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AMHARA NATIONAL REGIONA STATE SOUTH WOLLO ZONE, DESSIE CITY ADMINISTRATION

Salaysh-Segno Gebya Gravel Road Environmental and Social Impact Assessment Report

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Prepared by Amhara Design and Supervision Works Enterprise

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Dessie

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Acronym

ADSWE	Amhara Design and Supervision Works Enterprise
ANRS	Amhara National Regional State
BoEPLAU	Bureau of Environmental Protection, Land Administration and Use
CSA	Central statistic Agency
CSE	Conservation Strategy of Ethiopia
DEM	Digital Elevation Model
EEPCo	Ethiopian Electric Power Corporation
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EISR	Environmental Impact Study Report
EMB	Environmental Management Branch
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
EPC	Environmental Protection Council
ERA	Ethiopian Road Authority
ESMF	Environmental and Social Management Framework
FAO	Food and Agricultural Organization
FDRE	Federal Democratic Republic of Ethiopia
Ha	Hectare
MASL	Meter above Sea Level
MUDC	Ministry Urban Development and Construction
NGO	Non Governmental Organization
ROW	Right-of-Way
SIA	Social impact assessment
ULGDP	Urban Local Government Development Program
USA	United State of America

Executive Summary

Dessie is one of the oldest cities in the country and the capital city of South Wollo Zone in the Amhara National Regional State. It is located on the Addis Ababa - Mekelle highway, at about 400 km distance from Addis Ababa, in the northern part of the country.

According to information from the city council, the current population of the city is estimated at 174,705 people. The city, however, is deficient in infrastructure development and social service facilities. The infrastructures like gravel road, solid waste management facilities are much below the demand and requirements of the population of such medium sized urban area. Sustainability is one of the eight Millennium Development Goals (MDGs) set by the International community and hence, governments are expected to work towards those targeted goals.

Dessie city Administration has identified 18 priority municipal projects to be addressed in 2012/2013 and has developed capital investment plans accordingly. Gravel road construction is planed as one of those priority development areas that have been targeted for the plan period. The objective of this plan is described as to meet public satisfaction through efficient service delivery and infrastructure development.

Dessie gravel road project has investigated its design and Engineering work, Geology and Geotechnical study, Environmental Impact Assessment (EIA), and Socio-economic Studies by independent consultant of the Amhara Design and Supervision Works Enterprise. The implementation of this Project will create employment opportunities; improve transportation and the living condition of the local people. However, the road project will bring negative environmental and social impacts. The environmental issues are considering through Environmental Impact Assessment (EIA) before the implementation of development plan to ensure sustainable development. Prior to implementation of the proposed road project, it is very essential to identify environmental issues to provide information for decision making and integrate environmental considerations into the higher level of decision making.

The methodology adopted for conducting this environmental impact assessment study followed the Federal Democratic Republic of Ethiopia, Ministry of Urban development and construction Environmental and social Management Framework and Resettlement policy framework- urban

local government development project manual November 2008 that meet the requirements of the World Bank, Federal and Regional Environmental Protection Organs.

The collection of secondary data on environmental components was collected from relevant documents and literature sources (desktop study) and primary data was also collected through general public meeting, focus groups discussions, and site observation.

Need for the project

Salaish-segnoGebaye gravel road project is rehabilitation of the existing 10 meter width deteriorated road to 30 meter width at Tossa hill side though the project is very essential, but may have negative impacts, therefore the objective of this EIA study is to identify the possible negative impact during or after construction and to prepare mitigation. Due to the very nature of the site there will be huge excavation with additional 20m width to the previous 10m width to Tossa hill side throughout the 2km length; this will pose the negative impacts on the environment and the people.

According to the reports of the Administration, kebele 01 and 02 (the project area) do not get adequate transport services due to heavy damage of road. Most of social services such as health, schools, and market place and bank services are confined in the center of the city where adequate road and transport facilities are available. As a result, the community in the study area in general and mothers in particular were facing various problems and difficulties due to lack of transport services in the area. The problems are very acute during the time of pregnancy when women have to walk on foot for long distances or are carried on horse carts to receive medical checkup or to have delivery. The long walk they make on foot or on horse carts expose them to difficult situations and unexpected problems.

In addition to the problem of road accessibility, lack of proper drainage system in the above kebeles is also another bottle necks. The run off originated from the tip of the hills that surrounded the city were drains down towards the city creating flood at various places. Despite the fact that the city is threatened by flood, the existing drainage system covers only a small part of the city, mainly the central part just following the road route. Consequently, the project area is suffering not only from lack of road access but also from the problems of flood.

Therefore, the construction of the proposed road project will offer the local community easy, comfortable and quick access to markets and other social services. Following the increased access and transport opportunities, other socio-economic development will follow including education, health, communication, market, and banking. The project will reduce travel time to the social services by mode and location particularly to the clinic and Hospital that are found in Dessie city.

Description of the project

Construction of proposed gravel road project for kebele 01 and 02 of Dessie city involve delineation of the project target routes, identification of affected environmental, social and economic resources, excavation of the route, cut and fill, surfacing and Calvert building with the necessary downstream structures and Water ways or drainage (1.5m width one side) and walk way.

The total length of the route is 2 km and 30m width gravel road on the beneath of Tossa hill. During construction of the road there will be significant biodegradation, air and noise pollution.

Policy, Legislatives and Institutional Framework

The relevant policy, legal and institutional frameworks within which the project will be implemented have been reviewed and highlighted in the document. Accordingly, Projects to be implemented under the (Urban Local Government Development Plan (ULGDP) should adhere to acceptable environmental and social safeguards. The projects should, as far as possible, not result in significant disturbance of sensitive ecological resources. It should not result in involuntary resettlement and land acquisition, and where this is necessary it is minimized by exploring all viable alternatives and where it is unavoidable, compensatory programs are prepared and implemented

Summary of Environmental and Social Impacts

This part of the report addresses potential impacts associated with the proposed gravel road construction project and analysis of the related impacts. The project environmental impacts have

been those identified as specific to the site such as land clearance, removal of soil and vegetation, land escape alteration particularly at quarry site, silt deposition and pollution.

Table 1.Summary of Environmental and Social Impacts

Type of Impact	**Construction**	**Operation**
Environmental		
Adverse	• Slope Destabilization Impact • Impacts on soil erosion • Impact on Water Resources • Accidents from Slips and falls of Stone and soil Materials • Impacts on Quarry and Borrow Pits • Impacts on Vibration	• Impacts on Ambient Air Quality, Noise • Traffic Accidents and Safety Risks • Impact of Road Noise
• Positive	• Employment opportunity • Urban development • Increase livelihood	
Social		
• Adverse	• Impacts on Ambient Air Quality, Noise • Traffic Accidents and Safety Risks • Impact of Road Noise • Loss of Properties and Displacement people	• Impacts on Ambient Air Quality, Noise • Traffic Accidents and Safety Risks • Impact of Road Noise
• Positive	• Employment opportunity • Urban development • Increase livelihood	• Employment opportunity • Urban development • Increase livelihood • access roads provision • Establishment of proper drainage system

Mitigation measures for the adverse impacts

Mitigation measures are proposed for each of the likely adverse impacts to be posed by the project and respective to each stage of the project implementation processes.

The proposals for mitigation measures have been detailed for implementation both at the design, construction and operation phases of the project. The design of gravel road is to ensure the basic

objective of providing appropriate transport facilities, and the designer is advised to incorporate the necessary facilities and provisions for improved environmental performances.

Table 2.Mitigation measures for the adverse impacts

Potential Environmental Impacts	Proposed Mitigation Measures
Slope Destabilization Impact	• Careful sitting and selection of the road alignments and quarry sites • Both vertical and horizontal alignments of the road should follow the natural relief as closely as possible • Careful and proper execution of construction works • Avoid and/ or minimize side casting of materials from road cuts on down slopes.
Impacts on soil erosion	• Minimize the area of ground clearance • Cuts on erodible surface should be properly executed during dry season i.e. before the summer rains commence. • Excavated top soils or loss soils cut-off from the old road and selected material sites should be collected and preserved for reuse particularly clay soils for filling of gullies, borrow and quarry sites
Impact on Water Resources	• Design and execute adequate and proper drainage structures to reduce erosion or sedimentation in drainage ways affected by road construction. • Avoid the risk of pollution to soil, surface and ground water sources through the reduction of accidental spillage of fuels, oils, greases and other pollutants • Implement proper disposal of solid and liquid wastes generated by road construction activities.
Impacts on Ambient Air Quality, Noise and Vibration	• Reduce noise at the source by monitor and maintenance on noisy machines to minimize its effects on people living around the project; • Noise and vibration arise from crushing process should be minimized through adequately designing of the foundation for the facility; • use mechanical hammering which reduces the noise level;
Accidents from Slips and falls of Stone and soil Materials	• The contractor should erect stone slips and falls control barriers around perimeter of cuts, and roadways
Impacts on Quarry and Borrow Pits	• Leveling of the exploited blocks before abounding the used quarry; • In order to minimize the effect of flood, landslide and erosion on road & wetland, the surface rainwater has to be diverted through appropriate ditches or channels above the quarry

Loss of Properties and Displacement people	• Minimize the area of ground clearance i.e. land clearing for road construction should be restricted to what is absolutely necessary for the road construction; • Replanting right species of trees on the road side that could provide benefit such as shade, soil conservation and prevention of gullies, scenery, and protection from dust, noise and wind etc. • Pay compensation to the affected people
Traffic Accidents and Safety Risks	• Carefully and clearly mark pedestrian-safe access routes • Assign traffic safety personnel to direct traffic during school hours • Maintain supply of supplies for traffic signs, road marking, and guard rails to maintain pedestrian safety during construction
Landslides, Slumps and Slips	• Replanting and maintaining of vegetation • Draining the subsurface (reduces pore water pressure) • Construct artificial barriers • Reduce slope angle
Impact of Road Noise	• Plant 30m tree buffer strips between road and surrounding habitation

Environmental Management and Monitoring plan

The environmental management for the Gravel road will be a performance-based site assessment and management to ensure road designers and operators select the most appropriate and innovative means of meeting the specified environmental goals. Accordingly, the gravel road Environmental Management will have to comply with the following environmental goals;

The goals are geared towards:

- preventing water pollution
- minimizing public health impacts
- minimizing damages to flora and fauna resources
- preventing air pollution
- promoting responsible land management and conservation
- minimizing property losses
- Preventing hazards and loss of amenity.

Accordingly management and monitoring indicators are identified and discussed in detail, including in a matrix form to help as a checklist for control of major parameters.

The costs required during operation phase of the project will be part of the day to day administrative and operational is estimated about 262, 240 Eth. Birr.

The budget will be allocated for training and awareness creation of personnel on the principles Conservation of natural resource, traffic facilities and salary for permanent and temporary staff.

1. Introduction

1.1 Background

Dessie is one of the oldest cities in the country and the capital of South Wollo Zone in the Amhara Regional State. It is located on the Addis Ababa - Mekelle high way, at about 400 km distance from Addis Ababa, in the northern part of the country.

