better road would decrease the costs of transportation due to the saved time and due to the less breakage of vehicles.

Problems with the present road

The biggest problem also on this road is the frequency of traffic accidents caused by several reasons. The bad condition of the road such as potholes is blamed for the accidents, as well as animals crossing the road. Especially the accidents killing animals in Afar Region and incidents which have followed are well known. (If there are no people around the drivers try to escape the accident place, but if any of the Afars saw, say, the colour of the escaping car, the next cars with the same colour might face shooting, in case of a buss next busses will be targeted.) Not only animals but also pedestrians are causing accidents walking on the road and/or behaving unexpectedly.

One of the 'typical' accidents is trucks turning over from the road (often due to the missing shoulders). The breakages of the vehicles due to the poor condition of the road is very costly to the vehicles' owners. Also over speed and overloads are reasons for accidents.

Especially in Afar Region also the missing services for drivers due to the long distances are felt to be a big problem. If the trucks or cars break down for any reason there might be

hours without anybody passing by. There have also been cases when *shiftas* (bandits) have attacked truck drivers when trucks have stopped for technical failures. According to the interviewed there should be more stations or check points along this road.

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 devoleped 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 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 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 discipling and order. For example, no alcohol is allowed in the camps. Neither are the families of the workers allowed to stay overnight in the camps.

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

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

Although the camp administration does not allow temporary huts and houses to come too close to the camp to avoid looting or other misbehavior, 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 resources. 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 resedents 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, grieavance 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 enterprices differ significantly. However, the contructor 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 annyally 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 Mojo - Awash - Mille 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, operation of equipment's and housing of the labour force, but very few that will lead to permanent change

5.1 Physical Environment

5.1.1 Soil and erosion

Erosion

Road side ditches which are constructed to divert surface drainage water to the adjacent lands are major contributors to soil erosion.

Since the main construction is putting a new asphalt layer on top of the old layer, not much erosion is likely to occur; only minor erosion may be enhanced at the construction of bridges and culverts.

Soil contamination by spills of hazardous material

From Mojo to Wolenchiti the land adjacent to the road is arable land. On this section of the road improper disposal of used oils and lubricants and accidental spill of fuel, oil and other hazardous materials may be the cause of soil contamination. The other section of the road is found in very hot arid climate, where there is no arable land.

Rehabilitation of the road may increase the traffic along the road and may increase the amount of spills of oil and fuel due to accidents.

5.1.2 Hydrological conditions and water quality

Water resources and water quality

Construction of the road along Lake Besseka and Meteka swamp may affect the water quality due to pollution from spill of oil, fuel and lubricant and increase in turbidity.

The water quality of Lake Besseka will be polluted due to washing of vehicles and trucks.

Material use

The main material required for the rehabilitation of the road is rock quarry. Mostly the rock quarries are located at the highest topographic position in the area and the aridity of the area will not give the advantage to use them for water harvesting.

Highway run of pollution

Highway run off pollution has insignificant adverse impact for the following reason. Highway run off occurs during rainy reason when rivers and flood paths have high floods.

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

Additional risk to the aquatic environment arises from the accidental spillage of pollutants, particularly diesel fuel, lubricants and chemicals, which can cause extensive long term contamination of the Lake Besseka and River Awash and Meteka swamp.

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 burrow pit sites will be an annoyance to only those few residents living near the sites as well as the construction labour force. Noise is generally not considered 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.

There are excisting big industries only in Mojo and Nazret, but they use electricity as a power source. The only industries using other sources of power are sugar factories of Metahara and Wonchi which generate power by burning their sugar cane wastes and thus affect the quality of air.

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 quarry sites. The vegetation of the area

which will be disturbed comprises grasses with isolated Acacia trees in Afar and some agricultural lands in Oromiya Region.

There are no significant areas of natural or semi-natural forest all along the project area that will be affected by the construction activities of the project.

5.2.2 Destruction of wildlife habitat and impediment to movement of wildlife

The construction of the detour roads will encroach into the Awash National Park and Yangudi Rassa Wildlife Reserve as well as on Alledeghi plain and will require land clearing which will cause an impediment to movement of wildlife and a minor as well as temporary destruction of wildlife habitat. However, no change in the existing species of mammals and birds is expected within the parks due to the proposed rehabilitation project. According to the Head of the Awash National Park at least 50 wild animals are annually killed in the traffic accidents.

During the public consultation, the Awash National Park personnel have recommended the detour to be constructed along the present road or along the old Italian road going around in the North of the Park as not to disturb new areas in the park.

5.2.3 Encroachment into ecologically sensitive areas

The road Right-of-Way (ROW) was cleared and disturbed during construction of the existing road. Therefore, the project component do not involve any fresh encroachment into designated ecologically sensitive areas and nature reserves. However, the major threat to this region is from rapid expansion of modern agriculture which is highly dependent on the use of agro - chemicals, particularly fertilisers and pesticides and very little is known about what effects this development has on these areas.

