FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
ETHIOPIAN ROAD AUTHORITY (ERA)

CONSULTANCY SERVICE FOR THE CONSTRUCTION
SUPERVISION OF WORETA-WOLDIYA ROAD UPGRADE
PROJECT
CONTRACT III: GASHENA WOLDIYA

REVISED ENVIRONMENTAL MANAGEMENT PLAN

MARCH 5, 2010
TABLE OF CONTENTS

1. INTRODUCTION .................................................................3

1.1 PROJECT BACKGROUND .................................................3
1.2 OBJECTIVE ...............................................................3
1.3 METHODOLOGY ..........................................................3

2 STRATEGIES, POLICIES AND LEGISLATIONS PERTINENT TO
ENVIRONMENTAL PROTECTION ...........................................4

2.1 THE CONSTITUTION OF THE FDRE ..................................4

2.2 DEVELOPMENT STRATEGIES ...........................................4
2.2.1 AGRICULTURAL DEVELOPMENT LED INDUSTRIALIZATION STRATEGY (ADLI) 4
2.2.2 INDUSTRIAL DEVELOPMENT STRATEGY ...........................................4
2.2.3 CONSERVATION STRATEGY OF ETHIOPIA (CSE) ...........................................5

2.2.4 THE PLAN FOR ACCELERATED AND SUSTAINED DEVELOPMENT TO END
POVERTY (PASDEP) ..........................................................5

2.3 POLICIES ........................................................................ 6
2.3.1 ENVIRONMENTAL POLICY ...............................................6
2.3.2 LAND POLICY AND TENURE .............................................7
2.3.3 BIODIVERSITY POLICY ..................................................7
2.3.4 WILDLIFE POLICY ......................................................7

2.4 ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES ..............8
2.4.1 EPA ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINE .......................8
2.4.2 STANDARD TECHNICAL SPECIFICATIONS OF ERA .........................9

2.4.3 ERA’S ENVIRONMENTAL PROCEDURE MANUAL .........................9

2.5 ENVIRONMENTAL LEGISLATIONS .......................................9
2.5.1 ENVIRONMENTAL PROTECTION ORGANS ESTABLISHMENT PROCLAMATION 9
2.5.2 ENVIRONMENTAL IMPACT ASSESSMENT PROCLAMATION ................10
2.5.3 ENVIRONMENTAL POLLUTION CONTROL PROCLAMATION ................10
2.5.4 THE RURAL LAND ADMINISTRATION AND LAND USE PROCLAMATION ....11
2.5.5 AMHARA NATIONAL REGIONAL STATE’S GUIDELINE FOR COMPENSATIONS 11

2.5.6 PROCLAMATION ON EXPROPRIATION OF LANDHOLDINGS FOR PUBLIC
PURPOSES AND PAYMENT OF COMPENSATION ...................................12

2.5.7 PROCLAMATION FOR THE CONSERVATION, DEVELOPMENT AND
UTILIZATION OF FORESTS ..................................................12

3. EXISTING BIO-PHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT OF THE
PROJECT AREA .................................................................13

3.1 BIO-PHYSICAL ENVIRONMENT ........................................13
3.1.1 TERRAIN ...............................................................13
3.1.2 CLIMATE .............................................................13
3.1.3 FLORA .................................................................14
3.1.4 FAUNA .................................................................15

3.2 SOCIO-ECONOMIC ENVIRONMENT ...................................15
3.2.1 POPULATION ........................................................15
3.2.2 ECONOMIC BASIS OF THE PROJECT AREA ..............................15

4. ENVIRONMENTAL ISSUES ALONG THE PROJECT ROAD ..........16

4.1 BORROW PITS ...........................................................16
4.2 QUARRY AREAS .........................................................17
4.3 CRUSHER SITES .........................................................17
1. INTRODUCTION

1.1 Project Background

The Government of Federal Democratic Republic of Ethiopia, represented by the Ethiopian Roads Authority (ERA) is upgrading the 293km long Woreta - Woldiya gravel road to asphalt road. For ease of execution, the project is further subdivided to three parts, i.e., Woreta-Gobgob (Contract - I), Gobgob-Gashena (Contract – II) and Gashena-Woldiya (Contract – III). This Environmental management plan deals with contract III, Gashena-Woldia part only.

The Gashena-Woldiya project alignment is situated in the northern part of western highlands to the east of Lake Tana specifically at North Wollo Zone. The starting point of the project road section is at Gashena and the end point is at Woldiya town. The total length of the Gashena-Woldiya section is 108.707 km with 7m carriage way and 1.5 m shoulder in each side.

China Road and Bridges Corporation (CRBC) is undertaking the construction work of the project, while ICT in association with SHELADIA, INC, TCTE, UCE and ICTE is in charge of consulting and supervision of the construction work.

1.2 Objective

The main objective of this study is to identify major environmental impacts imposed by the undergoing Gashena-Woldiya road project and to propose mitigation measures and management plan that could be implemented by the contractor and other stakeholders before the completion of the road project.

1.3 Methodology

Since the road construction work is approaching to completion, the best method to identify road construction impacts is conducting observation along the road stretch. Accordingly, the project Environmentalist made extensive observation along the project road giving emphasis for borrow pits, quarry sites, detour roads, drainage lines, erosion prone areas, embankment stability, slope stability, tree plantations and grassing, access problems, etc. Besides the site observation, informal consultation was made with project affected people, consultant’s engineers and local authorities. Based on the observation and consultation, major environmental impacts were identified. As a tool to mitigate these impacts, this Environmental Management Plan (EMP) was prepared.

It is mainly the contractor’s responsibility to implement this EMP before the official close of the project, while overseeing of the implementation is the responsibility of the Consultant. The monitoring activities could be done by the Environmental Management Branch of ERA and financing organization.
2 STRATEGIES, POLICIES AND LEGISLATIONS PERTINENT TO ENVIRONMENTAL PROTECTION

2.1 The Constitution of the FDRE

The Constitution of the FDRE is the supreme law of Ethiopia where all national policies, laws and regulations as well as the institutional frameworks of the country are emerged. The Constitution of the Federal Democratic Republic of Ethiopia, Proclamation 1/1995, has several provisions to mitigate the adverse impacts on people who might be affected during the implementation of government projects such as the Road Sector Development Program prepared by the Ethiopian Roads Authority.

Art. 40.3 of the Constitution states that both rural and urban land as well as all natural resources are under public ownership. There is no private ownership of land in Ethiopia. As per FDRE Constitution, either rural or urban land could not be sold or mortgaged or transferred. However, the Constitution gives right to both rural and urban people to use the land and to be benefited from its development. Any interference on the right to use the land such as expropriation shall entail compensation. This is certainly provided in Art. 40.7 of the Constitution which says that “Every Ethiopian shall have the full right to the immovable property he builds and to the permanent improvements he brings about on the land by his labour or capital.” Moreover, Art. 40.8 reinforce this provision by providing for expropriation of private property by the government for public purposes subject to the payment in advance of compensation commensurate with the value of the expropriated property.

The other important thing among the provisions of the Constitution is Art 44.2. It states “All persons who have been displaced or whose livelihoods have been adversely affected as a result of state programs, have the right to commensurate monetary or alternative means of compensation, including relocation with adequate state assistance”.