According to information from the city council, the current population of the city is estimated at 174,705 people. The city, however, is deficient in infrastructure development and social service facilities. The infrastructures like gravel road and solid waste management facilities do not adequately addressed demand and requirements of the population of such medium sized urban area.

Dessie city Administration has identified 18 priority municipal projects to be addressed in 2012/ 2013 and has developed capital investment plans accordingly. Gravel road construction is planed as one of those priority development areas that have been targeted for the plan period. The objective of this plan is described as to meat public satisfaction through efficient service delivery and infrastructure development.

Accordingly, the city administration has planned to carry out the implementation of gravel road construction project under component-1 of the "Urban Local Government Development Project" ULGDP. The ULGDP represents the third phase of joint collaboration between the World Bank and Ethiopian Government to support urban development, and creates a new fiscal instrument in the form of a specific purpose grant (SPG) to urban local governments to support key performance improvements required for sustainable, accountable service delivery, which is an additional component to the government's fiscal architecture of predictable resource transfers to the urban sector.

Design and Engineering, geology and geotechnical studies, an Environmental Impact Assessment (EIA), and Socio-economic Studies of the Dessie gravel road have been undertaken by an independent consultant of the Amhara Design and Supervision Works Enterprise (ADSWE). Considering environmental and social issues through Environmental Impact

Assessment (EIA) and Social Impact assessment (SIA) before implementing a project can help to ensures sustainable by providing information for decision making to reduce adverse impacts

This report deals with the environmental and social impacts of the proposed development scheme. The environmental and social impact assessment study was conducted by a team that consists of multi disciplinary professionals that include environmentalist, geologist, socio-economist, design engineers (structural engineers), and surveyors.

The report is arranged in the format using environmental and social impact assessment guidelines of the GOE, the World Bank and the African Development Bank for road development projects as follow.

Section 1: Introduction

Section 2: Methodology

Section 3: Description of the Proposed Project

Section 4: Legal, Regulatory, Policy, and Administrative Framework

Section 5: Description of the Existing Environment

Section 6: Proposed Project and Alternatives

Section 7: Environmental Impacts Identifications, Prediction and analysis

Section 8: Impact Mitigation Measures

Section 9: Environmental management and monitoring plan

Section 10: Conclusion and recommendation

1.2. Objective of the Environmental and Social Impact Assessment

It is understood that construction of the gravel roads will have economic and social benefits in the improvement of the quality of living and facilitate the economic development of the area by reducing the prevailing impaired and retarded mobility of goods and services. However, it is also possible that some aspects of the construction of the gravel roads may have some negative or undesired impacts on the social, economical and bio-physical environment of the area concerned if appropriate measures that can correct or mitigate undesirable and unintended results are not incorporated.

1.2.1. Specific objectives:

- To identify sensitive environmental components likely to be affected by the proposed gravel road project,
- To provide baseline data on the existing physical, biological and socio-cultural environment of the project area.
- To Identify, predict and synthesizes of the potential environmental impacts associated with the project implementation and;
- To design mitigation measures and management plan to avoid or minimize adverse impacts and enhance beneficial impacts.

2. Approaches and Methodology

The methodology adopted for conducting this environmental impact assessment study followed the Federal Democratic Republic of Ethiopia, Ministry of Urban development and construction Environmental and Social Management Framework and Resettlement policy framework- urban local government development project manual November 2008 that meet the requirements of the World Bank, Federal and Regional Environmental Protection Organs.

The collection of secondary data on environmental components was collected from relevant documents and literature sources (desktop study) and primary data was also collected through general public meeting, focus groups discussions, and site observation.

2.1 Data Collection methods and tools Information

Secondary data were collected through, reviewing published international conventions and protocols ratified by the Federal Democratic Republic of Ethiopia (FDRE), national and regional state policies, legislatives, regulations and guidelines related to environment and base line data (rain fall, master plan population, health service.) were also collected from stakeholders and authorities with whom consultations made at the project area, Dessie city cabinet members, local sector offices (Dessie city service, agricultural office finance and local economic office). Primary data were collected using observation, focus groups discussion, general public meetings, and key informants.

Checklists and camera was used to collect data from secondary sources from site observation, camera was used to collect information from site observations and meetings, interview and FGD guide used to track discussion and collect information.

2.2 Field Survey

Site Visits to obtain Baseline Condition of the Project Area: An extensive field visit to the project area was conducted by the environmental specialist to collect primary data on bio-physical and socio-economic conditions of the project area as well as to identify the existing environmental issues and the potential environmental effects of the proposed project. Land use and land cover data of the route corridor was also surveyed along the old route alignment. Moreover, a detailed land acquisition (buildings, institutions, fences, commercial tress, useable lands, etc.) survey was also conducted to clearly identify and register each and every useable resources located within the proposed road right-of-way.

Site visits were made from October 6 - 10, 2012 to assess the baseline environmental conditions of the proposed project site; to define impacted areas and identify environmental components that are likely to be significantly affected by the proposed project. During field survey, basic data and information on the biophysical resources, historical and cultural sites have been collected.

2.3. Review of Existing Literature and Maps:

Relevant documents of previous studies as well as important policies, proclamations guidelines were reviewed. Guidelines such as World Bank Environmental Assessment Guidelines, Urban Local Development Project Environmental and Social Management Framework, Federal EIA

procedural Guidelines, Amhara region Revised EIA Guidelines, Environmental Impact Assessment Guidelines on Road were reviewed.

Sectoral environmental policies, proclamation on Environmental Impact Assessment, proclamation on expropriation of land and compensation, Proclamation on urban land administration and proclamation on preservation of cultural heritage were also reviewed.

2.4. Public Involvement and Stakeholders Consultation

Public involvement is a cornerstone and fundamental principle of the EIA process, The Ethiopian Government's Environmental impact assessment guidelines and the project's ESMF call for broad public involvement combined with greater accountability in environmental and development decision-making.

To meet the requirements of both the national and regional regulatory authorities and ULGDP's ESMF and seek the views and concerns on the proposed Salaysh-SegnoGebya gravel road project, formal as well as informal consultations were conducted with concerned officials and experts at different administrative levels, and with representatives of the local community of the affected and interested groups (Dessie city municipality,).

Formal public hearing and consultations with participants from different society groups was held at Kebele 01 and 02meeting hall on March, 22, 2012- March 30, 2012 (see photo on Figure 1.). In addition, discussions were conducted with semi structured interviews with relevant individuals and institutions at City, woreda and Kebele levels to solicit their views, concerns and comments to maximize the social and environmental outcomes of the project, obtaining key information from indigenous and current experiences and knowledge, impact identification , scoping, examination of alternatives , planning of potential mitigation measures and identify deliverables that can be provided by different stakeholders.

Public consultation was extended beyond the affected community in the project area, to understand the views of any member of the public that is knowledgeable on the impacts of the project or is better informed on environmental trends of the project area.

Based on the discussions made with the communities, they reflect their fear and suggest the possible adverse impacts associated design, construction and implementation of the gravel road project (a) Displacement of local communities,(b)aggravate landslide and flood hazard,(c) loss

of market places(Segno-Gebeya),(d) loss of fences, shops and plantation trees, and(e) impact on telephone lines and waterlines. However, the community has also mention the advantage of the implementation of the project like (a) Improve access to markets, (b) Improve access to health facilities, and linkage with other Kebeles (c) increase land value and improve health condition, (d) Reduce traffic accident, and (e) creates employment opportunity during road construction phase as well as operational phase.

Figure 2. Public Consultation Forum at 02 Kebele (left) and 01Kebele (Right)

2.5. Data Analysis and Report Writing:

Analysis of the collected data and information to assess and predict the potential impact of the proposed project as it is designed and report preparation was conducted as per the requirement of the environmental impact assessment guideline produced by World Bank and Amhara Region Environmental Protection, Land administration and use Bureau.

3. Project Description

3.1. Project Location

Dessie city is located between 11^0 13' N latitude and 39^0 65' E longitudes. It is situated at about 400 km distance North of Addis Ababa on the high way to Mekelle. The proposed gravel Road Project is located in Dessie city and connects two kebeles of the city, namely kebele 01 and 02 to the main road and market place of the city (Segno gebeya).

Figure 3: Showing location of the city within which the project is located

As stated above, this is a project of gravel road to be constructed in Salaysh-Segno gebya of Dessie city. The heavily damaged and heavily trafficked earth road in this area will be part of the project. The aim is to raise the standard of the road from earth and uncomfortable riding road to gravel roads so as to facilitate better access of residents. The length of the gravel roads is stretching from Salaysh to Segno Gebya about two km.

3.2 Project rational

Among the critical problems identified by Dessie city administration, the heavily damaged and heavily trafficked earth roads for kebele 01 and 02 is one of the major problems of the city. The proposed road development project will have a length of 2 km.

According to the reports of the Administration, the above kebeles (the project area) do not get adequate transport services due to heavy damage of road. Most of social services such as health, schools, and market place and bank services are confined in the center of the city where adequate road and transport facilities are available. As a result, the community in the study area in general and mothers in particular were facing various problems and difficulties due to lack of transport

services in the area. The problems are very acute during the time of pregnancy when women have to walk on foot for long distances or are carried on horse carts to receive medical checkup or to have delivery. The long walk they make on foot or on horse carts expose them to difficult situations and unexpected problems.

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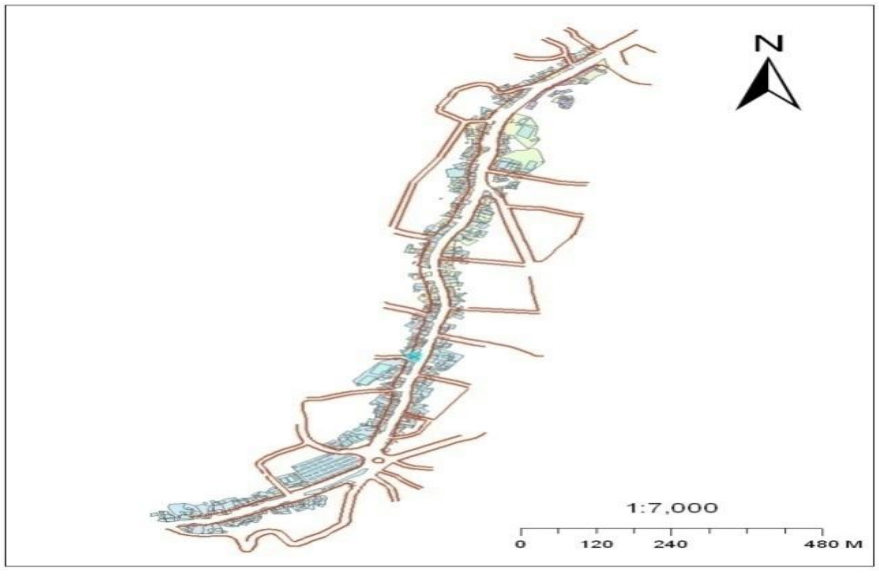

Figure 4. Location of Proposed gravel road and Road Network

3.3. Project activities

The project work mainly involves foundation excavation and compaction of Sub-base and Road base course at the road location, while material production and transportation will be done at outside of the city centers.