5.3 Human and Social Environment: Social Issues

5.3.1 Social acceptability

All people and organizations interviewed as well as the participants in Awash Public Consultation gave a clear acceptance for the project to rehabilitate the present road. The road is anticipated to increase the present and bring new benefits for both locals and for transitory traffic after the rehabilitation.

Even if there will be temporary losses of agricultural/pasture lands these problems are regarded as minor problems and temporary by nature compared to the long lasting beneficial impacts.

5.3.2 Resettlement/displacement of people

No resettlement issues will arise because of the rehabilitation project. There are no residential buildings within the reserved road area and hence there will be no need for displacement of people, and hence no resettlement question will arise.

5.3.3 Demographic changes

There will be no demographic changes due to the road rehabilitation project. The present road has had direct impacts on the existence of the towns and the better road will have only a slight impact on the growth rate of the urban population. There are many other and more direct reasons for the growth of urban areas and the rehabilitation of the road will not change the present development trend.

The total fertility rate will continue to decrease due to the increasing urbanization, and mixture and percentage share of different ethnicities might slightly change, especially with the new anticipated plantations. The share of women may increase especially in the towns along the road.

5.3.4 Change in way of life

The rehabilitation project will not dramatically change the way of life; the road has existed for years and no virgin areas will be connected to it. New and various activities will be created mainly due to the growth of towns, the rehabilitation, however, might only increase the present trend with better transportation possibilities for goods and people.

Temporarily some farmers will loose the agricultural land and nomads grazing lands due to the detours for one crop period. However, the short time will not cause any permanent changes.

During the construction period some people will start income generating activities serving the construction camps. Some people will arrive from rural areas with agricultural background and start business life. Many will be divorced/widowed women who has to move out from rural communities. Most activities will be temporary by nature, but some will stay even after the camp has been removed.

From the past experience it can be assumed that some of the 'camps' will continue the life of their own without the construction camp proper. For many people the way of life will be different due to the new economic activities, being dependant on business (charcoal, bars etc.) and not on agricultural activities.

5.3.5 Impacts on women

Since the road has existed for years the rehabilitation project will not have any radical impacts on women. However, the better and widened road with better shoulders and with good drainage 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 locals benefit from the better road, but especially women as the main users of the road as pedestrians.

Mainly women (often heads of households) run the road side services such as bars and hotels and the road is vital to their survival. More traffic benefit these enterprises. The traffic will increase with and without this road project, but will be quicker after the rehabilitation. Also more private cars will appear on the road. However, the good surface of the road will increase also the speed and minimize the needs to stop.

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

However, women will also be posed to increased risk of sexually transmitted diseases and unwanted pregnancies.

5.3.6 Impacts on indigenous peoples

The rehabilitation of the present road will not have any considerable impacts on the indigenous Afars, although the grazing lands will be temporarily taken for detours or for other construction purposes.

The present road has had a big impact on the migration of different ethnicities to this area and this trend will continue and change slightly the ethnic shares in this area. The road might have impacts on (decision-making of) the establishment of new farms by the road in Afar Region and the grazing lands now used by Afars will be much more affected than directly by the project.

Since Afars are also engaged in animal trade and use the trucks for cattle transportation the better road will benefit them. They also use the road to reach the health centers and other services and trade by the road side their products and buy especially farm products from the local farmers or from the markets.

The better road will increase the traffic speed which might cause more accidents with animals.

5.3.7 Induced development

The construction camps will have both short and long lasting impacts on the local communities. During the construction period most impacts will be felt temporarily while some will survive even after the camps are removed. 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. It can be assumed that some of the camps also along this road will turn out to be permanent settlement places for many people and households after the construction work is over.

The camps themselves are like small towns with residential and office buildings, storehouses and workshops, most of the services will be bought from the neighbouring environment. Food items, animals, grain and/or vegetables will be bought from farmers or shops (some bigger quantities are transported from the nearest big towns). Also many other items will be centrally bought by the camp administration and additionally many other and individual services are requested by the individual workers, both creating income possibilities to many people/households around the camp sites.

The suddenly created demands on the items such as food, drinks, fuelwood etc. and different services will considerably raise the prices of local products/services. The people selling their

products or services will benefit, while those local people who are dependant on the same purchases will suffer in the form of increased prices.

The increased demand of the goods and services and higher prices will affect some individuals and families to migrate and settle down near the camp sites for their own businesses. Most of these people are landless and continue to stay after the camps are removed.

The camps have more temporary impacts in the densely populated area from the Mojo to Wolenchiti and longer lasting impacts in the sparsely populated area from Awash to Mille because of more new settlements of outside people.

5.3.8 Conflicts between locals and immigrants

The arrival of 100-200 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. Due to the unemployment rates (varying between 8 and 18 percent among men in urban areas) many locals will be hired by a contractor as unskilled daily labour. The local administrations would like to have a say who should be employed by a contractor.

Because Afars do not easily accept employment as construction workers some daily labour might migrate also from the western hills to the northern part of the road and reside near (but not inside) the camps.