Thus, persons who have lost their land as a result of acquisition of such land for the purpose of road works are entitled to be compensated to a similar land plus the related costs arising from relocation; assets such as buildings, crops or fruit trees that are part of the land etc. The Resettlement/Rehabilitation Policy Framework prepared by ERA also expressly and appropriately recognizes that Art. 44.2 of the Constitution of the Federal Democratic Republic of Ethiopia provides the basis for the compensation procedures and the legal framework for its resettlement and rehabilitation policy (ERA, 2002, p.13)

2.2 Development Strategies

2.2.1 Agricultural Development Led Industrialization Strategy (ADLI)

ADLI is seen as a long-term strategy to achieve faster growth and economic development by making use of technologies that are labour intensive, but land augmenting, such as use of fertilizer and improved seeds and other technologies. However, the extremely small ratio of urbanization of the country threatens to make inadequacy of domestic demand, a critical constraint. This implies that agriculture has to be made internationally competitive, and that, part of its production has to be oriented towards exports.

2.2.2 Industrial Development Strategy

Giving a lead attention to manufacturing sub sector, the strategy recognizes the importance of other related areas including construction. It has acknowledged the private sector as an engine
of development in realizing the growth of the industrial sector. Moreover, the strategy has taken on board the importance of integrating the national effort with the global agenda in attaining competitiveness in the sphere of product quality pricing and timing. The strategy gives due considerations to conducive and stable macroeconomic environment to encourage private sector. Furthermore, establishment of rural finance institution, provision of land, drinking water, as well as other infrastructures are seen as important elements of the strategy.

2.2.3 Conservation Strategy of Ethiopia (CSE)

Since the early 1990s the Government has undertaken a number of initiatives to develop regional, national and sectoral strategies for environmental conservation and protection. Paramount amongst these was the Conservation Strategy of Ethiopia (CSE, 1996) approved by the Council of Ministers, which provides a strategic framework for integrating environmental planning into new and existing policies, programs and projects. The CSE is an important policy document, which views environmental management from several perspectives. In particular, it recognizes the importance of incorporating environmental factors into development activities from the outset, so that planners may take into account environmental protection as an essential component of economic, social and cultural development.

2.2.4 The Plan for Accelerated and Sustained Development to End Poverty (PASDEP)

The Plan for Accelerated and Sustained Development to End Poverty (PASDEP) is the Ethiopia’s guiding strategic framework for the five-year period 2005/06-2009/10. The main development objective of the Ethiopian Government is poverty eradication. Hence, the country's development policies and strategies are geared towards this end.

The PASDEP represents the second phase of the Poverty Reduction Strategy Program (PRSP) process, which has begun under the Sustainable Development and Poverty Reduction Program (SDPRP), which covered 2002/03-2004/05. The PASDEP carries forward important strategic directions pursued under the Sustainable Development and Poverty Reduction Program (SDPRP) -related to infrastructure human development, rural development, food security, and capacity-building- but also embodies some bold new directions. Foremost among them is a major focus on growth in the program period with a particular emphasis on greater commercialization of agriculture and enhancing private sector development, industry, urban development and a scaling-up of efforts to achieve the Millennium Development Goals (MDGs).

The objectives of the PASDEP are:

- To define the nation’s overall strategy for development for the coming five years;
- to lay out the directions Ethiopia wants to take, with the ultimate objective of eradicating poverty; and
- To outline the major programs and policies in each of the major sectors.

Concerning the road development sector, during the SDPRP period, priority had been given to new road construction and major rehabilitation/upgrading/maintenance work. Accordingly, out of the targeted 5,637 km road development, 5,561 km were completed; of which 1,276 km were new rural roads. Road density had increased from 32.3 km/1,000 km² in 2001/02 to 33.6 km/1000 km² by the end of the program period (2004/05). The main challenges during the program period were raising adequate financing for the major investments required, ensuring continued maintenance, and the limited domestic construction capacity.
Revised EMP for Gashena-Woldiya Road Project

Road Sector Development Program under PASDEP (2005/06-2009/10) is a continuation of SDPRP and it comprehends that the investment and policy reforms in the road sector need to be continued since a partial implementation would fail to yield the full potential benefits agreed among different stakeholders. Rehabilitation of the existing limited paved trunk road network and provision of funds for minimum maintenance alone will not ensure sustained protection of the network as a whole. Without continuing investments in follow-on projects included under RSDP/SDPRP, vehicle-operating costs will remain high, and evacuation of agricultural production will continue to suffer from inaccessibility resulting in high transportation costs. Therefore, under PASDEP the primary objectives of the Road Program are:

- To sustain road sector reforms and to restore and expand Ethiopia's road network and provide a sustainable level of essential road infrastructure to the rural population;
- Side-by-side, the program assists in developing a strong management and technical capacity to manage the road network; and
- The development of the capacity of the domestic construction industry.

The physical targets set are to:

- Reduce the inhabited land area farther than 5 km from a road to 59% by the end of 2009/10, from the 72% achieved in 2004/05;
- Reduce the inhabited land area farther than 2 km from a road to 81% by the end of 2009/10, from the 88% achieved in 2004/05;
- Reduce average walking distance from a road to 3.2 hours by the end of 2009/10, from the 5 hours achieved in 2004/05;
- Increase the road density to 54.1 km/1,000 km² or 0.72 km/1,000 people by the end of 2009/10 (including low class roads) - from the 33.6-km/1,000km² or 0.51 km/1,000 people achieved in 2004/05; and
- Increase the rate of acceptable (good + fair) roads to 84% for all road types by the end of 2009/10, from the level of 64% achieved in 2004/05.

2.3 Policies

2.3.1 Environmental Policy

The Environmental Policy of Ethiopia (EPE) was issued in April 1997. The EPE supports Constitutional Rights through its guiding principles. The overall policy goal is to improve and enhance the health and quality of life of all Ethiopians, and to promote sustainable social and economic development through the sound management and use of natural, human-made and cultural resources and the environment as a whole, so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs.

The policy seeks to ensure the empowerment and participation of the people and their organisations at all levels in environmental management activities, and to raise public awareness and promote understanding of the essential linkage between the environment and development. In addition, the EPE has outlined its guiding principles. Sectoral and cross-sectorial environmental policies will be checked against these principles to ensure consistency.

Environmental Impact Assessment (ESIA) policies are included in the cross-sectoral environmental policies. The ESIA policies emphasise the early recognition of environmental issues in project planning, public participation, mitigation and environmental management and capacity building at all levels of administration.
The policy establishes the Environmental Protection Authority (EPA) as the body to harmonise Sectoral Development Plans and to implement an environmental management programme for the country. It also imparts political and popular support to the sustainable use of natural, human-made and cultural resources at the federal, regional, zonal, Wereda and community levels.

2.3.2 Land Policy and Tenure

The Constitution of Ethiopia states that the right to ownership of rural and urban land, as well as all natural resources, is exclusively vested in the state and in the people of Ethiopia. Article 40 of the Constitution indicates that land is a common property of the nation, nationalities and the people of Ethiopia, and shall not be subjected to sale or to other means of transfer. Based on this guiding principle, some regional states have issued policies on rural land use and administration. Among these policy documents, the ones relevant to the project under consideration is that of Amhara Rural Land Use and land Administration.

The policy guiding principles include:

- Land ownership is exclusively vested in the State and people of the region and shall not be subjected to sale or to other means of exchange,
- Where the holding right changes under any change of holding, payment of due compensation is to be made by the new holder to a previous and lawful holder for improvements he/she had made on the land by his/her labour or capital, and
- Any land user is obliged not to mismanage or miss utilize the land provided to him/her with the land resources thereon.

2.3.3 Biodiversity Policy

The biodiversity policy, which was approved in 1998, provides guidance towards the effective conservation, rational development and sustainable utilization of the country’s biodiversity. In general, the policy consists of comprehensive policy provisions on the conservation and sustainable utilization of biodiversity.