Clearing and Grubbing

- Clearing and grubbing of 7.6 hectare of land
- Demolishing of existing 1000m^3 Asphalt and 600m^3 ditch

Drainage work and Concrete Pipe Culverts

- Internal diameter of 90cm Concrete pipe for storm water drains including Class B bedding.
- Internal diameter 15cm Concrete pipe for inlet of water to the ditch every 30m interval both sides.

Curbing, channeling, open chutes, down pipes and concrete lining of open drains

- Concrete Curbing C-25 Concrete as Shown on the detail to be used at the edge of Asphalt road. Cost including production, hauling & Placing
- Concrete Curbing C-25 Concrete as shown on the detail no 2 to be used at the edge of the median & Side walkway. Cost including production, hauling & Placing

Concrete lining for open drains

- Cast in situ Concrete lining of C-20 Concrete for Rectangular Open drains
- 5cm thick Cement Screed surface finish to cast in situ concrete

Platching, Stone Work, and Erosion protection

- 40cm thick Cement- Mortared Stone Walls(for ditch)
- 40x40x6cmcement tile for Side walk Pavement
- 4cm thick Sand Used for bedding under tile
- 15cm thick Red ash to be used bedding under sand for tile

Stone masonry walls

- Cement-mortared stone walls(for pipe end wall)

- Cement-mortared stone walls(for retaining wall)

Preparation of road bed and Protection of Earth works

- Compaction to 93% of modified AASHTO density
- Cut and Borrow to Fill Including Free-haul up to 1.5 Km
- Cut to spoil ,Common excavation
- Cut to spoil, rock excavation

Sub-base and Road base course

- 95% of Modified AASHTO density 250mm Compacted layer thickness
- Non-Cemented material 250mm Compacted layer thickness
- 98% of Modified AASHTO density 200mm Compacted layer thickness

Ancillary Works

- Erect and construct 14 Signboard and Sign faces with painted background, Symbols, lettering and borders in engineering grade retro-reflective material with 2mm thick aluminum the Area not exceeding 2 sq m
- Office Building and laboratory Building Complete as specified including furniture

4. National policies and regulatory framework

Similar to other developmental projects; the proposed gravel road construction project that passes through kebele 01 and 02 Project is influenced by several policies and programs aimed at development and environmental protection. Therefore; policies, legislations and institutional frameworks most relevant to development projects in general and to the proposed project in particular are presented and assessed for relevant.

4.1 Policy framework

4.1.1 Constitution of the Federal Democratic Republic of Ethiopia

The constitution of the Federal Democratic Republic of Ethiopia provides the overriding principles for all legislative frame-works in the country. The concept of sustainable development

and the environmental rights of the people are enshrined in the constitution by the following articles that stipulate the rights of peoples in country.

5.1.2. National and Regional Conservation Strategy

The initiation of the project on Conservation Strategy of Ethiopia (CSE) in1989 was the first comprehensive undertaking that laid down the basis for conservation policies and strategies in Ethiopia. The purpose of the CSE Project was the assessment of the status and trends in the use and management of the resource base of Ethiopia, the foundation of a policy and a strategy framework and the development of a Federal Action Plan and Investment Program including legislative measures and operational arrangements for implementation. The formulation process has been countrywide, multi-sectoral and participatory. The CSE takes a holistic view of the natural, human-made and cultural resources and their use and abuse. It seeks to integrate existing and future Federal and Regional State Government planning in all sectors that rests upon the natural and human-made environments.

4.1.3. Environmental Policy of Ethiopia

The Environmental Policy of Ethiopia (EPE) was issued in April 1997. The overall policy goal is to improve and enhance the health and quality of life of all Ethiopians, to promote sustainable social and economic development through sound management and use of natural, human and cultural resources and their 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 organizations at all levels in environmental management activities, and to raise public awareness and promote understanding of the essential linkage between environment and development. In addition to its guiding principles, the policy provides sectoral and cross-sectoral environmental policies.

Environmental Impact Assessment (EIA) policies are included in the cross-sectoral environmental policies. The EIA policies emphasize the early recognition of environmental issues in project planning, public participation, mitigation and environmental management, and capacity building at all levels of administration.

4.1.4 Sectoral Environmental Policies

The detailed sectoral environmental policies and strategy together with the related law and regulation are currently in various stages of preparation. One of the policies is the wildlife policy developed by the Ministry of Agriculture whose prime objective are the preservation, development and sustainable utilization of Ethiopia's wildlife resources for social and economic development and for the integrity of the biosphere. This is at present in draft form and covers a wide range of policies and strategies relating amongst others, to wildlife conservation and protected areas. A forestry management policy is also under preparation by the Ministry of Agriculture, to address the problems posed by continued deforestation arising from the use of wood in construction and as domestic fuel. Water Resources Policy has been formulated by the Ministry of Water Resources and Biodiversity Policy by the Ministry of Agriculture.

4.1.5 National Health Policy

The health policy and strategy of the government is based on the belief that health policy cannot be considered in isolation from policies addressing population dynamics, food availability, acceptable living conditions and other requisite essentials for health improvement and shall therefore develop effective inter-sectoral connection for a comprehensive betterment of life. Article 2 of the General Policy states the 'development of the preventive and promotive components of health care' as one of the basic policy component. The promotion of occupational health and safety (Article 2.2.2) and the development of environmental health (Article 2.2.3) are identified as priority policy areas for the health sector.

Article 3.4 of the policy states that inter-sectoral collaboration shall be emphasized in developing safe disposal of human, household, agricultural, and industrial wastes and encouragement of recycling'. Article 5.2 states that the promotional and preventive activities shall address 'prevention of environmental pollution with hazardous chemical wastes'.

4.1.6. Ethiopian Roads Development (Policy Framework)

Resettlement and rehabilitation are recognized civic rights in the Ethiopian legislation. Article 44 No.2 of the Constitution of the Federal Democratic Republic of Ethiopia has a clause stating that:

"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."

This is the basis for the compensation procedures established by the ERA has and likewise, the legal framework for the present resettlement and rehabilitation policy framework.

Furthermore, by signing the credit agreements for the RSDPSP (credit 3032) and the RRP (credit 2438) with IDA, The Federal Democratic Republic of Ethiopia committed itself to abide the involuntary resettlement policy of the World Bank and both parties do agree on the fact that development projects should not be realized at the expense of the people affected by the projects. Thus, the legal framework of the RSDPSP are the Ethiopian constitution as transcended into the ERA procedures and the World Bank Operational Directive (OD) 4.12 on involuntary resettlement and its operational policy as spelled out in *Involuntary Resettlement Sourcebook: Planning and Implementation in Development Projects.*

Apart from the broad policy frameworks at national level, the main reference behind the preparation of a Resettlement Action Plan (RAP) is ERA's guiding principles as stipulated in its Resettlement and Rehabilitation Policy Framework. The following statement is quoted from the ERA's Resettlement and Rehabilitation Framework to show when and where a RAP is required or not.

At project identification, social screening/social impact assessment (SIA) of the subprojects will be conducted with the aim to determine whether or not a subproject requires detailed resettlement action plans. The principles of compensation/rehabilitation will be triggered wherever there will be a land requirement and adverse social impacts. Should, however, the SIA findings reveal that more than 200 persons are affected by a subproject, a resettlement action plan will have to be prepared (ERA 2002). In the same issue the World Bank OP/BP 4.12, as referred in ERA's Policy Framework, states:

As per the above framework, a threshold has been set whether or not to proceed with a detail RAP once a social screening is done on any proposed road development project. Road development that entails the relocation of more than 200 individuals or about 40 households is expected to draw up a resettlement action plan. Those road projects that would displace less than 200 individuals are not expected to come up with a detailed/full scale RAP and instead

appropriate compensation measures for lost assets, arrangements for logistical support and a relocation grant have to be made.

4.2 Legislative Framework

4.2.1 Establishment of Environmental Protection Organs (Proclamation No. 295/2002)

This law clarifies the institutional mandate and responsibilities of the Environmental Protection Authority (EPA) and aims to integrate environmental considerations into the policies and decision-making of sectoral agencies through such means as the establishment of environmental units in these agencies at the federal level and the creation of independent environmental agencies at the regional level.

This law also re-established the Environmental Protection Council, a cross-sectoral co-coordinating body that advises the federal EPA and supervises its activities. The mandate of the Council includes: (i) reviewing environmental policies, strategies and laws proposed by the EPA and issuing recommendations to government; (ii) providing appropriate advice on the implementation of the Environmental Protection Policy of Ethiopia; and (iii) reviewing and approving directives, guidelines, and environmental standards prepared by the EPA.

4.2.2 Environmental Impact Assessment (Proclamation No. 299/2002)

The Federal Government has issued a Proclamation on Environmental Impact Assessment (Proclamation No. 299/2002) and the primary aim of this Proclamation is to make EIA mandatory for specified categories of activities undertaken either by the public or private sectors, and possibly, the extension of EIA to policies, plans and programs in addition to projects.

The provisions of the proclamation include:

- Projects will be subject to EIA in the plan stage and execution is subject to an environmental clearance from the EPA or Regional Government Environmental Agency, as applies;
- EPA or the Regional Agency, depending on the magnitude of expected impacts, may waive the requirement of an EIA;

- All other licensing agencies shall, prior to issuing of a license, ensure that either EPA or the regional Environmental Agency has authorized implementation of project; and
- A licensing agency shall either suspend or cancel a license that has already been issued, in the case that EPA or the Regional environmental agency suspends or cancels the environmental authorization.
- Approval of an Environmental Impact Study Report (EISR) or the granting of authorization by the EPA or the Ethiopian Road Authority (ERA) does not exonerate the proponent from liability for damage.

The proclamation is 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. It contains provisions for Control of Pollution, Management of Municipal Waste, and Management of Hazardous Waste, Chemical and Radioactive Substance. It also encompasses provisions for the formulation of practicable Environmental Standards by the EPA, in consultation with competent agencies. Furthermore, it empowers the EPA or ERA to assign Environmental Inspectors who have powers and duties to control pollution.

4.2.3 Environmental Pollution Control (Proclamation No. 300/2002)

The environmental Pollution Control Proclamation (Proc. no. 300/2002) is promulgated with a view to eliminate or when not possible to mitigate pollution as an undesirable consequence of social and economic development activities. This proclamation contains general provisions on pollution control, environmental standards, powers and duties of environmental inspectors, rights to appeal and offences and penalties. The pollution control component includes provisions on management of hazardous wastes, chemicals and radioactive substances, management of municipal wastes and protection or the ozone layer. The proclamation has provisions on forfeiture, cancellation and restoration.