However, major ethnic conflicts between locals and migrant workers are not to be expected along this road. The Afars are willing to take employment as guards and the camps might be easily accepted by them due to the increased trading possibilities for them too.

Usually the workers stay in the camp for three weeks at a time and during the fourth week end the whole staff is taken to the near by town for *asbosa*/shopping week end.

However, occasional and personal conflicts will be expected due to many reasons, especially during shopping week ends, often due to heavy drinking. Also the more cash available among the migrant workers might cause personal conflicts over available resources between the locals and migrants. The more cash will also temporarily inflate local prices and cause bad feelings in the local population. Especially the poorer sector of the society will suffer.

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 the Ethiopian men the occurrence of veneral diseases increases also among the local population. Many temporary relations result in pregnancies and 'milk payment' court cases will increase.

5.4 Human and Social Environment: Economic Issues

5.4.1 Loss of agricultural lands

There will be no permanent losses of the agricultural land due to the rehabilitation project. There will be temporary losses of the agricultural lands due to the detours, quarry, and storage sites. ERA has the right to occupy any needed sites. After the construction temporarily lost agricultural lands should be rehabilitated to their previous state.

5.4.2 Loss of grazing land

The detour and construction of the access roads to the quarry areas will affect present grazing lands. The losses will be temporary and the contractor should rehabilitate the sites into their previous condition.

5.4.3 Loss of property

Although ERA has the right to occupy any sites needed for the road construction, it has also the responsibility to compensate all lost property. The land is not considered as a property, but the crop or trees growing on it are considered to be property when with commercial value. All buildings are considered as a property and entitled to compensation. However, the property within the reserved road area is not compensated, only houses/buildings outside it. Compensation is paid to the owner be it public or private.

Residential and/or other buildings. There is no need to remove or demolish houses or other buildings along the present road due to the rehabilitation project. The road is wide enough in all the towns and in the rural areas houses are not by the road.

Loss of crop and trees. Since the detours will affect agricultural and pasture lands there might be some losses of growing crop. Most of the rehabilitation/construction will happen mainly during the dry season and since the fields affected are rainfed, the loss of crop will be minimal. In case the construction work continues over the cultivation period the value of the lost crop will be estimated by the ERA Compensation Committee and compensated by ERA.

There are no forests along the road but some individual trees might be cut down due to the detours or other construction needs (eucalyptus in the first part of the road). ERA compensate only the trees with commercial value.

5.4.4 Employment opportunities

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. Although previously only men were hired now also women participate in road construction work. Some local people will also be hired for the camps as cooks and cleaners, some of them women.

The local administrations want to have (and should have) a say about who should be employed, because they are aware of the local unemployment situation. Unemployment is bigger in the first part of the road, while in the second part of the road unemployment is lower. There might be a need to bring unskilled construction workers from outside.

Already now most labour in the state farms is migrant labour. The Afars are not eager to the road construction work but are willing to take employment as guards for construction camps/sites and machinery/equipment.

The employment based on the rehabilitation project will be temporary, but some might be hired on the permanent bases for future maintenance work.

The national policy underlines the labour-intensive methods also in the road construction (mainly to the rural roads). The trunk road construction will be opened to the international tenders. Due to the privatization the amount of the workers will probably decrease from its present number due to the more effective working method (such as computers for clerical staff, bigger machinery needing less labour etc).

Outside the construction work there will be many self-employed people who are serving the camp workers in different ways. Also most of this type of employment will be temporary.

5.4.5 Change in economic activities

The scale of economic activities, especially services and demand on local products, will increase temporarily but big changes in economic activities or long lasting impacts are not expected.

5.4.6 Effects on public and private services

During the existence construction camps there will be an extra pressure on public health and other services. Demand of private services will increase, benefitting the local economy. These impacts are temporary.

5.4.7 Impacts on national economy

The road is already now important for export/import. The better road will decrease the transportation costs due to the shortened transportation time and less breakage of vehicles.

5.5 Human and Social Environment: Other Issues

5.5.1 Cultural, religious and historical areas

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.

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.

In the whole survey area there are no nationally known important monuments or historical sites which would be negatively affected by the project. However, this road serves as a link road to many other roads leading to such places (Kulubi Harar, Sheik Hussein etc.). the increased tourism due to the better road would use this road but most stops for food, drinks etc. would be done in the present towns.

5.5.2 Health and sanitary issues

The camp regulations require satisfactory sanitation conditions to the workers. However, the survey area is an endemic malaria area and especially workers coming from the highland areas are posed to the risk to malaria. Most construction, however, happen during the dry season mitigating the risk in the area. Between Arush and Mille there are no open ponds and no new water harvesting places will be constructed there.

5.5.3 Road Safety

The better pavement and road shoulders will make road safer for both pedestrians and transitory traffic, especially in the towns.