2.3.4 Wildlife Policy

The Ministry of agriculture and rural Development has developed the Wildlife policy in 2006. The specific objectives of the policy include properly developing and administering the country’s wildlife resources and enabling the sector to contribute fully to the economic development and the wellbeing of the ecosystem. The policy also includes articles on how to protect the wildlife resources and their habitat so that stability of the ecosystem is maintained for posterity, in accordance with international wildlife conventions and agreements to which the country is a signatory.

The most important articles, covered in the policy and strategy are to gazette the national parks, development of participatory wildlife management, to give special attention to the protection and conservation of the endemic and threatened wildlife, to promote wildlife health, to give due attention for the control of the illegal movement of wildlife and products among others are the most important points that has been dealt with in the policy and strategy.
2.4 Environmental Impact Assessment Guidelines

2.4.1 EPA Environmental Impact Assessment Guideline

The EPA has issued a Guideline Document for ESIAs. The document provides a background to environmental impact assessment and environmental management in Ethiopia. The document aims at being a reference source to ensure effective environmental assessment and management practice in Ethiopia for all parties who engage in the process. The long-term objectives of the ESIA system as set out by the EPA are:

- Conservation and sustainable use of natural resources;
- Integration of environmental considerations in development planning processes
- Protection and enhancement of the quality of all life forms; and
- Attainment of environmentally and socially sound and sustainable development.

The document details the required procedures for conducting an ESIA in Ethiopia, and the requirements for environmental management. These requirements are presented on a step by-step basis. In addition, the document specifies tools that may be considered when engaging in the ESIA process. Reference is made to the legislation and policies that potential investors and developers must comply with in Ethiopia, and key issues for environmental assessment in specific development sectors are detailed for consideration.

In addition, the ESIA Guideline provides the categories of projects concerning the requirement of ESIA, and lists project types under each category. In this Guideline projects are categorized under three schedules:

Schedule 1: Projects which may have adverse and significant environmental impacts, and may, therefore, require full ESIA

Schedule 2: Projects whose type, scale or other relevant characteristics have potential to cause some significant environmental impacts but are not likely to warrant an environmental impact study falls under Schedule 2

Schedule 3: Projects which would have no impact and do not require an environmental impact assessment.

However, projects located in environmentally sensitive areas such as land prone to erosion, land prone to desertification, areas of historic or archaeological interest, scenic landscape, religiously important areas etc. should be treated as equivalent to schedule I activities irrespective of the nature of the project.

Screening of the project roads has been undertaken using the EPA ESIA guidelines during the feasibility study. According to the guidelines the Gashena-Woldiya road project falls under schedule 1, requiring a full ESIA and preparation of Environmental Management Plan. The main reason being that the project is traverses through some areas categorized in the guidelines as 'environmentally sensitive areas'. These include degraded land, steep slope, areas with erosion-prone soils and areas prone to desertification. Also the size and scale of the project requires full scale ESIA and EMP.
2.4.2 Standard Technical Specifications of ERA

ERA prepared the Standard Technical Specifications (2002) which specifies among others acceptable environmental standards for the preparation of the road project design and contract document. The standard under division 1600 deals with environmental protection and mitigation measures. It mainly covers landscape preservation, temporary soil erosion control, preservation of trees and shrubbery, preservation of water pollution, abatement of air, dust, noise and lighting pollution, preservation of historical, archaeological and cultural remains and clean up and disposal of waste materials. Moreover, under division 1400 it deals with accommodation, sanitary arrangements, water and other social services. These standards specified regarding the social and environmental protection have been used appropriately in the preparation of this EMP.

2.4.3 ERA’s Environmental Procedure Manual

The environmental monitoring branch EMS of ERA, has prepared Environmental Procedures Manual (2001), which specifies the requirements and procedures for the conduct of an ESIA for road sector projects. According to this manual projects can be classified into environmentally none critical and critical projects.

Environmentally none critical projects are projects which do not have substantial adverse effects on the biophysical environment and do not involve the displacement of people or businesses and they do not significantly increase access to the influence area of the road. This may include:

- Upgrading involving only minor realignments, no extension and no new bridges for all road class;
- Rehabilitation, including reconstruction, where the widening is only a small percentage of the existing width of the travel area for all road classes;
- Periodic and routine maintenance of all road classes; and
- Traffic management projects for all road classes.

Environmentally critical projects, on the other hand, include all projects that have substantial adverse effect on the bio-physical environment and involve the displacement of people and businesses and those that significantly increase access to the influence area of the road.

It is understood by the Consultant that according to ERA’s Environmental Procedure Manual the environmental assessment process to be adopted for the Gashena-Woldiya Road Upgrading Projects requires preparation of EMP.

2.5 Environmental Legislations

2.5.1 Environmental Protection Organs Establishment Proclamation

The objective of Proclamation No. 295/2002 is to assign responsibilities to separate organizations for environmental development and management activities on the one hand, and environmental protection, regulations and monitoring on the other, in order to ensure sustainable use of environmental resources, thereby avoiding possible conflicts of interest and duplication of efforts. It is also intended to establish a system that fosters coordinated but
differentiated responsibilities among environmental protection agencies at federal and regional levels.

This Proclamation re-established the EPA as an autonomous public institution of the Federal Government of Ethiopia. It also empowers every competent agency to establish or designate an environmental unit (Sectoral Environmental Unit) that shall be responsible for coordination and follow-up, so that the activities of the competent agency are in harmony with this Proclamation and with other environmental protection requirements.

Furthermore, the Proclamation stated that each regional state shall establish an independent regional environmental agency or designate an existing agency that shall be based on the Ethiopian Environmental Policy and Conservation Strategy, be responsible for:

- Ensuring public participation in decision-making processes;
- Coordinating the formulation, implementation, review and revision of regional conservation strategies; and
- Undertaking environmental monitoring, protection and regulation.

2.5.2 Environmental Impact Assessment Proclamation

The main objective of this Proclamation is to make ESIA mandatory for specified categories of activities undertaken either by the public or private sectors. Among other things, the proclamation defines the different legal organizations concerning Environmental Impact Assessment, outlines the contents of ESIA, and determines the duties of different parties concerning ESIA.

The general provisions of the Proclamation include:

- Implementation of any project that requires ESIA, as determined in a directive, is subject to an environmental clearance or authorization from the EPA or Regional Environmental Agency (REA).
- The EPA or the relevant REA, depending on the magnitude of expected impacts, may waive the requirement for an ESIA.
- Any licensing agency shall, prior to issuing an investment permit or operating license for any project, ensure that the EPA or the relevant REA has authorised its implementation.
- A licensing agency shall either suspend or cancel a license that has already been issued in the case that the EPA or the REA suspends or cancels the environmental authorization. Approval of an EIS or the granting of authorization by the EPA or the REA does not exonerate the proponent from liability for damage.

To the effect of this Proclamation, the EPA issued an ESIA Guideline Document, which provides details of the ESIA process and its requirements.

2.5.3 Environmental Pollution Control Proclamation

The law on pollution control was issued in December 2002. It was issued mainly based on the principle that each citizen has the right to have a healthy environment, as well as the obligation to protect the environment of the country.
The proclamation contains provisions for Control of Pollution, Management of Municipal Waste, and Management of Hazardous Waste, Chemical and Radioactive Substances. It also encompasses provision for the formulation of practicable Environmental Standards by the EPA, in consultation with competent agencies. Furthermore, it empowers the EPA or REA to assign Environmental Inspectors who shall have several powers and duties to control pollution.