4.2.4 National Rural Land Administration and Use (Proclamation No. 456/2005)

Land is the property of the state/public and does not require compensation. The land proclamations 31/1975 of rural land and 47/1975 of urban land state that the Government holds the ownership of land; it is the property of the Ethiopian People, Article 7(72) of proclamation

4/1975 states that the Government shall pay fair compensation for property found on the land, but the amount of compensation shall not take any value of the land into account, because land is owned by state.

Proclamation No.55/1993, article 5.2, states that ERA shall use, free of charge; land and such other resources and quarry substances for the purpose of construction of highways, in construction of camp, storage of equipment and other required services, provided, however, that it shall pay compensation in accordance with the law for properties on the land it uses.

The Right-of-Way (ROW) is the land allocated and preserved by the law for the public use in road construction, rehabilitation and maintenance work. For example in the Rural Road (RR50) standard 15m width on either side of the road centerline fall into the legal ROW.

4.2.5 EPA's Environmental Impact Assessment Guidelines (2002)

As part of the ongoing effort to develop environmental legislation and guidelines in Ethiopia, the EPA released its EIA guidelines document. The document provides a background to environmental impact assessment and environmental management in Ethiopia. The document aims as being a reference material to ensure effective environmental assessment and management practice in Ethiopia for all parties who are engaged in the process. The long-term objectives of the EIA 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
- Attainment of environmentally and socially sound and sustainable development

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

In addition, the EIA Guideline provides the categories, the relevant requirements for Ethiopian Road Authority (ERA) and lists project types under each category. In accordance with this Guideline, projects are categorized into three schedules:

Schedule-I: Projects, which may have adverse and significant environmental impacts and therefore require a full Environmental Impact Assessment.

Schedule-2: Projects whose type, scale or other relevant characteristics have potential to cause some significant environmental impacts but are not likely to warrant a full EIA study.

Schedule-3: Projects which would have no impact and do not require an EIA.

Accordingly, rural road programs fall into Schedule 1 and major rural road upgrading/ rehabilitation fall into Schedule 2. However, projects located in environmentally sensitive areas such as land prone to erosion; land prone to desertification; areas of historic or archaeological interest; important landscape; religiously important area, etc. should be treated as equivalent to Schedule 1 activities.

4.2.6 Ethiopian Road Authority's Environmental Impact Assessment Guideline

On the basis of the EPA's Environmental Impact Considerations for Transport Sector Projects (January 1998), ERA has issued Environmental Guidelines for the road subsectr to instruct different parties involved with road sector environmental activities. The main objective of the document is to provide specific guidelines on how to integrate environmental concerns associated with road works into planning, design and implementation. It is not a legal document, but rather an official guideline to serve the activities of the Ethiopian Roads Authority (ERA) and its relations with other organizations in environmental issues.

4.3. Institutional Framework

The following paragraphs discuss the institutional and administrative framework at the Federal and Regional level and organizations responsible for the preparation of environmental policy and technical guidelines.

4.3.1 Federal and Regional States

The Federal Democratic Republic of Ethiopia (FDRE) was formally established on 1995. The FDRE comprises of the Federal states with nine Regional State members. The roles of government at the different levels (Federal, Regional and Local) are defined by the Constitution (1995) and Proclamations No. 4 of 1995. The government structure takes power from the centre to Regions and Woredas. Under these proclamations, duties and responsibilities of Regional States include planning, directing and developing social and economic programs, as well as the administration, development and protection of natural resources of their respective regions.

4.3.2 Federal Environmental Protection Authority (EPA)

The Environmental Protection Authority (EPA) was established in August 1995, under Proclamation 9/1995, and is an autonomous government body reporting directly to the Prime Minister. It has a broad mandate covering environmental matters at Federal level. The Proclamation sets out the main responsibilities and broad organizational structure of the EPA.

The key functions of EPA are defined in Proclamation 9/1995 and may be summarized as follows:

- preparation of environmental protection policies and laws and to ensure that these are implemented
- preparation of directives and implementation of systems necessary for the evaluation of the impact of projects on the environment
- preparation of environmental protection standards and implementation of directives concerning soil, water and air
- the conduct of studies on desertification and the co-ordination of efforts to combat it
- preparation of recommendations regarding measures needed to protect the environment
- enhancement of environmental awareness programs
- implementation of international treaties concerning the environment to which Ethiopia is a signatory
- provision of advice and technical support to the regions on environmental matters

The Federal government of Ethiopia issued Environmental protection organs establishment proclamation (proclamation No. 295/2002). The objective of this Proclamation is to assign responsibilities to separate organizations for environmental development and management activities on one hand, and environmental protection, regulations and monitoring on the other hand in order to ensure sustainable use of environmental resources, thereby avoiding possible conflicts of interest and duplication of effort. 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 (based on the Ethiopian Environmental Policy and Conservation Strategy) be responsible for:

- Ensuring public participation in decision-making process.
- Coordinating the formulation, implementation, review and revision of regional conservation strategies, and
- Environmental monitoring, protection and regulation.

As indicated above, the new Proclamation on Institutional Arrangements for Environmental Protection, envisages a widening of the EPA's mandate. Most of the proposed additional powers and duties relate to co-ordination and monitoring aspects. Key elements include:

- to establish a system for EIA of projects, policies, strategies, laws and programs
- to enforce implementation of this EIA process (i.e. review EIA reports) and the recommendations which result from it for projects that are subject to Federal licensing, execution or supervision
- to determine environmental standards and ensure their compliance

- to enter any land, premises or any other places that falls under the Federal jurisdiction, inspect anything and take samples as deemed necessary with a view to ascertaining compliance with environmental protection requirements
- to ensure implementation of environmental protection laws

In view of the multi-sectoral nature of the EPE and the number of government agencies involved in various aspects of environmental management, overall co-ordination and policy review and direction is the responsibility of an Environmental Protection Council (EPC) within EPA, whose members represent the key agencies concerned with policy implementation and representatives from the civil society. With these powers, EPA has the mandate to involve itself on all projects that have a federal, inter-regional (involving more than one Region) and international scope.

4.3.3 The Ethiopian Roads Authority (ERA)

The Ethiopian Roads Authority (ERA) was established in 1951 through proclamation No.63/1963 with responsibilities for the construction, improvement and maintenance of the Country's road network. Proclamation No.80/1987 reestablished ERA. ERA's Environmental Management Branch (EMB) was established in January 1998 with major responsibility of setting and implementing ERA's environmental guidelines in support of the national level requirements. The EMB holds the capacity of advisory, co-ordination and supervision aspects that are pertinent to the road environmental impacts and implication assessment as well as co-ordination with the respective ERA district offices.

4.4 Summary of the World Bank's Safeguards Policies

The World Bank's environmental and social safeguard policies are a cornerstone of its support to sustainable development. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for bank and borrower staffs in the identification, preparation, and implementation of programs and projects. Operational Policy (OP) and bank Procedure (BP) 4.01- Environmental Assessment is one of the 10 environmental, social Safeguard Policies of the World Bank. Environmental Assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental impacts associated with Bank lending operations. In World Bank operations, the

purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted.

The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment. This policy is considered to be the umbrella policy for the Bank's environmental 'safeguard policies' which among others include: Natural Habitats (OP 4.04), Forests (OP 4.36), Pest Management (OP 4.09), Physical Cultural Resources (OP 4.11), and Safety of Dams (OP 4.37), Involuntary Resettlement Policy (4.12).

5. Description of Baseline Environment

The physical, biological and socio-economic environment is investigated to facilitate the evaluation of potential impacts in chapter 6. This description of the environmental setting is a record of conditions prior to implementation of the proposed project. It is primarily a benchmark against which to measure environmental changes and to assess impacts.

5.1. Bio-physical Environment

5.1.1. Location

The project is located in Amhara National Regional State (ANRS) of South Wollo zone, Dessie town. The proposed gravel road project consists of one road alignment namely Segno-Gebeya-Salayesh (01 and o2 Kebeles).The proposed gravel road has a total length of 2km stretching From Salaysh to Segnogebeya (Figure 4. Shows the location of proposed road project)

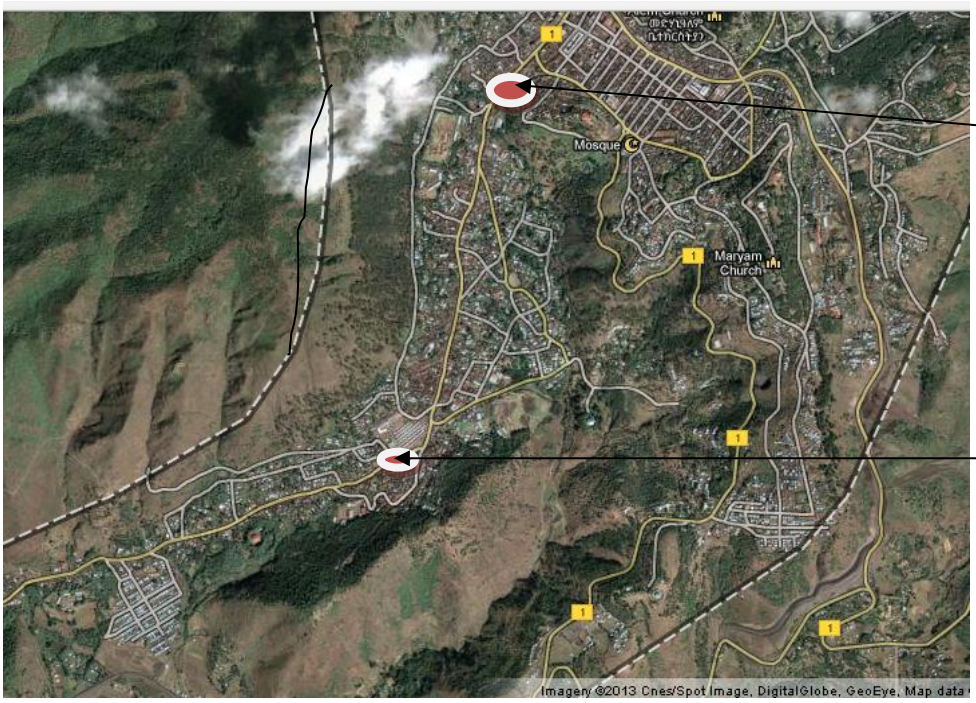

Figure 5. Location Map of the Dessie Gravel road Project

Figure 6. Location Map of the Dessie City

5.1.2. Topography

The project area of Dessie Town is characterized by significant variations in topography. As we prepared elevation map from 30m DEM, altitude variations, range from 1924 meter, in low lying river valley bottoms to about 3037 meter above sea level in the nearby Tossa mountain ridges. And the proposed road scheme is in range of 2369 to 2592meter above sea level, slopes ranging from 0.024 to 19 degree.