The better pavement without potholes will also increase the speed of traffic increasing the risk of accidents. There are no traffic signs to warn drivers about animal crossing places. The present truck drivers are more or less aware of them due to the familiarity with the road. However, anticipated new drivers on the road are not aware of these places. Especially the natural park areas pose the risk to wildlife.

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.

6. ANALYSIS OF ALTERNATIVES

The analysis for the alternatives will be based on (i) the proposed rehabilitation and (ii) on the non-rehabilitation or "zero alternative".

The Mojo-Awash-Mille road has already exceeded its design life and the road needs the proposed rehabilitation activities in order to stop the accelerated deterioration and bring the road to the condition where it can keep up with the growing traffic. The road already has a pavement and the justification for the rehabilitation is to increase its bearing capacity now when the road is in the condition still to do so. It would be much more expensive to make the needed improvements later if the road condition is still allowed to deteriorate.

To have a new pavement is environmentally more sound solution. After proper rehabilitation the erosion problem decreases due to the stabilization of soil. The road safety improves when vehicles stay in the better condition. On the other hand, the increased traffic speed may cause more accidents.

From the social environmental point of view the acceptability of the rehabilitation project is high. The adverse impacts are considered to be small when compared to the local social and economic benefits and/or the benefits to the transitory traffic and/or to the national economy.

The adverse environmental impacts of the proposed rehabilitation project on the biological environment are mainly related to the construction period and are therefor temporary.

Based on the analysis of the environmental assessment the consultants support the rehabilitation which they see to bring more environmental benefits than the zero-alternative would bring.

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 specifications for the prevention of environments hazards and pollution i.e.

Borrow materials sites

- Blasting should be optimised not to cause slope destabilation and damage to adjacent structures.
- Materials will be preferably extracted from existing quarries.

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.

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 minimise 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.

Washing of trucks and vehicles in Lake Besseka should be prohibited.

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.

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 minimised or rescheduled so as not to occur at night or locally recognised religious days.

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 minimise excessive gaseous emission.

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, therefore, exacting principles of design is need to be adhered in order to avoid excessive destruction of vegetation and disturbance of land.

The most important mitigation options for terrestrial vegetation are:

- consider the location of mature trees during detour route selection to minimise 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;

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

To compensate for the losses, it is recommended to re-forest selected places including the Awash National Park. 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 organise and manage the overall implementation of this proposal as soon as the fund is made available for the construction of the project.

The estimated cost to implement the programme over a period of two years is about Birr 150,000. Table below shows the cost break down. Regular progress reports will be prepared by the team and submitted to ERA.

Table. Cost estimate for compensation reforestation programme

Cost Item	Amount (Birr)
Nursery Support	25,000
Labour and Transport	100,000
Monitoring and Evaluation	25,000
Total	**150,000**

7.2.2 Impediment to movement of wildlife

The project has an alignment through the National Parks and Game Reserves, therefore, construction of the project will affect the wildlife population and wildlife habitat in these areas.

While there would appear to be no restriction on constructing detour in the national parks and wildlife sanctuaries and game reserves, the park authorities should have the right to be consulted over route selection in these areas to minimise potential damage.

7.2.3 Encroachment into ecologically sensitive areas

The project will not involve in any fresh encroachment into known and designated ecologically sensitive areas and nature reserves, because, the road right-of-way was already cleared and disturbed during construction of the existing road some years ago.

7.3 Human and Social Environment: Social Issues

7.3.1 Social acceptability

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 Committee includes all stakeholders and is represented by the locals as well.

7.3.2 Resettlement/displacement of people

ERA Compensation Committee to meet in case the resettlement issues arise.

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

No mitigation plan needed

7.3.6 Impacts on indigenous peoples

The road project will affect temporarily very small part of the grazing lands. However, the negotiations with Afars must be taken seriously due to the basic issue of traditional lands. The Afars may also require employment possibilities as a compensation of lost pasture lands and this should be taken also into consideration. All the guards in the area already now Afars. This is a responsibility of an ERA Compensation Committee

The information to the drivers of the transitory traffic should be increased in order to mitigate the problems in case of accidents.

There should be the speed limits in the traditional crossing places of cattle. (Not only in the Afar Region but all along the road there should be speed limits in the traditional crossing places.)

7.3.7. Induced development

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

Especially after Awash the construction sites should be planned in the places where they can serve the future traffic and drivers.

Houses which are build 'temporarily' due to the camps should be registered by the kebeles/PAs in order 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

Especially in Afar region Afars can (should) be hired as guards to the camps and storage places. (All guards are Afars in the state farms as well.)

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

ERA Compensation Committee should minimize the temporary losses of agricultural land.

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

7.4.2 Loss of grazing land

ERA Compensation Committee should minimize the temporary losses of agricultural land.

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

7.4.3 Loss of property

The needed areas for construction should be planned as to minimize the effects on the growing crop.

The value of the lost crop should be estimated according to market prises.

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 (especially in Muslim areas, because they are not always clear to the Christians) 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.