2.5.4 The Rural Land Administration and Land use Proclamation

The Constitution of FDRE leaves the detailed implementation of the provisions concerning use rights over rural land to be determined by subsequent specific laws to be issued at both the federal and regional levels. Accordingly, at the federal level, the Rural Land Administration and Land use Proclamation (Proclamation No.456/2005) was enacted in 2005 to further determine the land use system and use rights in the country. The Proclamation provides that land administration laws to be enacted by regions should be based on the provisions provided therein and specifies the basic principles of rural land distribution and utilization including the scope of land use right which Regional laws should grant.

Similar to the Constitution, the Proclamation provides that peasants, semi-pastoralist and pastoralists shall have the right to get rural land holding the size of which shall be determined based upon the particular conditions of the locality and free of charge. The proclamation also states that any citizen of the country who is 18 years of age or above wants to engage in agriculture for a living shall have the right to use rural land. Regarding the women, the proclamation has confirmed that women who want to engage in agriculture shall have the right to get and use rural land. As to the duration of rural land use right, the proclamation provided limitless time for peasant farmers, semi-pastoralists and pastoralists. However, duration of rural land use right of other holders left to be determined by rural land administration laws of the regions.

Concerning the acquisition of rural land by private investors, the proclamation states that giving priority to peasant/pastoralists and semi-pastoralist, private investors that engaged in agricultural development activities shall have the right to use rural land in accordance with the investment policies and laws at federal and regional levels.

The proclamation also states that holder of land who is evicted for the purpose of public use shall be given compensation proportional to the development he has made on the land and the property acquired or shall be given substitute land thereon. Where the rural landholder is evicted by federal government, the rate of compensation would be determined based on the federal land administration law. Where the rural land holder is evicted by regional governments, the rate of compensation would be determined based on the rural land administration laws of the regions.

2.5.5 Amhara National Regional State’s Guideline for Compensations

The Amhara National Regional State has prepared Guideline No.28/2007 on valuation and compensation of affected properties due to the loss of land for public use. The guideline is prepared based on the Proclamation No. 455/2005 of FDRE on the expropriation of land holdings for public purposes and payment of compensation.

The guideline provides methodologies for the estimation of compensation and valuation of affected properties, establishment of compensation committee and indicates grievance mechanisms and steps to be followed when two parties are fail to agree each other.
2.5.6 Proclamation on Expropriation of Landholdings for Public Purposes and Payment of Compensation

Proclamation no. 455/2005 states that a landholder whose holding has been expropriated shall be entitled to payment of compensation for his property situated on the land and for permanent improvements he made to such land. The amount of compensation for property situated on the expropriated land shall be determined on the basis of replacement cost of the property.

Regarding displacement compensation, the proclamation states that a rural landholder whose landholding has been permanently expropriated shall, in addition to compensation paid for property situated on the expropriated land, be paid displacement compensation, which shall be equivalent to ten times the average annual income he secured during the five years preceding the expropriation of the land.

2.5.7 Proclamation for the Conservation, Development and Utilization of Forests

Proclamation no. 94/1994 includes provision for the conservation, development and utilization of forest resources. The objective of the proclamation is to provide the basis for sustainable utilization of the country's forest resources. The proclamation categorises types of forest ownership (state, regional and private forests). It provides the power for designation, demarcation, and registration of forests to the Ministry of agriculture (now MoARD) and Regional Government.

One of the objectives of establishment of State forest is to conserve genetic resources and/or conserve the ecosystem. The law prohibits cutting and utilization of protected tree species such as Hagenia abyssinica (Koso Zaf), Cordia Africa (Wanza), Podocarpus falcatus (Zigiba), Prunus Africana (Tikur Inchet) and Juniperus procera (Yeabesha Tid) from either State or Regional Forests.

Sub-article 4 of article 13 of this proclamation states that prior consultation and approval is required from the appropriate regional body in order to conduct construction of any projects within federal and regional forests. Concerning Gashena-Woldiya road, there is no state or regional forest conservation area.
3. EXISTING BIO-PHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT OF THE PROJECT AREA

3.1 Bio-physical Environment

3.1.1 Terrain

Terrain of the project area comprises flat, rolling, mountainous and escarpment areas. The general elevation ranges from 1700 to 3000m, punctuated by higher mountainous ranges and cinder cones.

Table 3.1 Terrain classification along the project road

<table>
<thead>
<tr>
<th>Terrain type</th>
<th>Coverage</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat</td>
<td>55.5</td>
<td>51.05</td>
</tr>
<tr>
<td>Rolling</td>
<td>6.1</td>
<td>5.6</td>
</tr>
<tr>
<td>Mountainous</td>
<td>32.9</td>
<td>30.27</td>
</tr>
<tr>
<td>Escarpment</td>
<td>14.2</td>
<td>13.06</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>108.7</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

3.1.2 Climate

The climate and weather pattern are primarily altitude induced. The temperature ranges from cool highland temperature at the start of the project to ever-temperate climate at the end of the project. The mean annual rainfall ranges from 1124 to 1367mm and characterized by distinct period of high rainfall from June to September, and medium rainfall in March and April, while very little or no rainfall from Dec to Feb (see fig below).

Table 3.2 Rainfall data of the project area

<table>
<thead>
<tr>
<th>Year</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan</td>
</tr>
<tr>
<td>2007</td>
<td>31.35</td>
</tr>
<tr>
<td>2008</td>
<td>62.7</td>
</tr>
<tr>
<td>2009</td>
<td>0</td>
</tr>
<tr>
<td>Sum</td>
<td>94.05</td>
</tr>
<tr>
<td>Aver.</td>
<td>31.35</td>
</tr>
</tbody>
</table>
3.1.3 Flora

There is no as such natural forest or indigenous vegetation cover along the project road. All the trees observed along the project road are cultivated by individual farmers or communities either for fuel and construction wood or for soil conservation purposes. The dominant tree species is Eucalyptus tree. It is observed almost in all the areas including on the bottom of escarpment and top of the mountainous areas. However, there are acacia and other indigenous tree species grown in a lowland areas starting from Sank to Woldiya. The diversity and cover of trees in this stretch is by far better than the cool and highland areas.

On the escarpment and mountainous areas, there is an endemic shrub known as Kniphofia foliosa. This shrub is adapted to cool temperature and highland ecosystem. However, the impact of the project road construction on this endemic shrub is insignificant for the matter of the fact that it adapted to the steep areas which is difficult to access by human. Also because of the difficult terrain the contractor didn’t use detour roads and didn’t disturb the vegetation cover along the escarpment section.

Generally, the impact of the project on indigenous tree species is insignificant. If any impact, it is on roadside Eucalyptus trees.

Photo 1: Kniphofia foliosa an endemic shrub found on the escarpment section along the project road
3.1.4 Fauna

Since the project area is fully agricultural and highly disturbed by human activities, number and diversity of wildlife is very low. During the field visit only avifauna were observed. However, information from local informants revealed that there are baboons and common fox inhabiting in the escarpment areas. There are also nocturnal animals such as porcupines and hyena dwelling in caves and borrows.

3.2 Socio-Economic Environment

3.2.1 Population

The project road is located fully in the Northern Wolo Zone of Amhara Regional State. According to the 2007 census report, the total population of the Northern Wolo Zone is 1503283. The Northern Wolo Zone comprises eleven Woredas. See Table 3.3 for the population.