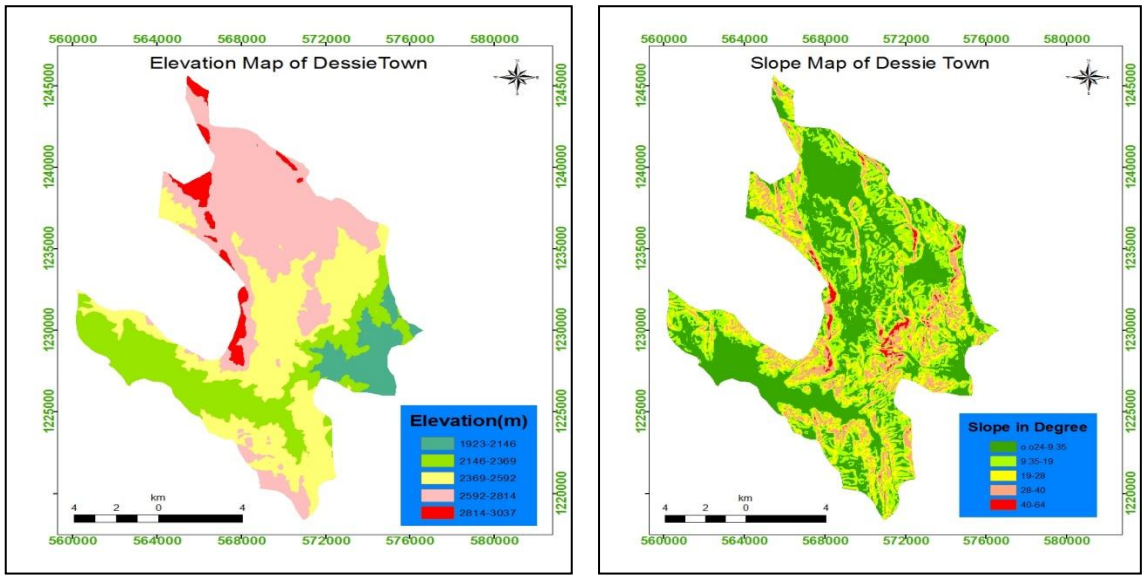

Figure 7. Elevation and slope Map of Dessie city

5.1.3. Climate

There is Dessie meteorological station in project area. At this station highest rain fall and average maximum and minimum temperature data were recorded. The maximum rains fall data are received in months of July or August, when the full effect of inter-tropical convergence zone (ITCT) is observed. The details of highest rainfall, average maximum and minimum temperature data for Dessie station are shown in the table 3.1, 3.2&3.3 respectively.

Rainfall

Like other parts of the country, Dessie is also experiencing four seasons. These are:

- Keremt (mainly rainy season)
- Bega (dry season)

- Belg (small rains)
- Meker (a spell between the main rainy season and small rains)

The hydrologic analysis result that rainfall is the major factor controlling the water cycle of the area of orographic type, which is formed from condensation of the vapors driven by winds against highly elevated parts of the area.

The rainfall is weakly bi-modal with a small rainy season during the months of April and May while along rainy season is experienced during summer comprising the months of July, August and September.

The rainfall recorded at Dessie metrological station for the past 18 years (1994-2011) indicated that the mean annual rainfall is about 866.25mm. The proportion of the precipitation in the months of July and August is about 55% of the annual total. The mean monthly rainfall that characterize the area for 18 years range from 10.00 mm in December to 228.6 in August.

Table 3**: Dessie Station Highest Rainfall**

Year	Jan.	Feb.	Mar.	A.	May.	Jun.	Jul.	A.	Sep.	O	N.	D
1994	0	0	18.7	51	19.8	14.4	40.9	53.4	37.3	22.6	31	0
1995	0	27.3	24.5	58.8	26.8	40.3	45.2	94	14.5	48	0	23.4
1996	12.8	15	24.3	25.1	24.9	11.9	39.6	63.5	16.2	2.2	38.8	3.5
1997	16.2	0	40.8	18.7	8.8	21	37.5	52.8	12.4	36.5	55.5	0
1998	23.5	35.6	14	21.1	31.6	0	78.1	78.1	21	32.2	0	0
1999	30	0	24.1	0	7.6	8.6	68.3	44.5	50.5	23	0	9.1
2000	0	0	3.7	19.6	15.7	21.9	36.7	53.7	49.6	49.5	23.7	17.8
2001	1.3	0	44	20	32.5	23.4	39.1	46.7	55.2	12.7	0	5
2002	7.5	11.2	23.8	34.1	12.1	Xx	76.2	71	33.2	10.5	Xx	Xx
2003	21.5	19.1	20.3	65.9	9.3	17.4	30	55.4	36.4	2.3	8.7	43.2
2004	0	3.4	3.5	21.3	5.1	18.2	46	40	15	37.8	48.4	3.6
2005	10.4	18.9	30.7	55.9	35.5	16.3	55.9	61.5	12.6	13.4	6	0
2006	2.3	1	26.7	41	38.6	20.7	83.6	74.8	52.5	38.8	0	7.9
2007	15.8	38.8	21.8	22.6	21.7	12.4	36.7	34.7	27.1	14.2	8	0
2008	7.3	0.6	0	6.2	26.1	14.1	31.2	46.5	30	33.1	24.2	Xx
2009	9	8.4	7.8	49	8.4	14.1	66.7	50.7	15	28	12.7	Xx
2010	0	26	26	33.6	27.2	20.7	71.4	46.5	8.2	27.7	5.8	4.5
2011	5.6	1	17.4	38.8	37.5	12.5	43	42	8.2			

Temperature

Two years (2010-2011) data is obtained from Dessie station for monthly mean temperature. The two years average value shows that the mean annual temperature of the city is 24.025 ^{0}C. The hottest month with the maximum temperature of 27 ^{0}c is May and June while the coldest month is November and December with the minimum mean temperature of 5 ^{0}c and 5.5^{0}c. Thus, the two years average value show variation which range from 5.5^{0}c and 5 ^{0}c (for November and December) to 27 ^{0}c and 25 ^{0}c (for May and June)

Table 4**: Dessie Station Average Maximum Temperature**

	J	F	M	A	M	Ju	J	A	S	O	N	D
Max	21.6	23.3	22.4	24.1	25	27	25.3	25.1	25	24	22.9	21.5
Mimi	7	7.3	8.9	9.4	9.6	9.8	10.2	10.3	8.8	6.2	5	5.5

5.1.4. Geology

5.1.4.1. Regional Geology

The regional geological setting of the stream basin is part of the geological history of the Afro Arabian geology; the regional geology of the project area can be summarized as follows:

The Precambrian basement complex does not outcrop in the project area. The Mesozoic sedimentary rocks are observed at some places in downstream. The bedrock in the upper and middle catchments is mainly Trap Series basalt. The Series is divided into two groups, namely, Ashangi and Shield Group, and the two groups are similar in litho logy.

The Ashangi Group comprises the older volcanic rocks which were formed by lava and debris ejected from fissure eruptions. It covers most of the project area and consists predominantly rhyolitic and ignimbrite with inter-bedded pyroclastic, trachyte. The eruptions took place at intervals and in some locations there was sufficient time between different episodes to allow inter-bedded soil or pale soil layers to form.

5.1.4.2 Local geology

As it is observed from the local geology of the project area include the surrounding volcanic ridges and mountain area that have same geological formations and have distinct geological

formation to the plain area; the Ashangi formation corresponds with the surrounding ridges and mountain whereas the quaternary volcanic and sediments with the plain area.

A) Volcanic rock

The volcanic ridges and mountain those encompass the project area/ the study area/ are dominated by the trepans series especially the Ashangi group volcanic. These Ashangi Group consists of predominantly highly weathered and jointed at the top rhyolitic/ignimbrite acidic rock which forms mountain and ridge both upstream and downstream of the project site and around the project site. This rock is the major construction material within the project and around the project and it occur widely and predominantly in the project site. It has low strength compared to basaltic rock origin and it has variegated color which is yellow, white and pink colors. The top part of this rock is highly weathered and covered by dark brown silt clay soil which is developed from underlying rock in the most part of the study area. This rhyolitic/ignimbrite rock exposed widely at the top of mountain and ridge and in some amount it exposed along the river bed

B) Quaternary Sediments

The quaternary sediments are all unconsolidated deposits that filled the river water way and come from surrounding area and mountain. It also located in some amount along the river banks (older deposit).It has shallow depth on river bed. The erosion/transportation from the highland and deposition of sediments in the river bed is a continuous process to the present as witnessed in the field.

This sediment deposits are composed of gravel and sand. While the deposition of the larger materials like boulders, cobbles, and pebbles is restricted to narrow transportation and the fine materials reach furthest extremes of the area following flood plains of streams and much in Project River.

5.1.4.3. Geological Structure

The geological structure of the area is controlled by tectonic events that led to the development of different topographic feature. These events are characterized by different volcanic eruption, which gave rise to different volcanic mountain and fault zone. This fault zone (weak zone) is responsible for development river water way (channel) and it is narrow and elongated and run in N-S direction.

5.1.5. Soil

The soil types reflect the combined effects of soil formation factors: geology (primarily fine grained, weathering to produce clays), climate (moderate to high rainfall), topography (with distinct variation between sites on slopes red soils) and time. Climate, topography and human settlement are the main factors that have influenced both the land use and the natural vegetation cover type. The nature of soils and the landscape combined with factors such as a long history of settlement, prevailing agricultural practices, and increasing population pressure which forces people to cultivate even steeper slopes all exacerbate land degradation.

The dominate soil type of the specific project site (the road alignments run) is lithic Leptosols. While the soil types of Dessie town administration are Eutric Vertisols and Lithic Leptosols. As it can be seen from the soil map, the dominant soil type is Lithic Leptosols which accounts 16831.73 ha (97.92%) followed by Eutric Vertisols 355.81ha (2.08%).

Leptosols: Leptosols accommodates very shallow soils over hard rock or highly calcareous material but also found on deeper soils that are extremely gravelly and/or stony. Leptosols are azonal soils with an incomplete solum and/or without clearly expressed morphological features. They are particularly common in mountain regions. Leptosols correlate with the 'Lithosols' taxa of many international classification systems (USA, FAO) and with 'lithic' subgroups of other soils groupings. Leptosols include a wide variety of soils with greatly differing chemical and physical properties. By and large, Leptosols are free-draining soils with the exception of certain Hyperskeletic Leptosols that may have groundwater at shallow depth.

Vertisols: Vertisols are mineral soils that are more than 50 centimeters thick; contain 30 percent or more clay in all horizons and have cracks at least 1 centimeter wide to a depth of 50 centimeters, unless irrigated at some time, in most years. The typical vegetation in natural areas is grass or herbaceous annuals, although some Verticals support drought-tolerant woody plants. The high content of swelling clay and movement of soil by expansion and contraction retard the development of B horizons

5.1.6. Hydrogeology

As indicated in the previous sections the existing geology and geomorphology of the project area are characterized by jointed bed rock, and gentle to moderate slope landform respectively. These conditions are suitable for the infiltration, percolation and consequent storage as groundwater of

significant amount of the precipitation in these weak zones. Close observation and estimation of the discharge (base flow) of the stream at the project area and surrounding areas both up- and down-streams indicates that the recharge of the groundwater to the stream flow is significant. It increases to downstream direction. This observation can also be confirmed by the existence of springs, which are found at the periphery of the stream floodplain/bank foot. The area's groundwater is stored within weathered section and jointed part of the bedrock, which are overlain by fine- grained soils at many places. The main recharge of ground water is subsurface recharge (movement of ground water from neighboring area by percolation).