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 and Natural Environment			
1.1 Soil and erosion			
- Erosion	* Blasting should be optimised not to cause slope destabilise and damage to adjacent structures. * Materials will be preferably extracted from existing quarries.	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	* Construction activities in and around perennial rivers should be conducted during 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 * Washing of trucks and vehicles in Lake Besseka should be prohibited. * 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 * Rehabilitationof detours after construction * Compenstion Afforestation	Contractor Contractor ERA	150,000 Birr
2.2	Destruction of wildlife habitat and impediment to movement of wildlife	* The park authorities should have the right to be consulted over route selection in these areas to minimise potential damage.	ERA/Contractor	-
2.3	Encroachment into ecologically sensitive areas	* Avoide tree areas were possible	Contractor	-

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 Compensation Committee	For ERA coordinator per diems and transportation costs
3.2 Resettlement	* ERA Compensation Committee to meet in case the resettlement issues arise.	ERA	
3.6 Impact on indigenous people	* The road project will affect temporarily very small part of the grazing lands; however, the negotiations with Afars must be taken seriously due to the basic issue of traditional lands. The Afars may also require employment possibilities as a compensation of lost pasture lands and this should be taken also into consideration * There should be the speed limits in the traditional crossing places of cattle (not only in the Afar Region but all along the road).	ERA Compensation Committee ERA	
3.7 Induced development	* To induce planned development the sites should be selected in a way which take into consideration the available natural resources (water, fuel etc) for potential permanent settlement after the construction camps are removed (especially after Awash) * 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	* Especially in Afar region Afars can (should) be hired as guards to the camps and storage places * 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.	ERA Camp Administration	

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

5 Human and Social Environment; Other Issues			
5.1 Cultural, religious and historic areas	* The destruction of locally important sites can be avoided in cooperation with local elders/administration. * The local religious places, graves and funeral places as well as holy trees or springs must be taken into consideration when the detours, quarry and other construction sites are designed.	ERA Compensation Committee	
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 and benefits of condoms must be introduced * availability of condoms must be assured	Contractor	
5.5 Public Consultations	* Sound and transparent public meetings/consultations shall be held with relevant information before decision making. Consultations should include all stakeholders and should be held in all localities along the road. Before the public consultation local people should be well informed about the project design and activities.	ERA	

8. ENVIRONMENTAL MONITORING PLAN

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

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

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

8.1 Soil and Erosion

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

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

8.2 Terrestrial Vegetation

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

8.3 Agricultural Land

The Environmental Inspector together with 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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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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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

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Statistics

The 1994 Population and Housing Census of Ethiopia. Federal Democratic Republic of Ethiopia. Office of Population and Housing Census Commission. Central Statistic Authority.

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

Statistical Abstract 1995, Ethiopia, April 1996

General data of Ethiopia:

Spectrum Guide to Ethiopia 1995

Sources of social, cultural, economic and health data:

Trends in Developing Economies, World Bank, 1994

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

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

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

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

Environmental Protection Authority of Ethiopia, EPA

The World Bank, Addis Ababa

The Delegation of the European Commission

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

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

Forestry Department

Ministry of Economic Development and Cooperation
- Environmental Planning Unit

Road Transport Authority

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

List of Organizations, Institutions and Persons

Participants representing the following organizations in Public Meetings:

Place Dire Dawa
Date June 20, 1997

Representatives from:

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

Place Awash Town
Date June 22, 1997

Representatives from:

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

List of Organizations, Institutions and Persons

1	Education Office	Awash
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 the Public Consultation

MINUTES OF MEETING

Public Consultation due to the Rehabilitation Project of the Mojo - Awash - Mille Road

Place: Awash Town
Date: June 22, 1997
Time: 9:00 - 12:00

Coordinator: Ato Sharew Bekele

Facilitators:		
	Ato Tadele Debele,	ERA HQ, Chairperson
	Ato Dejene Wolde Mariam	Plancenter
	Ato Atnafe Beyene	Plancenter
	Ms. Ulla Mustanoja	Plancenter

Participants of the Public Consultation:

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
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	Gewane
1	ERA	Awash
2	ERA	Awash-Gewane

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 consultationmmeeting 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 also explained 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.

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 the meeting discussion

* The road is the major import and export road and a life line of the country
* The road between Wolenchiti and Metehara is narrow, lack proper visibility and has been a major cause of accidents.
* The Besseka lake near Metehara is flooding the road and a solution has to be found, maybe to follow the old Italian trail by the hill side.
* The asphalt road at Awash town is broken from the sides since the road has no shoulders and this has become a major cause of accidents for vehicles when turning around. There are cases where vehicles have (gone into the bars and) destroyed properties. It has become also difficult for the people to cross the road at certain points. People have gone to the extend of making bridges to solve the problem. People have given a special name to this section of road (danger zone) since it has become a cliff.