Table 3.3 Population of Northern Wolo Zone

<table>
<thead>
<tr>
<th>Name of Woredas</th>
<th>Total population</th>
<th>Male</th>
<th>Female</th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woldiya town</td>
<td>46128</td>
<td>22990</td>
<td>23136</td>
<td>46128</td>
<td>-</td>
</tr>
<tr>
<td>Gubalafto</td>
<td>139800</td>
<td>70732</td>
<td>69068</td>
<td>4885</td>
<td>134915</td>
</tr>
<tr>
<td>Gidan</td>
<td>160115</td>
<td>79148</td>
<td>967</td>
<td>7713</td>
<td>152402</td>
</tr>
<tr>
<td>Meket</td>
<td>227338</td>
<td>114731</td>
<td>112607</td>
<td>11748</td>
<td>215590</td>
</tr>
<tr>
<td>Wadla</td>
<td>128145</td>
<td>64553</td>
<td>63592</td>
<td>4289</td>
<td>123856</td>
</tr>
<tr>
<td>Bugna Wereda</td>
<td>75468</td>
<td>37869</td>
<td>37599</td>
<td>-</td>
<td>75468</td>
</tr>
<tr>
<td>Kobo Wereda</td>
<td>221894</td>
<td>111571</td>
<td>110323</td>
<td>33135</td>
<td>188759</td>
</tr>
<tr>
<td>Delanta Wereda</td>
<td>128411</td>
<td>64068</td>
<td>64345</td>
<td>7847</td>
<td>120564</td>
</tr>
<tr>
<td>Harbu Wereda</td>
<td>192701</td>
<td>96856</td>
<td>95845</td>
<td>21598</td>
<td>171103</td>
</tr>
<tr>
<td>Last Wereda</td>
<td>118185</td>
<td>58648</td>
<td>59537</td>
<td>17790</td>
<td>100395</td>
</tr>
<tr>
<td>Dawunt Wereda</td>
<td>65100</td>
<td>33188</td>
<td>31912</td>
<td>528</td>
<td>64572</td>
</tr>
<tr>
<td><strong>Zone Total</strong></td>
<td><strong>1503283</strong></td>
<td><strong>754354</strong></td>
<td><strong>748929</strong></td>
<td><strong>155659</strong></td>
<td><strong>1347624</strong></td>
</tr>
</tbody>
</table>

Source: 2007 Census result, Population Census commission, 2008

However, the benefit of the project is not limited to only Northern Wolo Zone population. Since the road is shortcut to Djibouti port, the Northern part of the country can utilize the advantage. Therefore, the economic advantage of the road is vital. The road would also create better access to one of the well known tourist destination of the country, Lalibela.

3.2.2 Economic basis of the project area

The main economic base of the project area is agriculture. Main crops grown in the low land stretch are sorghum, teff, and maize. In Sanka area in addition to the above crops sugarcane and other vegetables are grown using small scale irrigation. The high land portion of the project grows mainly barley. Due to the cool temperature at the highland area, it is impossible to produce Variaty of crops rather than barely and small amount of bean.

Due to raged topography and stony nature of the soil along the escarpment, the productivity as well as diversity of crops is very low. Farmers living in this stretch of the road are food insecure, since the amount of production is hardly enough to satisfy the food requirement of each family.
4. ENVIRONMENTAL ISSUES ALONG THE PROJECT ROAD

Environmental issues of the Gashena-Woldiya road construction were identified during the site visit conducted from October 22-26/2009 along the road corridor. These observed issues are presented as follows:

4.1 Borrow Pits

There are several borrow pits along the road on both sides of the road (See table below). During the field visit it was observed that none of them were reinstated. These borrow pits took valuable farmland and grazing land. From the discussion made with local farmers, land is very scarce in the area. Besides taking valuable farm land, these borrow pits situated on the sides of the constructed road are causing aesthetic impact. Also some of these borrow pits are deep enough to cause accident on livestock and people, particularly on children playing around. Therefore, all of the borrow pits utilized by the contractor during the road construction should be reinstated properly by filling with appropriate materials, leveling and spreading top soils preserved for the rehabilitation purposes. After leveling, grassing or tree plantation should be done. (Location of borrow pits and proposed detailed management plan are presented in section 5).

<table>
<thead>
<tr>
<th>Borrow location/Chainage</th>
<th>Direction</th>
<th>Current status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Km 189+380</td>
<td>RHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 189+380</td>
<td>LHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 204+070</td>
<td>LHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 206+500</td>
<td>RHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 209+880</td>
<td>LHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 231+640</td>
<td>LHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 234+400</td>
<td>LHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 246+100</td>
<td>RHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 261+130</td>
<td>RHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 262+320</td>
<td>RHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 265+480</td>
<td>RHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 229+540</td>
<td>LHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 280+480</td>
<td>RHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 284+240</td>
<td>RHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>Km 286+780</td>
<td>LHS</td>
<td>Not reinstated</td>
</tr>
</tbody>
</table>
4.2 Quarry Areas

The contractor utilized three quarry sites located at km 221, km 245 and km 270. Except the quarry site located at km 270, Gimbora river site which utilized stones from the river, the other two sites resulted in a very high vertical cuts with loose fragmented and overhanging stones. These sites should be reinstated properly in such a way that the land occupied by unused materials, boulders, and leftovers of the crashed materials is cleaned and the pits should be filled and leveled in such a way that the land can be usable by the farmers. After reinstating, planting trees or grassing should be done. (See section 5 for the detail EMP).

Table 4.2 List of Quarry Sites and Current Status

<table>
<thead>
<tr>
<th>Quarry location/Chainage</th>
<th>Direction</th>
<th>Current status</th>
</tr>
</thead>
<tbody>
<tr>
<td>KM 221+00</td>
<td>LHS &amp; RHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>KM 245+00</td>
<td>LHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>KM 246+020</td>
<td>LHS</td>
<td>Not reinstated</td>
</tr>
<tr>
<td>KM 270</td>
<td>LHS</td>
<td>Rehabilitation will not be required</td>
</tr>
</tbody>
</table>

4.3 Crusher Sites

Crusher sites which are located at the side of each quarry areas need clearance and the land occupied by the machineries and crashed materials and access roads to these sites require rehabilitation before the final termination of the construction work.
4.4 Unstable Slopes and Rock Fall
Due to stony and steep nature of slope between Km 251 and km 261 there are some areas which have potential risk of stone fall and landslides. It is highly advisable to stabilize these areas by removing loosely hung stones and flattening the side embankments. In addition to bank stabilization work, putting traffic signs which indicate the potential danger of stone fall would be important. Also speed limiting signs & other standard traffic signs should be put in appropriate places before the final commissioning of the road. (Specific chainages require attentions are presented in section 5).

4.5 Camp Sites
There are a total of three camp sites (a main camp at Sanka area at km 269+00 and two temporary camps at km 218+200 and at km 221+00) along the project road. These camp sites are occupying significant land area. As last activities of the contractor these camp sites should be demolished and the areas should be reinstated unless local authorities and communities request the contractor to leave the camps for their use. Reinstating activities should include:
- Demolishing of all the structures placed by the contractor
- Cleaning and disposing all the waste substances and leftover materials in an appropriate and authorized places
- Removing of asphalt and concrete from the ground and loosening of compacted soils
• Leveling and grassing or tree planting
These activities should be accomplished before the contractor officially handover the project to the client.

4.6 Explosive Storage
One of the areas that require attention is explosive storage site. There is one explosives storage site at km 246 along the project road. This explosive storage should be removed by qualified person or professionals in the field of land mines. All the explosives should be inventoried before removing to know the exact amount utilized during the course of construction and what is remained. After removing the explosives all the fences should be removed and any compacted land and access road to the store should be loosen and rehabilitated.