5.1.7. Flora and Fauna

5.1.7.1. Flora

There is no protected natural forest or vegetation in the road alignment and surrounding area. The vegetation type in the road project area includes bush/shrub and scattered trees. Eucalyptus is mainly found along the rivers and individual household homestead area which is planted to satisfy the family wood and energy requirements. No significant impact on this vegetation anticipated during the road project construction since the road project follows the existing pavement.

The present poor vegetation cover in the road alignment and surrounding area shall be improved. Plantation of trees in the road environment could provide benefit such as shade, soil conservation and prevention of gullies, scenery, and protection from dust and wind.

5.1.7.2 .Fauna

The proposed road project doesn’t cross any protect natural habitat that can be used for feeding and breeding of important fauna. The proposed road runs through urban area, the route corridor has no wildlife reserves or habitats that can provide protection for wild animals.

5.2. Socio-Economic Environment

5.2.1. Demographic Features and Settlement Patterns

The total population of Dessie town is estimated at about 174,705.The sex composition shows that the male population constitutes 84,224(48.21) and the female counterpart is 90,481(51.79).

Table 5**. Population Size of Dessie Town by Sex Distribution, 2011**

Male		**Female**		**Total**	
Number	%	Number	%	Number	%
84,224	48.21	90,481	51.79	174,705	100

Source: CSA, Population Size by Sex, Area, and Density by Region, Zone and Woreda, 2011

The settlement pattern of communities around the project area has created significant problem in the provision of infrastructure and other services. This is mainly due to the unfavorable topography of the place which is dominated by mountainous and gorge landscape. This combined with landslide problem that is recurring along 'Tossa' mountain ridges has forced some residents to think resettlement to other better places.

5.2.2. Health service

The health problem and disease causes among the city population are mainly communicable diseases water and/or air born diseases. Major factor contributing to these diseases is the poor waste management and pollution impacts of both the air and water resources of the area. Health facilities are reasonably increasing in the area with improved coverage. Health services are provided both by government, NGOs and private institutions. Table below gives list of health institutions available in the city.

No	Type of institution	Government	Private	Total
1	Hospital	2	3	5
2	Health center	7	0	7
3	Clinic	0	15	15
4	Pharmacy		10	10
5	Rural drug vendor		25	25

Table 6. Health Institutions in 2012 G.C

5.2.3. Education:

Dessie city is one of the cities in Ethiopia which host quit large number of students attending their higher education studies. Dessie University, government and private College, technical training center, the higher education institutions found in Dessie. The University of Dessie is established and open on 1996 Ethiopian calendar alone receives ten thousand students in evry

year. The University of Dessie is located at the northern periphery of city. The city also has 9 high schools, 37 primary schools, and 28 kindergartens. The number of students of Dessie for the year 2005 is 40,526. Among these 19,804 are female and 20,722 are male. See below the table

No.	Typeof school	Government	Private	Total	Number of students		
					Male	Female	Total
1	University	1	1	2			
2	College	2	3	5			
3	Technical training center	1	0	1			
4	High school	4	4	8	5737	5181	1018
5	Elementary school	26	11	37	13191	13013	26205
6	Kindergarten	7	21	28	1793	1610	3403

Table 7.Educational Institutions in 2012 G.C

5.2.4. Land use/cover

Land use describes how a patch of land is used (e.g. for agriculture, settlement, forest, whereas the land cover describes the materials (such as vegetations, soils, rocks, water bodies or buildings that are present on the surface.

The land cover in Dessie town administration is categorized into 8 major classes. The major classes are the built up area, cultivated land, exposed surface, forestland, grassland, marsh land, Shrub and bush land, and water body. From the 8 major lands, cultivated land (54.85%) takes the lion's share followed by Shrub and bush land (19.50).

As it can be seen from figure.8 (the proposed road alignment superimposed with the land use/cover, the proposed road alignment passes through built up(urban) area. The proposed road does not cross any protect natural forest, grassland and cultivated land. The area distribution in the sub-basin by major land cover is presented in the table below (see the details from the table below).

Table 8 Land Use/cover of the Dessie Town Administration

No	LULC Type	Area (ha)	Area (%)
1	Built-up Area	1594.76	9.27
2	cultivated land	9429.08	54.85
3	exposed surface	65.62	0.38
4	Forestland	625.14	3.65
5	Grassland	2067.97	12.03
6	marsh land	31.11	0.18
7	Shrub and bush land	3352.98	19.50
8	water body	20.88	0.12
	Total	17187.54	100%

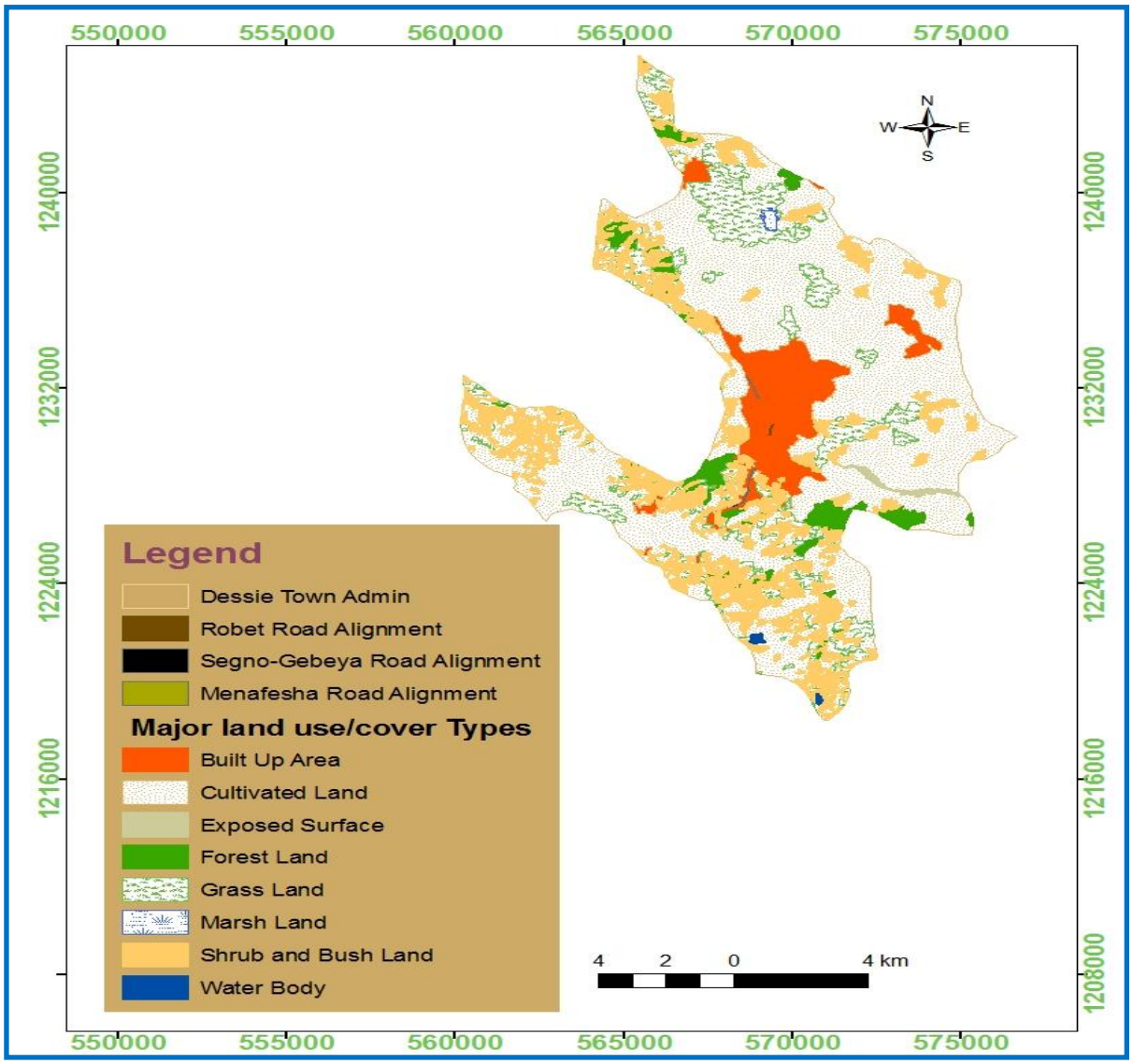

Figure 8.**Dessie Town Administration Major Land use/cover map, 2012**

5.2.5. The existing Road Network, Utilities and Transport Study

The existing road network comprises of about 45.8km long asphalt road, 105.3 km Gravel road and 47.7km earthen roads and Cobblestone 31.52km road making a total of about 230.32 km. The road density in the city is 0.00131 km per person. Some of the existing road network like

Salaysh-Segno Gebya road is in a very poor condition. Large part of it deteriorated causing a lot of problems to traffic and has substantially increased the maintenance cost of vehicles, has heavily increased property loss and disturbs the day-to-day activities of the dwellers. The modes of transport in the city include horse-drawn carts and taxis. More than 200 carts, around 200 taxis and Tagro bajaj 80 are rendering the transport service to the city. The city also gives service for passengers travelling to Addis Ababa, Mekelle, Woldeya, Bahirdar, Lalebela, Western woreda of South wollo zone , Asayta city and vice versa.

The table below shows the length of asphalt, gravel and compacted earth surfaced roads in Dessie city studied by the Dessie city infrastructure department.

Asset Category	**years**	
Road Sub-Category	**2011/2012**	**2012/2013**
Asphalt Roads	43.8km	45.8km
Gravel Roads	100km	105.3km
Earth Roads	59km	47.7km
Cobble Stone road	25.52km	31.52km
Pedestrian Side walkways	21600Km	21610Km
Bridges	9(No.)	13(No.)
Culverts	7(No.)	15(No.)
Drainage Cover	63(No.)	70(No.)
Drainage Sub-Category		
Masonry Drain with slabs	7.82 km	10.82 km
Open masonry channel	25.37km	37.37km
Earth drain	126 km	129 km
Stone lined or paved with out mortar joints	12.54 km	15.54 km
Concrete-lined Drain	0	0.511 km
Pipe Drains (excluding culverts)	38(No.)	116(No.)

Table 9 :-show the asset registered for Dessie city in 2012/2013

6. Project Alternatives analysis

From a purely natural environmental point of view, the "without project" scenario is preferable to project implementation, since it would avoid creation of any of the activities related the project construction and operations and related adverse environmental consequences. However, the potential social and economic benefits would be foregone; this might be true for other project. The above is not true for the case of the Salaysh-Segno Gebya gravel road. As discussed on section of project description one of the upmost environmental and social issues in the city of Dessie is attributed to the lack of proper road services. Because no action" without the project means letting the environmental and social issues of the existing earth road to aggravate.