Minutes of the Public Consultation

* The road is built for smaller trucks and this days very wide and long vehicles are on the road due to the technological improvement of car manufacturing.
* The region is a major agricultural development area and a lot of cotton is grown and this ha to be taken into consideration when rehabilitating the road.
* The road is useful to the country as a whole and the nomadic population of the area to take their cattle to market areas and sell also by the road side whatever products they have like firewood, charcoal, goats, sheep etc
* The towns and villages along the road were created as a result of the construction of the road and all social and economic activities depend on this road.
* The road near Meteka is badly damaged and has cause problem due to the dust. It is also slowing down traffic
* The road is being used by the local people since they have realized the benefits than before
* The construction of the trunkroads should be given also emphasis to maximize the benefits of the main road for the development of the area.
* There are a lot of accidents on cattle when crossing the road to go to water points and grazing area.
* Pond construction should be considered when rehabilitating this road since water is very scarce in the region.
* The present villagers developed as a result of the construction of the road but in some areas there is no village for over 100 kilometers. This has caused problems for drivers and residents of the area. Therefor, the future construction of this road has to consider construction camps in the area which may develop into market centers and rest places as experience has shown.
* Burial places/cemetaries and other important places should be identified when widening the road and construction of detours.
* Traffic rules are not respected in the park and as a result up to 50 wild animals are killed in the park limit of the road.
* Old road should be used when constructing this road to prevent the destruction of grazing land and other species of the park
* There is a need to construct pavements along the road for the people since both vehicles and human beings use the same road which is a cause for accidents.
* Awash town detour should consider the master plan of the town instead of constructing it on other sites. This point was debated since people fear that if the present road is changed even for a day their daily activities will be seriously affected. This group recommended the detour along the existing road
* The safety and security of the drivers should be considered in rehabilitating the road. The main action that should be taken regarding this matter is to establish villagers and police stations etc. at different intervals of the road. There were many accidents on the road by different groups, Afars, Isas.. Vehicles were shot and overturned etc.
* Employment opportunities should be given to the local population and the local administration can help in making available people who are unemployed.
* Detour should be constructed with care not to destroy natural resources like forests which are disappearing.
* Prevention of pollution especially in the park area should be given special emphasis. E.g. oil spills etc. Construction camps should not be built within the park limits.

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.

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?

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

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 (June 1997)

Project: Modjo - Awash - Mille

	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	

	Potential Environmental Impact Area	Adverse Impacts	No Impacts	Beneficial Impacts	Evaluation Base
II	**Natural Environment**				
4	**Biological and Ecological Changes**				
	4.1 Impacts 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				

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		
	5.8 Conflicts between locals and immigrants	X			

	Potential Environmental Impact Area	Adverse Impacts	No Impacts	Beneficial Impacts	Evaluation Base
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			
9	**Traffic Safety**	X			
10	**Cultural, Religious and Historical areas**		X		
11	**Damage to Aesthetic Sites**		X		
12	**Impacts on Local and National Economy**			X	

Table 1 Annual Rainfall for Selected Location In The Project Area

Month	Locations		
	Wonji	Melka Werer	Dubti
January	12.62	8.83	6.25
February	27.43	52.70	8.00
March	45.23	51.98	31.84
April	54.02	45.31	19.87
May	61.22	27.13	11.63
June	78.39	23.84	6.74
July	206.08	110.25	56.65
August	197.27	121.09	57.74
September	99.35	42.43	19.58
October	29.76	20.78	3.93
November	7.16	23.89	4.58
December	7.27	2.87	2.34
Annual			

(Wonji and Dubti are not located by the study road, but are the nearest meteorological stations by the road)

Table 2. Mean Monthly Maximum Temperature (°C)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Wonji	26.4	27.4	29.1	29.1	30.2	29.4	26.1	25.8	26.8	27.6	26.3	26.0	27.5
Dubti	32.3	33.3	35.9	38.5	40.3	42.1	40.5	39.2	39.3	37.2	33.8	32.1	37.0

Table 3. Mean Monthly Minimum Temperature (°C)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Wonji	11.4	13.0	14.9	14.9	15.4	16.4	16.1	15.8	15.1	11.7	10.6	9.9	13.8
Dubti	16.9	18.6	19.7	20.9	22.7	24.7	24.9	24.4	24.0	20.2	16.8	15.5	20.8

Table 4. Mean Monthly Wind Speed (m/s)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Wonji	1.2	1.2	1.2	1.1	1.0	1.5	1.5	1.2	1.0	1.0	1.2	1.2	1.2
Werer	1.5	1.5	1.6	1.5	1.9	2.5	2.4	2.1	1.7	1.5	1.5	1.4	1.8
Dubti	1.2	1.2	1.4	1.2	1.0	1.2	1.6	1.5	1.0	0.9	1.0	1.1	1.2

Table 5. Mean Monthly Sunshine Hours

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Wonji	8.9	8.7	8.4	8.4	8.4	8.5	7.1	7.1	7.5	8.6	9.5	9.4	8.4
Werer	8.5	8.5	8.2	8.5	9.0	8.6	7.2	7.3	7.8	9.1	9.5	9.2	8.5