![Photo 5: Explosive store at km 246+00](image)

4.7 Road Side Cuts and Embankments

There are several areas where the road side cuts are exposed. Unless covered with appropriate grass or trees and flattened, they would be eroded easily and may cause adverse impact on the road and surrounding farm lands. These road side cut slopes should be grassed/planted by appropriate tree species. The recommended grass species are vetivera grass, Elephant grass and Sardo. These grasses should be planted in cut slopes where there is enough soil to maintain the growth of the grasses. Cut slopes which are stony and not suitable for grassing and tree planting and not susceptible for soil erosion should be flattened and shaped to increase aesthetic value.

So far the contractor has planted about 6000 trees on road sides and cut slopes. The major tree species planted was Eucalyptus tree. From the observation made on the site, the survival rate of planted trees is low. This may be attributed to lack of appropriate care after planting the seedlings and planting on stony areas where there is no enough nutrients and moisture. The contractor has to take necessary care for the planted trees like watering, weeding and protecting from animals. Also planting on rocky places would not give the required outcome. Therefore, the contractor should be
advised to select suitable sites to plant trees and also plant other indigenous tree species rather than eucalyptus tree.

From the soil conservation point of view other tree species like Acacia, Cordia Africana, Cajanus cajan and Gravilia robusta would serve better than Eucalyptus tree. These tree species could grow well in the road stretch from Sanka to Woldia. The appropriate tree species for the high land area (from Gashena to Sanka) is Eucalyptus tree. Due to very cool climate, other tree species rather than eucalyptus could not survive in the highland stretch of the project area. Therefore, the contractor is advised to plant additional tree species in appropriate places and take care of them until they can survive by themselves. Appropriate season for tree plantation is during the onset of rainy season (June-July). If in case the construction work completed before the onset of rainy season, the contractor has to give tree planting activities to local subcontractors.

4.8 Access to the Road

Due to the raged topographic nature and high fill, there are access problem at several locations. Residents living on the steep side of the road are suffering more. Also drainage structures which are left open are creating access problem, particularly for old age, pregnant women, handicapped and children (see photo 5). The problem is very severe in urban areas such as Woldia, Sanka, Sakala, Hamusit and Ahuntegegn. There is also no vehicular access to individual houses at Woldiya town. Therefore, it is advisable that the contractor should provide crossing access to the road as much as possible. It could also be better to cover the open drainage structures at least in town sections and construct foot stairs where there are too steep slopes.

Photo 6: An old women was crossing the open drainage ditch by the help of other people (left), too steep side slope at Sanka town hindering access to the road (right)

4.9 Irrigation Canals

There is an irrigation system in Sanka area which has been developed by diverting spring water coming from the escarpment area. The water is distributed to the farmers on both sides of the road through road side drainage line. In order to transfer water from one side of the road to the other side the contractor installed concrete pipes under the Asphalt road. However, due to siltation some of these pipes are not functioning well. In order to reduce the observed siltation problem farmers recommended lining of drainage line which at the same time serve to convey
irrigation water to the installed pipes/aqueducts. It is also recommended to protect siltation of the pipes by installing wire mesh at the intake of each pipe to filter out silt and other foreign materials from closing the pipes. This activity could be done by the woreda irrigation department in collaboration with beneficiary farmers as part of their routine maintenance work.

![Photo 7: Silted up irrigation pipe/aqueduct](image)

### 4.10 Erosion and Gully formation

Due to the high level of head differences, erosion created in the escarpment section is powerful to cause big gully formations at the escarpment bottom soils. Though there are erosion protection structures at the outlets of culverts which were placed during the gravel road construction, they are aged and some require maintenance works. In order to control the expansion of these gullies towards the farm land and asphalt road, it is advisable to strengthening the existing structures. Specially, dissipating the energy of runoff by placing boulders and big stones at the tailrace of the drainage culverts would help to reduce soil erosion.

There are also erosion problems which are related to the road side drains particularly at the approach of the main drainage system. The road side drains after concentrating the runoff deliver to the main channel. However, as it was observed in some locations there are no lined structures at the intersection point of roadside drain and main channels. These small gaps could serve as a seed for the expansion of erosion. (See section 5 for specific locations).

Erosion protection activities outside the ROW should be done by various stakeholders including farmers or land owners, Woreda level environmental protection and land use offices and NGOs. The role of road construction contractor should be limited to constructing road side drainage structures and culverts in such a way that it could not cause erosion problem and fixing erosion features caused by his negligence and erratic construction activities if any.
Photo 8: Unlined road side drainage line susceptible for erosion (left), Gully erosion at the outlet of culvert at escarpment area.
5. ENVIRONMENTAL MANAGEMENT PLAN

Environmental management is concerned with implementation of measures necessary to minimize or offset adverse environmental impacts imposed by the development projects or any other human activities. It is one of the tools to protect environment from adverse human interventions and to enhance beneficiary impacts.

Usually, environmental management plan covers activities to be done during the different phases of the project starting from design to operation phases and as such it has to be prepared before the start of the construction work. However, in this particular case, the EMP is focusing on the activities to be carried out during the remaining construction period and completion phase of the project only. This is because at the time of this EMP preparation the road project under consideration is nearly in a completion phase. Also all the other social issues including resettlement, land expropriation and compensation payment had been fully undertaken by the ROW agent and officially established local committee, while monitoring of the same has been carried out by the project intermittent sociologist. The project sociologist as part of the monitoring activity has prepared series of socio-environmental impact monitoring reports. Therefore, the focus of this EMP is on rehabilitation of borrow pits, quarries, access roads, crusher sites, detour roads, slope stabilities, erosion prone areas and other identified issues related to road environment. In the following table detail environmental management activities and responsibilities for execution and overseeing these activities are described.
### Table 5.1 Detail Environmental Management Plan