Hence the "without project" alternative is inappropriate not only from social and economic viewpoint, but also more strongly from the environmental stand points. Since implementation of the project will improve the present worst social and environmental condition of the city and associated safety and health issues.

Salaysh-SegnoGebya gravel road project was proposed by Dessie Municipality with the purpose of adjoining kebele 01 and 02 to the main asphalt road and market places as per the master plan of the town. The construction of the gravel road does not have other alternative basically for two major reasons. These are:

a) The proposed road route is based on the master plan of the town and thus, changing the route could induce the change of the master plan of the town that actually was very difficult and lengthy process,

b) During master plan preparation, the gravel road route was proposed through thorough analysis due to the fact that it connects various feeder roads and also connects the aforementioned two kebeles to the center of the town and main market places.

Therefore, there is no option to change the proposed road route as any alternative action induces change to the master plan of the town.

7. Environmental Impacts Identifications, Prediction and Analysis

This part of the report addresses potential impacts associated with the proposed gravel road construction project and analysis of the related impacts.

The major positive impacts of the proposed project are mainly those of solving the lack of access roads, poor transportation services and establishment of proper drainage system, while adverse impacts are mainly related to the involuntary resettlement of about 221 householders.

The project environmental impacts have been those identified as specific to the site such as land clearance, removal of soil and vegetation, land escape alteration particularly at quarry site, silt deposition and pollution.

7.1. The positive Impacts

The establishment of this project will have a number of positive impacts to local people and the region. Some of the major positive impacts include, obtain access road and transportation services so that the community can easily and comfortably reach to market and socially services, technology transfer, generating revenues and creation of employment opportunities during the construction phase of the project. These potential positive impacts, their origin and characteristics and proposed measures to enhance those benefits are presented below.

7.1.1 Employment Opportunity

The direct and indirect employment opportunity to be created for citizens is economic benefits of the project. Basically the project will create employment opportunities for women, young and other needy citizen. It requires low skill level which can be well managed through appropriate training.

The feasibility study of the project indicates that the road construction will create direct job opportunity for more than 300 citizens of labour and technical experts during the construction phase within which most of them will be local residents.

7.1.2. Social Benefits

The employment opportunity to be created by the project will have social benefit beside the expected economic benefit. The employment income from the project will have a substantial role

for social livelihood improvement in the project area. This local income generation related social benefit will have long term as well as cumulative benefits: As a result of creation of jobs, the project will have a meaningful impact on poverty reduction as the project area is inhabited by largely unemployed citizens, the employment priorities would focus on households subsisting below the poverty line.

7.1.3. Urban Development

The implementation of the project is expected to contribute to the development of process that would provide social services to the local community. The construction of road automatically calls for better transport services. The availability of access road and better transport services will also attracts various social services such as school, health, water supply, market and banking, contributing to expansion and development of the city.

7.2. Potential Negative Impacts

7.2.1. Slope Destabilization Impact

The rehabilitation area of the road networks is so sloppy that may trigger slope instability as a result of considerable cutting and grabbing by heavy machineries particularly if excavation is done during rainy season.

7.2.2. Impacts on soil erosion

The project will involve huge excavation and removal of the excavated soil temporarily, quarry sites by this aggravates soil erosion, due to its effects of being impervious stratum, diverting and concentrating runoff water. Soil erosion can be more serious along the route corridors where considerable cut and fill works are involved, soil structures are naturally weak, steep slope, gullies and rills are formed, no vegetation cover and susceptible to erosion, the drainage structure, shall consider the volume of flood and keep the natural way, in addition downstream sites should be considered

7.2.3. Impact on Water Resources

The project will modify the natural flow of surface water and drainage patterns along the road alignments by concentrating flows. Earth works for road construction and foundation of drainage

structures, and excavation at quarries and borrow pits can result in an increased soil erosion, temporarily cut-off the normal natural flow and ultimately siltation in the streams and decline in water quality. In most places, it is common to see substantially high amounts of silts collected at side ditches that will eventually discharged into water courses. Furthermore, accidental spillage of fuels, oils, greases and other pollutants during construction phase can have adverse effects on water qualities of the streams that would eventually receive those effluents charged with pollutants. Abstraction of water from rivers for road construction and perhaps for application of water to suppress dust and for road construction may affect the daily demand of the downstream users (demand for animal, ecological and irrigation).

7.2.4. Impacts on Air Quality, Noise and Vibration

During construction phase there will be a localized air and noise pollution particularly in the vicinity of roads, borrow pits and quarry sites as a result of earthworks, quarrying activities and vehicle movements on dusty roads as well as emission of partially oxidized fuels. Noise and vibration from operation of equipments and by passing vehicles may bring about all nuisances to local residents.

Excessive noise levels can also occur from the vehicular movement during operational phase, there will be a significant increase in vehicular movement, generally, and it is recommended that noise levels in residential areas should not exceed 55dBA.

7.2.5. Impacts on Quarry and Borrow Pits

The source of construction material for the proposed road project is from the nearby Plato, the process of extraction of selected material will also result in loss of bush and grass. The project will have moderate impact where operation of quarry sites and borrow pits are practiced. However such activity should in all cases minimize tree cutting.

7.2.6. Impacts on Socio-Economic Environment

Attempts have been made to widen the road that would bring minimal loss of properties and displace residents. After trying all possibilities, the properties and fixed assets that would be affected by the proposed road are included the residential and commercial houses, market place (Segno Gebeya), fences and plantation trees.

Loss of Housing Units

The housing units that would be affected by the proposed road are either residential houses or commercial houses (shops, flour mills etc) made of wood and plastered with mud in most cases. The total number of houses affected by the project is 221 (along Salayesh -Segno-Gebeya Road alignment) details about compensation cost, see RAP document.

Loss of Fences

Different types of fences such as wood, wood and iron wire, masonry and hallow block, masonry and corrugated iron sheet, and masonry only will be affected and compensation fee is prepared as per the guideline.

Loss of Plantation Trees

There is no protected natural forest or vegetation in the road alignment and surrounding area because the proposed road passes through the town. Though no significant impact on this vegetation anticipated during the road project construction since the road project is follows the existing road and settlement, compensation fee is paid for those who owns.

7.2.7. Impact on Public Utilities

The construction and operation of the proposed development project is predicted to have potential impact on public infrastructures found in the area of its influence.. The public infrastructures that may be affected by the construction activities of the proposed development project are going to be the utility lines such as telephone, power and water supply lines. The shops and residential houses present in the existing market are connected to utility services. Thus there is a possibility that water supply distribution lines buried underground as well as power and telephone distribution lines could be damaged during project construction activities. However proper measures can be taken beforehand to minimize these impacts.

According to the inventory 222 telephone poles, about 289 Electric poles and 6 transformers will be affected by the proposed road project.

7.2.8..Impact on Traffic Accidents and Safety Risks

When the new gravel road commences operation, it is anticipated that it will bring a new traffic volume that was not there before. Apparently, it will become a centre of movement for the city minibuses, taxis and Bajaj's which will make one or frequent trips on a daily basis. Thus the flow of traffic in the area is another issue which needs further considerations.

The impact of the proposed development project on the traffic flow is generally to increase the traffic volume in the area. Clearly, there will be more vehicle movement and traffic activity along the Salaysh-SegnoGebya.

8. Impact mitigation measures

8.1. Mitigation Measure Impact on Slope Destabilization

The rehabilitation area of the road networks is so sloppy that may trigger slope instability as a result of considerable cutting and grabbing by heavy machineries particularly if excavation is done during rainy season

Possible mitigation measures for slope destabilization:

- Careful sitting and selection of the road alignments and quarry sites
- Both vertical and horizontal alignments of the road should follow the natural relief as closely as possible
- Careful and proper execution of construction works
- Construct retaining walls, rock fills etc reshaping and other appropriate measures to protect slope destabilization.
- Immediate construction of appropriate drainage structure
- Design the road as two way in such a way that the road will be separated by masonry wall and hill side part of the road is elevated so that, the residents will get ease access to the road and stability will be obtained
- Dispose excavated materials only at approved depots to avoid spoils of materials on the downhill slopes, and replant the depots with appropriate tree species to improve the aesthetic values of those sites

8.2. Mitigation Measures impact on soil erosion

The soil in the project area, though not generally productive due to area is occupied by residences, there are areas of erosion along the road side that have resulted in part due to vegetation clearance and in part due to lack of proper drainage. Erosion can be felt in the form of a gully where vegetation has been removed and where drainage structures were not provided. These problems may have detrimental effect on the life of the road

- Erosion is also envisaged on embankments. Compact the soil on embankments in a well compacted manner and planting with grasses can minimize the erosion problems on embankments.
- Minimizing vegetation cutting during construction as well as provision of standard side and cross drains will minimize the problem.
- Cut of topsoil (excavated soils) should be used for replanting improvements of the embankments and to refill borrow pits.
- Adopt regulation (in consultation with the local communities and their leaders) that prohibit livestock grazing on road shoulders, embankments, and right-of-way, as necessary,
- Public education on soil conservation, and road influences on erosion and sedimentation;
- Use of local labour in preventative and first-response maintenance to erosion problems developing on the road.

8.3. Mitigation measures Impact on Water Resources

Movement of vehicle and machinery can compact the shallow aquifers leading to the modification of the water table and fragmentation. Deep cutting will also cause modification. The possible preventive and mitigation measures to protect water resources deterioration and conflicting demands include:

- Design and execute adequate and proper drainage structures to reduce erosion or sedimentation in drainage ways affected by road construction.
- Avoid the risk of pollution to soil, surface and ground water sources through the reduction of accidental spillage of fuels, oils, greases and other pollutants
- Whenever there is conflicting demands on water resources between the local people and the need for road construction, always give priorities to the local people
- Implement proper disposal of solid and liquid wastes generated by road construction activities.

8.4. Mitigation measure impact Air Quality, Noise and Vibration

During the road construction period, haulage of construction material increase dust, noise and vibration. Since the road passes through settlements, raised dust and noise can cause considerable nuisance, and can result in increased incidence of respiratory related diseases.

Mitigation measure to minimize impacts on noise and vibration:

- Reduce noise at the source by monitor and maintenance on noisy machines to minimize its effects on people living around the project;
- Noise and vibration arise from crushing process should be minimized through adequately designing of the foundation for the facility;
- use mechanical hammering which reduces the noise level;
- Reduce dust by watering the road to suppress dust
- Plant 2m tree buffer strips between road and surrounding habitation

8.5. Mitigation Measures for Soil Erosion at Quarry Sites

During construction phase, stone and sand are digged out from the quarry sites. Such activities may affect the site due to creation of various pits or even big ponds, affecting the natural land escape of the area. In addition to this, noise nuisance and dust problems will also be induced due to increased traffic that carries the materials from the quarry sites.