Table 6. Mean Monthly Relative Humidity (%)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Wonji	53.5	52.2	55.6	58.7	55.5	55.6	66.2	69.7	68.2	56.2	53.9	55.7	58.4
Werer	50.2	52.4	48.6	49.4	42.1	36.6	49.3	58.0	52.1	44.2	46.9	48.8	48.2
Dubti	57.8	60.2	59.1	58.1	45.4	38.3	47.6	54.0	53.9	53.2	55.9	59.8	53.6

Table 7. Mean Monthly Flows for Selected Rivers Along the Road (m3/s)

Month	Locations		
	Mojo	Awash at Awash Station	Mille
January	3.50	82.58	7.07
February	4.41	80.18	11.56
March	5.68	95.53	24.36
April	5.14	100.37	30.67
May	5.86	102.14	18.35
June	8.24	91.79	3.18
July	30.84	152.87	28.25
August	91.95	281.96	100.87
September	19.99	280.03	23.13
October	4.15	112.98	13.37
November	3.10	79.00	7.11
December	2.81	80.36	3.65
Annual			

Table 8. Water quality data of the Awash and Mojo rivers.

From Dejene

Table 9. List of large mammals in the Awash National Park

Common Name	Scientific Name
1. Greater Kudu	Trgelaphus strepsiceros
2. Lesser Kudu	Tragelaphus imbersis
3. Defassa Waterbuck	Kobus defassa
4. Beisa Oryx	Oryx beisa
5. Soemerring's Gazelle	Gazella soemmeringi
6. Grevy's Zebra	Equus grevyi
7. Saalt's Dik-dik	Madogua saltiana
8. Bohor Reedbuck	Redunca redunca
9. Klipspringer	Oreotragus oreotragus
10. Warthog	Phacochoerus aethiopicus
11. Hippopotamus	Hippopotamus amphibius
12. Lion	Panthera leo
13. Leopard	Panthera pardus
14. Cheetah	Acinonyx Jubatus
15. Bushbuck	Tragelaphus scriptus
16. Rock Dassie (Hyrax)	Procavia capensis
17. Grimm's Duiker	Sylvicapra grimmia
18. Abyssinian Hare	Lepus habessinicus
19.Bat-eared Fox	Otocyon megalotis
20. African Civet	Viverra civetta
21. Caracal	Felis caracal
22. Aardvark	Orycteropus afer
23. Serval	Felis serval
24. Aardwolf	Proteles cristatus
25. Spotted hyaena	Crocuta crocuta
26. Striped hyaena	Hyaena hyaena
27. Side-striped jackal	Canis adustus
28. Black-backed jackal	Canis mesomelas
29 Anubis Baboons	Papio anubis
30. Vervet monkey	Cercopitheus aethiops

Source: Ethiopian Wildlife Conservation Organization
(Unpublished check list)

Table 10. List of the large mammals in the Yangudi-Rasa National Park

Common Name	Scientific Name
1. Pallid Ground Squirrel	Xerus rutilus
2. Crested Porcupine	Hystrix sp.
3. Hamadryas Baboon	Papio hamadyas
4. Grivet Monkey	Cercopithecus aethiops
5. Common Jackal	Canis aureus
6. Black-backed Jackal	Canis mesomelas
7. Bat-eared Fox	Otocyon megalotis
8.African civet	Viverra civetta
9. Common Genet	Genetta genetta
10.White-tailed Mongoose	Ichneumia albicauda
11. Spotted hyaena	Crocuta crocuta
12. Striped hyaena	Hyaena hyaena
13. Aardwolf	Proteles cristatus
14. African Wild Cat	Felis libyca
15. Serval	Felis Serval
16. Caracal	Felis Caracal
17. Lion	Panthera Leo
18. Leopard	Panthera Pardus
19. Cheetah	Acinonyx Jubatus
20. Abyssinian Hare	Lepus habessinicus
21. Aardvark	Oryceteropus afer
22. Rock Dassie (Hyrax)	Procavia capensis
23. Wild ass	Equus asinus
24. Grevy's zebra	Equus grevyi
25. Warthog	Phacochoerus aethiopicus
26. Greater Kudu	Traglaphus strepsiceros
27. Lesser Kudu	Tragelaphus imberbis
28. Common bushbuck	Tragelaphus scriptus
29. Beisa Oryx	Oryx beisa
30. Defassa Waterbuck	Kobus defass
31. Gerenuk	Litocranius walleri
32. Soemmerring's Gazelle	Gazella soemmeringi
33. Grimm's Duiker	Sylvicapra grimmia
34. Klipspringer	Oreotragus Oreotragus
35. Salt's Dik-dik	Madogua Saltiana
36. Hippopotamus	Hippopotamus amphibius

Source: Ethiopian Wildlife conservation Organization
(Unpublished check list)

Baseline Data/Human and Social Environment

Table 1. Distribution of the total population by sex, by regions, by woredas and by towns in the survey area.