<table>
<thead>
<tr>
<th>S.N</th>
<th>Environmental Issues</th>
<th>Location/Chainage (km)</th>
<th>Management activities/mitigation measures</th>
<th>Executors</th>
<th>Supervisor</th>
<th>Execution period</th>
<th>Monitoring</th>
<th>Cost required</th>
</tr>
</thead>
</table>
| 1   | Un-rehabilitated borrow areas which are causing:  
- Wastage of land,  
- Impounding water which create conducive environment for malaria transmission and, impose accident of drawing particularly on children and cattle  
- Create unaesthetic environment  
- Waste of land,  
- Impounding water which create conducive environment for malaria transmission and, impose accident of drawing particularly on children and cattle  
- Waste of land,  
- Impounding water which create conducive environment for malaria transmission and, impose accident of drawing particularly on children and cattle  
- Waste of land,  
- Impounding water which create conducive environment for malaria transmission and, impose accident of drawing particularly on children and cattle  
- Waste of land,  
- Impounding water which create conducive environment for malaria transmission and, impose accident of drawing particularly on children and cattle  
- Waste of land,  
- Impounding water which create conducive environment for malaria transmission and, impose accident of drawing particularly on children and cattle | Km 189+380 RHS  
Km 189+380 LHS  
Km 204+070  
Km 206+500 RHS  
Km 209+880 LHS  
Km 230+640 LHS  
Km 234+400 LHS  
Km 246+100 RHS  
Km 261+130 RHS  
Km 262+320 RHS  
Km 265+480 RHS  
Km 229+540 LHS  
Km 280+480 RHS  
Km 284+240 RHS  
Km 286+780 LHS | ➤ Reinstall Borrow pits (Reinstalling should include refilling of deep pits with appropriate materials and leftovers, landscaping/leveling/shaping, spreading the topsoil uniformly over the surface, constructing spillways in case of borrow pits hold water),  
➤ After reinstating, plant appropriate tree species (indigenous and exotic tree species like Acacia, Cordia Africana, Neem indica from Sanka to Woldiya area, and eucalyptus tree from Gashena to Keberomeda)  
➤ Provide proper drainage to avoid storage of water in borrow sites to reduce expansion of malaria and to protect people and livestock from falling into deep pits. | Road construction contractor | The project consultant through his RE and coworkers (Sociologist/Environmentalist) | Before the completion of the construction work, specifically from Nov 1, 2009- Dec 15, 2010 (see work schedule below) | Amhara EPLAUA in collaboration with each Woreda EPLAU offices, EMB of ERA, and Finding Organization | Part of the road construction work (no additional cost required) |
| 2   | Un-reinstated quarry sites which are causing:  
- Wastage of land,  
- Impounding water which create conducive environment for malaria transmission, and  
- Impose accident of drawing particularly on children and cattle  
- Waste of land,  
- Impounding water which create conducive environment for malaria transmission, and  
- Impose accident of drawing particularly on children and cattle  
- Waste of land,  
- Impounding water which create conducive environment for malaria transmission, and  
- Impose accident of drawing particularly on children and cattle  
- Waste of land,  
- Impounding water which create conducive environment for malaria transmission, and  
- Impose accident of drawing particularly on children and cattle  
- Waste of land,  
- Impounding water which create conducive environment for malaria transmission, and  
- Impose accident of drawing particularly on children and cattle  
- Waste of land,  
- Impounding water which create conducive environment for malaria transmission, and  
- Impose accident of drawing particularly on children and cattle | Km 221+00 LHS  
Km 224+00 LHS  
Km 246+020 LHS | ➤ Reinstall quarry areas (Reinstalling should include refilling of deep pits with appropriate materials and leftovers, landscaping/leveling/shaping, spreading the topsoil uniformly over the surface, constructing spillways in case of quarry areas hold water),  
➤ After reinstating, plant appropriate tree species (mainly eucalyptus tree because the climatic condition of the quarry areas is not fever able for other indigenous tree species) | Road construction contractor | The project consultant through his RE and coworkers (Sociologist/Environmentalist) | Before the completion of the construction work. Specifically from Dec 1, 2009-Jan 30-2010. | Amhara EPLAUA in collaboration with each Woreda EPLAU offices, EMB of ERA, and Finding Organization | Part of the road construction work (no additional cost required) |
### Revised EMP for Gashena-Woldiya Road Project

<table>
<thead>
<tr>
<th>No.</th>
<th>Activity Description</th>
<th>Site Details</th>
<th>Road Construction Contractor</th>
<th>Project Consultant</th>
<th>Collaborative Agency/Code</th>
<th>Cost Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Dominic sites, causing land loss, dust and sound pollution and aesthetic impact</td>
<td>KM 221+000 LHS, KM 221+000 RHS, KM 246+020 LHS</td>
<td>Road construction contractor</td>
<td>The project consultant through his RE and coworkers (Sociologist/Environmentalist)</td>
<td>From Jan 8 to 15</td>
<td>Amhara EPLAUA in collaboration with each Woreda EPLAU offices, EMB of ERA, and Finding Organization</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Part of the road construction work (no additional cost required)</td>
</tr>
<tr>
<td>4</td>
<td>Detour and access roads to borrow sites, quarry areas and crusher sites causing Loss of productive farm land and dust pollution</td>
<td>KM 225+180-225+560 RHS (detour) KM 229+540 LHS (access road to borrow area) KM 270+130-KM 271+00 RHS</td>
<td>Road construction contractor</td>
<td>The project consultant through his RE and coworkers (Sociologist/Environmentalist)</td>
<td>Before the completion of the constructio n work, specifically from Dec 7, 2009-Feb 15, 2010</td>
<td>Amhara EPLAUA in collaboration with each Woreda EPLAU offices, EMB of ERA, and Finding Organization</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Part of the road construction work (no additional cost required)</td>
</tr>
<tr>
<td>5</td>
<td>Unstable road side which may cause collapse of the road</td>
<td>KM 253.800 RHS, KM 253+500, KM 275+900 LHS</td>
<td>Road construction contractor</td>
<td>The project consultant through his RE and coworkers (Sociologist/Environmentalist)</td>
<td>Before the completion of the constructio n work, specifically from Nov 1, 2009-Dec 21, 2010</td>
<td>Amhara EPLAUA in collaboration with each Woreda EPLAU offices, EMB of ERA, and Finding Organization</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Part of the road construction work (no additional cost required)</td>
</tr>
<tr>
<td>6</td>
<td>Unstable embankments, stone fall and landslide prone</td>
<td>KM 245+00 LHS, KM 251+980 RHS, KM 255+640 RHS</td>
<td>Road construction contractor</td>
<td>The project consultant through his RE</td>
<td>Before the completion of the constructio n work, specifically from Nov 1, 2009-Dec 21, 2010</td>
<td>Amhara EPLAUA in collaboration with each Woreda EPLAU offices, EMB of ERA, and Finding Organization</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Part of the road construction work (no additional cost required)</td>
</tr>
</tbody>
</table>
Revised EMP for Gashena-Woldiya Road Project

<table>
<thead>
<tr>
<th>Areas</th>
<th>KM</th>
<th>Livestock</th>
<th>Put appropriate traffic warning signs which indicate potential risk of stone fall in these locations</th>
<th>and coworkers</th>
<th>n work, specifically from Nov 1, 2009-Dec 21, 2010</th>
<th>Woreda, EPLAU offices, EMB of ERA, and Finding Organization</th>
<th>Additional cost required</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Km 253+979 RHS, Km 282+225 RHS, Km 255+835 LHS, Km 287+805 RHS, Km 262+320 RHS, Km 281-282 RHS, Km 282+225 LHS</td>
<td>✓ Line the road side drains wherever the slope is big enough to cause erosion on road side drains ✓ Construct energy dissipating structures at the outlet of the runoff culverts so that the erosivity of the runoff will be minimized ✓ Do not leave unlined gaps between lined drainage ways and receiving drain (main drainage)</td>
<td>Road construction consultant through his RE and coworkers (Sociologist/Environmentalist)</td>
<td>Before the completion of the constructio work, specifically from Nov 1, 2009-Jan 7, 2010</td>
<td>Amhara EPLAU in collaboration with each Woreda EPLAU offices, EMB of ERA, and Finding Organization</td>
<td>Part of the road construction work (no additional cost required)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Km 246+020 LHS</td>
<td>✓ Apply dust control mechanisms such as spraying water while crashing ✓ Remove the plant ✓ Rehabilitate the land taken by the crusher plant ✓ Avoid discharging solid as well as liquid waste and used oils into the community pond</td>
<td>Road construction consultant through his RE and coworkers (Sociologist/Environmentalist)</td>
<td>Before the completion of the constructio work, specifically from Dec 22, 2009-Jan 15, 2010</td>
<td>Amhara EPLAU in collaboration with each Woreda EPLAU offices, EMB of ERA, and Finding Organization</td>
<td>Part of the road construction work (no additional cost required)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Km 287+650 RHS</td>
<td>✓ Store any explosives and chemicals in a safe place and make notification during blasting activities ✓ Finally remove all the remaining explosives by professionals in the area of handling land mines in the presence of local police and RE ✓ Rehabilitate the land taken by the store</td>
<td>Road construction consultant through his RE and coworkers (Sociologist/Environmentalist)</td>
<td>Before the completion of the constructio work, specifically from Jan 15, 2010-</td>
<td>Local police in collaboration with each Woreda administration</td>
<td>Part of the road construction work (no additional cost required)</td>
<td></td>
</tr>
</tbody>
</table>
## Revised EMP for Gashena-Woldiya Road Project

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Location</th>
<th>Action</th>
<th>Responsible Party</th>
<th>Timeline</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10</strong></td>
<td>Erosion of Bridge footing</td>
<td>Km 287+650</td>
<td>Rehabilitate the eroded river bed under the bridge by concrete lining the eroded section</td>
<td>Road construction contractor</td>
<td>Before completion of the construction work, specifically from November 5, 2009, to Nov 5, 2010.</td>
<td>Part of the road construction work (no additional cost required).</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>Lack of access and crossing from road to residential houses and vice versa by the community and lack of vehicular access from road to residential houses at Woldiya town</td>
<td>Km 254+420 RHS, Km 215+700 L&amp; RHS, Km 229+740 RHS, Km 232+320 RHS, Km 232+820-Km 233+00 RHS, Km 270+130-Km 271+00 RHS</td>
<td>Provide access to the community residing at the side of the road (Construct stairs on steep areas and construct closed drainage lines in the town sections or provide other appropriate crossing structures)</td>
<td>Road construction contractor</td>
<td>Before the completion of the construction work, particularly from Nov 1, 2009, to Jan 15, 2010.</td>
<td>Part of the road construction work (no additional cost required).</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td>Exposed cut slopes and embankments sensitive to erosion</td>
<td>Km 219+300 L &amp; RHS, Km 231+200 RHS, Km 239+300 RHS, Km 235+200 RHS, Km 244+700 RHS, Km 245+900 RHS, Km 285+400 LHS, Km 285+900 LHS, Km 286+000 LHS</td>
<td>Protect the exposed cut slopes and embankments by grassing (appropriate grass species are Vetivera grass and elephant grass).</td>
<td>Road construction contractor or subcontractors</td>
<td>From Jun 1, 2010, to Jun 30, 2010.</td>
<td>Part of the road construction work (no additional cost required).</td>
</tr>
<tr>
<td><strong>13</strong></td>
<td>Compensatory tree plantation</td>
<td>Along the road</td>
<td>Plant adequate number of trees (at least 10 seedlings to compensate a single mature tree removed during the road construction)</td>
<td>Road construction consultant</td>
<td>Before the completion</td>
<td>Amhara EPLAU in collaboration with each Woreda EPLAU offices, EMB of ERA, and Finding Organization.</td>
</tr>
</tbody>
</table>
### Revised EMP for Gashena-Woldiya Road Project

<table>
<thead>
<tr>
<th>No</th>
<th>Impact of road construction on irrigation system</th>
<th>KM 257-KM 266</th>
<th>Main camp site at Sanka (Km 269+00) Temporary camp sites I at Estayish (km 218+00) and temporary camp site II at km 189</th>
<th>Remove all the camp sites and workshops and reinstate the land before officially handover the project to the client</th>
<th>Demolish all the concrete structures</th>
<th>Clean solid as well as liquid waste and damp in an Authorized damping place</th>
<th>Loosen any compacted ground and remove asphalts and gravels</th>
<th>Road construction contractor</th>
<th>The project consultant through his RE and coworkers (Sociologist/Environmentalist)</th>
<th>Before officially handover the project, specifically from Feb 1, 2010-Feb 30, 2010 (during the wet season)</th>
<th>Amhara EPLAU in collaboration with each Woreda EPLAU offices, EMB of ERA, and Finding Organization</th>
<th>Part of the road construction work (no additional cost required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td></td>
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<td></td>
<td></td>
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</tbody>
</table>

Appropriate tree species for the lowland area (from Sanka to Woldiya) are *Cordia africana*, *Acacia seyal*, *Azadirachta indica* (neem tree) or other recommended trees by Woreda forestry department.

Appropriate tree species for the highland areas from Gashena to Sanka area is *Eucalyptus* tree (due to cool temperature and nature of soil these areas are not favorable for other tree species rather than eucalyptus tree).

The contractor provided 29 box culverts and aqueducts to channelize irrigation water from one side to the other side. The box culverts and aqueducts were constructed based on the discussion and agreement with Woreda irrigation department. Currently some of these aqueducts are closed by silt. Therefore it is advisable to clean these silted aqueducts and install metal mesh at intake of each aqueduct to prevent them from siltation.

The contractor or subcontractors will provide 29 box culverts and aqueducts to channelize irrigation water from one side to the other side. The box culverts and aqueducts were constructed based on the discussion and agreement with Woreda irrigation department. Currently some of these aqueducts are closed by silt. Therefore it is advisable to clean these silted aqueducts and install metal mesh at intake of each aqueduct to prevent them from siltation.

| No | Impact of road construction on irrigation system | KM 257-KM 266 | Main camp site at Sanka (Km 269+00) Temporary camp sites I at Estayish (km 218+00) and temporary camp site II at km 189 | Remove all the camp sites and workshops and reinstate the land before officially handover the project to the client | Demolish all the concrete structures | Clean solid as well as liquid waste and damp in an Authorized damping place | Loosen any compacted ground and remove asphalts and gravels | Road construction contractor | The project consultant through his RE and coworkers (Sociologist/Environmentalist) | Before officially handover the project, specifically from Feb 1, 2010-Feb 30, 2010 (during the wet season) | Amhara EPLAU in collaboration with each Woreda EPLAU offices, EMB of ERA, and Finding Organization | Part of the road construction work (no additional cost required) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
6. TIME SCHEDULE FOR THE EM ACTIVITIES OF GASHENA-WOLDIYA ROAD PROJECT

<table>
<thead>
<tr>
<th>S.n</th>
<th>Activities</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nov</td>
<td>Jan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Week</td>
<td>Week</td>
</tr>
<tr>
<td>1</td>
<td>Reinstating of Borrow pits (14 borrow sites. Reinstall at least 2 sites per week)</td>
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<tr>
<td>2</td>
<td>Reinstating of quarries (4 sites) reinstates all of them before February</td>
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<tr>
<td>3</td>
<td>Removing of Crusher plants and reinstating of the plant site</td>
<td></td>
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<tr>
<td>4</td>
<td>Reinstating of detour and access roads</td>
<td></td>
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<tr>
<td>5</td>
<td>Stabilizing unstable road side slopes</td>
<td></td>
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<tr>
<td>6</td>
<td>Removing unstable and loosely hanged stones from the escarpment section and stabilizing steep embankments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Erosion control activities (lining of drainage ways, grassing of cut slopes, construction of energy dissipating structures at the outtake of culverts</td>
<td></td>
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<tr>
<td>8</td>
<td>Demolish the crusher plant and Rehabilitate crusher plant site &amp; affected community</td>
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<td></td>
</tr>
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</table>
Revised EMP for Gashena-Woldiya Road Project

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>9</strong></td>
<td>Remove unused explosives carefully and reinstate the land area occupied by the explosive store</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>Protect river bed erosion under the bridge at km 287+650</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>Provide access and crossing to residential houses</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td><strong>Protect the exposed cut slopes and embankments by grassing</strong></td>
</tr>
<tr>
<td><strong>13</strong></td>
<td><strong>Plant trees (at least 10 seedlings to compensate a single tree removed during the road construction)</strong></td>
</tr>
<tr>
<td><strong>14</strong></td>
<td>Clean silted irrigation aqueducts and install metal mesh at intake of each aqueduct to prevent them from silting</td>
</tr>
<tr>
<td><strong>15</strong></td>
<td>Remove all the campsites and workshops and reinstate the land before officially handover the project to the client</td>
</tr>
</tbody>
</table>

*According to the project schedule, the completion date is on February 28, 2010*

**Tree plantation & grassing can only be done during the rainy season. According to the project schedule the construction will be completed before rainy season comes. Therefore tree planting and grassing should be given to local contractors.**