	Total Population		Percent Female	Percent Under 15
Oromiya Region	19062056		50.0	46.6
Misrak Shewa Zone	1668184		49.8	44.9
Lome Woreda		66449		48.742.9
- Mojo town	21825		52.8	35.0
Adama Woreda	261341		50.4	38.7
- Nazret town	127101		51.8	33.0
- Wonji Gefersa	13156		51.8	38.0
Boset Woreda	109578		48.2	43.4
- Wolenchiti town	11519		52.2	37.0
Fentale Woreda	60048		47.3	42.8
- Metehara	11655		61.2	35.0
Affar Region	1098184		43.3	46.0
- towns	85879		47.8	34.1
Zone 3	150346		45.0	43.8
- towns	36929		47.9	37.6
Awash Fentale Woreda	18593		48.4	38.0
- Awash Sabat Kilo	7570		51.3	31.1
Amibara Woreda	40175		45.1	38.6
- Awash Arba town	4042		49.6	34.0
- Melka Sedi town	6539		47.3	38.0
- Melka Werer town	5620		46.6	33.8
Gewane Woreda	28144		43.3	47.4
- Meteka town	1076		47.7	33.0
- Gewane town	7504		46.2	47.0
Zone 1	327901		43.0	43.6
- towns	42213		47.4	29.3
Mille Woreda	70417		43.7	47.4
- Mille town	2441		49.4	32.4

Table 2. Total Fertility Rate in the Study Area

TFR	Total	Urban	Rural	
Oromiya Region	4.875	3.375	4.680	
Misrak Shewa		4.510	2.780	5.280
Afar Region		3.110	3.255	

Table 3. Ethnicity in the Study Area by Woredas along the Road

	%Total	%Urban	% Urban Female
Lome Woreda			
Total population -	32	52	
Oromo	66	21	52
Amhara	30	47	54
Fentale woreda			
Total population -	20	51	
Oromos	47	10	51
Amhara	18	43	56
Kembata	12	8	52
Boset woreda			
Total population -	17	51	
Oromo	74	10	51
Amhara	21	39	52
Adama woreda			
Total population -	59	52	
Oromo	46	37	51
Amhara	32	77	55
Guragie	28	96	45

Table 4. Ethnicity in the Study Area by Towns along the Road

	%	%Female
Metahara	-	51
Oromo	23	51
Amhara	39	56
Wolenchiti	-	51
Oromo	44	50
Amhara	59	52
Nazret	-	51
Oromo	26	51
Amhara	44	55
Gurage	18	45
Tigraway	6	53
Mojo	-	52
Oromo	39	53
Amhara	48	54
Guragie	8	45

Table 5. Average Monthly Rent and Percentage of Rented Houses along the Study 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
Mojo	19.55	33	22	34
Nazret	27.74	27	22	40
Wolenchiti	17.40	31	17	44
Metehara				
Afar Zone 3	38.71	9	27	45
Afar Zone 1	41.69	11	31	50

Table 6. Energy used by a household for cooking in Mojo, Nazret, Wolenchiti and Metahara

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 Kerosine alone or with other fuels - percent of all housing units
IV Electricity only or with other fuels - percent of all housing units

	I	II	III	IV
Mojo	81	18	8.8	6.8
Nazret	76	44	8.7	7.8
Wolenchity	93	70	1.2	0.0
Metehara	79	77	0.01	0.8
Afar Zone 3, urban		83 36	2.1	-
Afar Zone 1, urban		86 56	1.5	0.02

Source: The 1994 Population and Housing Census of Ethiopia

Table 9. Economically Active Population in the Study Area

The Oromiya Regional State: I Percent share of economically active
II Out of which a share of women
The Afar Regional State: III Percent share of economically active
IV Out of which a share of women

	I	II	III	IV	
Economically active	9299158	44	620406	35	
Agriculture, hunting, forestry, and fishing	92.0	44	93	35	
Mining and quarrying	7.0	14	0.03	-	
Manufacturing	1.0	39	0.4	56	
Electricity, gas and water supply	00.5	18	0.08	-	
Construction	0.1	6	0.2	1.9	
Wholesale and retail trade, repair of vehicles, personal and household goods	2.0	42	2.2	32	
Hotels and restaurants	2.0	88	0.7	76	
Transport, storage & communication	0.4	13	0.2	18	
Financial inter-mediation	0.01	22	-	-	
Real estate, renting and business activities	0.02	17	0.01	-	
Public administration and defence, compulsory social security	0.8	20	0.9	18	
Education, health and social work	0.6	22	0.2	18	
Other social, cultural, personal and household activities	0.2	18	0.3	22	
Private households with employed persons	0.4	69	0.2	81	
Extra-territorial organization and bodies	0.002	23	-	-	
Not stated	0.5	44	0.8	51	

Source: The 1994 Population and Housing Census of Ethiopia

Economically active population aged ten years and over by sex and major industrial divisions (Oromiya Region - total): 1994 &
Economically active population aged ten years and over by sex and major industrial divisions (Affar Region - total): 1996