The project will have moderate impact where operation of quarry sites and borrow pits are practiced. The possible mitigation is,

- Borrow areas or quarry sites should be excavated and fill areas filled in such a way as to facilitate rehabilitation and reinstatement.
- After completion of the works, all sites should be rehabilitated and restored.
- Large borrow areas should be replanted or transformed into ponds (in consultation with the competent local authorities).
- Where possible, trees along borrow areas or quarry sites edges should be protected.
- Random movement of heavy machinery at excavation sites should be prevented.
- Cut of topsoil should be used for replanting improvements of the embankments and to refill borrow pits.

8.6. Mitigating measures Impacts on Socio-Economic Environment

The project impact on property which is higher significant due to the presence of settlements. The recommended mitigation measures for impact under consideration include:

- Before clearance of services and property the site for relocation should be designated and alternative service for water, electricity and the like should be provided. Such sites should be away from areas for water harvesting and from ground water sites.
- The Affected groups should be aware before any property or service is damaged and they should be consulted for options.
- Payment of full and fair cash compensation, which leaves those, affected by relocation at least no worse off than they were previously.
- Minimize the area of ground clearance i.e. land clearing for road construction should be restricted to what is absolutely necessary for the road construction;
- Replanting right species of trees on the road side that could provide benefit such as shade, soil conservation and prevention of gullies, scenery, and protection from dust, noise and wind etc.

8.7. Mitigation measure Impact on Public Utilities

The only public utilities that may be affected by the construction activities of the proposed development project are going to be the utility lines such as power and water supply lines. The ULGDP project office will ensure that necessary arrangements are done with the Dessie branch office of EEPCo and the Dessie water supply and sanitation authority to safely relocate their network lines found in the part of the project site which is not yet cleared for construction of the Gravel road. The planned relocation of the utility lines will prevent unintended interruption of water supply and power cut-off in the area caused by project construction activities. The ULGDP project office will also ensure that the contractor is advised to avoid any unnecessary damage to existing public infrastructures in the area during the entire construction phase

8.8. Mitigation Measures Impact on Traffic Accidents and Safety Risks

Traffic during construction can lead to accident in construction areas, detours, access roads, material sites and in near-by towns and villages if proper mitigation and monitoring is not in

place. Areas such as sites where there are schools, market places, religious and belief sites as well as residential areas need special attention. In order to mitigate the impact the following is recommended:

- It is necessary to make every reasonable effort to minimize road safety hazards and inconvenience to other road users, resulting from the passage of his, or his subcontractors' haulage vehicles, and should impose and enforce compliance with speed limits that may be established for construction traffic at lower speeds than usual
- Proper signs should be in place and training for drivers should be provided to ensure traffic safety
- Maintain supply of supplies for traffic signs (including paint, easel, sign material, etc.), road marking, and guard rails to maintain pedestrian safety during operation phase.
- Carefully and clearly mark pedestrian-safe access routes.
- The local people ought to get more information how to behave with motorized vehicles and keep safe their livestock.
- Properly place hazard marks and signs to limit vehicle speeds especially for sections passing through difficult terrain and denser settlement areas.

Table 10.**Summary Major Impacts and Proposed Mitigation Measures**

Project phase	Project Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Institutional Responsibilities	Cost Estimates
Construction Phase	The rehabilitation of the road networks passes through steeper slopes may trigger slope instability as a result of considerable cutting and grabbing by heavy machineries	Slope Destabilization Impact	• Careful sitting and selection of the road alignments and quarry sites • Both vertical and horizontal alignments of the road should follow the natural relief as closely as possible • Careful and proper execution of construction works • Avoid and/ or minimize side casting of materials from road cuts on down slopes.	Contractor	No need cost
Construction Phase	Cutting into the soils and rock as well as clearing of the protective ground cover to construct the road. Construction of drainage structures (bridges, culverts) and construction of retention walls that involve excavation for foundation works Excavation at quarry sites will expose the soil to water erosion	Impacts on soil erosion	• Minimize the area of ground clearance • Cuts on erodible surface should be properly executed during dry season i.e. before the summer rains commence. • Excavated top soils or loss soils cut-off from the old road and selected material sites should be collected and preserved for reuse particularly clay soils for filling of gullies, borrow and quarry sites	Contractor	No need cost

	Earth works for road construction and foundation of drainage structures, and excavation at quarries and borrow pits can result in an increased soil erosion. Accidental spillage of fuels, oils, greases and other pollutants during construction phase	Impact on Water Resources	• Design and execute adequate and proper drainage structures to reduce erosion or sedimentation in drainage ways affected by road construction. • Avoid the risk of pollution to soil, surface and ground water sources through the reduction of accidental spillage of fuels, oils, greases and other pollutants • Implement proper disposal of solid and liquid wastes generated by road construction activities.	Contractor	No need cost
Construction Phase	Earthworks, quarrying activities and vehicle movements on dusty roads as well as emission of partially oxidized fuels. Noise and vibration from operation of equipments and by passing vehicles may bring about all nuisances to local residents.	Impacts on Ambient Air Quality, Noise and Vibration	• Reduce noise at the source by monitor and maintenance on noisy machines to minimize its effects on people living around the project; • Noise and vibration arise from crushing process should be minimized through adequately designing of the foundation for the facility; • use mechanical hammering which reduces the noise level;	Contractor	No need cost

Construction Phase	Along the Robit road, the settlement area is situated beneath the existing road as a result of this, hazards related to slips and falls of stone and soil materials will occur	Accidents from Slips and falls of Stone and soil Materials	• The contractor should erect stone slips and falls control barriers around perimeter of cuts, and roadways		No need cost
Construction Phase	Extraction of materials from quarries/borrow pits involve site clearance and movement of large construction materials	Impacts on Quarry and Borrow Pits	• Leveling of the exploited blocks before abounding the used quarry; • In order to minimize the effect of flood, landslide and erosion on road & wetland, the surface rainwater has to be diverted through appropriate ditches or channels above the quarry	Contractor	No need cost
Construction Phase	Upgrading of the road involves increased carriage width and widens the existing roads towards different properties such as house, fence and market places.	Loss of Properties and Displacement people	• Minimize the area of ground clearance i.e. land clearing for road construction should be restricted to what is absolutely necessary for the road construction; • Replanting right species of trees on the road side that could provide benefit such as shade, soil conservation and prevention of gullies, scenery, and protection from dust, noise and wind etc. • Pay compensation to the affected people		

OPERATION PHASE	Lack of safe access routes Absence of traffic sign and pedestrian safety during construction	Traffic Accidents and Safety Risks	• Carefully and clearly mark pedestrian-safe access routes • Assign traffic safety personnel to direct traffic during school hours • Maintain supply of supplies for traffic signs, road marking, and guard rails to maintain pedestrian safety during construction	City admin Police office	50,000
OPERATION PHASE	Infrastructure (road) and proximity to drainage will aggravate landslide in the project area.	Landslides, Slumps and Slips	• Replanting and maintaining of vegetation • Draining the subsurface (reduces pore water pressure) • Construct artificial barriers • Reduce slope angle	City Adm.	100,000
OPERATION PHASE	Excessive noise levels can occur from the vehicular movement	Impact of Road Noise	• Plant 30m tree buffer strips between road and surrounding habitation	City admin.	60,000

9. Environmental Management and Monitoring Plan

The environmental management plan and monitoring plans can be seen as protection against environmental degradation for long term benefit to the society for continued socio-economic development and environment.

9.1. Environmental Management Plan

This section documented how the environment will be managed during the design, construction and operation phases of the Dessie gravel road project. The environmental management plan covers summary of impacts, mitigation measures, responsible institutions, and implementation schedules.

The EMP will ensure the effective implementation of identified mitigation measures. The proper implementation of construction works with professionals and careful supervisors and well planned maintenance afterwards will be the best mitigation measures against most of the potential negative environmental impacts. Various organizations with different environmental management responsibilities, Dessie city Administration, Dessie City Kebele Administration(Kebele 01,02,), Dessie City Infrastructure and ULGDP Co-ordination Core Process, Dessie town Ensuring Sustainable Environmental Protection Core Process, interested and affected parties(IAs),study and design consultants(ADSWE), contractors, and construction supervision companies-have been involved during project preparation and implementation, and will be involved in the implementation of the EMP. The main environmental issues, their mitigation measures and implementing bodies are presented in table 7.

9.2. Monitoring Plan and Implementation Program

Environmental monitoring is an essential tool in relation to environmental management as it provides the basis for rational management decisions regarding impact control. The monitoring program for the present project will be undertaken to meet the following objectives:

- to check on whether mitigation and benefit enhancement measures have actually been adopted, and are proving effective in practice

- to provide a means whereby any impacts which were subject to uncertainty at the time of preparation of the EIA, or which were unforeseen, can be identified, and to provide a basis for formulating appropriate additional impact control measures
- To provide information on the actual nature and extent of key impacts and the effectiveness of mitigation and benefit enhancement measures which, through a feedback mechanism, can improve the planning and execution of future, similar projects.

There are two basic forms of monitoring:

1) Compliance monitoring, which checks whether prescribed actions have been carried out, usually by means of inspection or enquiries.
2) Effects monitoring, which records the consequences of activities on one or more environmental components, and usually involves physical measurement of selected parameters or the execution of surveys to establish the nature and extent of induced changes

Table 11- Environmental and Social Impact Management, Monitoring plan

	Environmental Aspects to be Monitored	Monitoring (Methods)	Parameters	Location of Monitoring	Frequency	Responsibility
	CONSTRUCTION PHASE					
	Erosion, slope Stability and waste Management	Survey& observation	Extent& degree of soil erosion& landslide, Ensure excavation and earth work undertaken during dry season and to areas necessary only, Ensure a proper site for waste dumping.	Road alignment, drains, quarry sites, dredged river areas	Daily	Supervisory Staffs, EPLAUB and Project Proponent
	Clearing, Earthworks & Waste Management	Survey &Observation	Land clearing earthworks should be confined to what is absolutely necessary Do excavation works during dry season Ensure a proper site for waste dumping	Road alignment	Daily	Supervisory Staffs, EPLAUB and Project Proponent
	Noise, Dust and Vibration	Survey, Collect samples and field observation	Level of dust, noise and number of community complains about noise.	Road, Crusher sites/Quarry site	Daily	EPLAU and Project Proponent
	Quarry Site	Visual inspection &Photographic record	The extent/size of quarry, constructed ditches, soil conservation and Revegetation activities	Quarry Site	Three times for first one year, annually thereafter	. EPLAU and Project Proponent
	Traffic Safety	Survey, Interview &field observation	Posting of warning signs or safety signal devices in construction areas &at material sites Traffic and workers occupational safety	Road & Offices	daily	Supervisory Staffs, EPLAUB and Project Proponent

			Number of accidents reported per month			
	Resettlement	Survey, Interview &field observation	Implementation of proper resettlement &compensation program for the displaced people and for those who lost their movable &fixed properties.	Resettlement areas		Supervisory Staffs, EPLAUB and Project Proponent
	OPERATIONAL PHASE					
	Accidents and Safety Risks	Survey and Observation	Number of accidents reported per month Number of people who have got information about traffic safety Check the presence of hazard marks & signs to limit vehicle speeds at difficult terrain	Road & Offices	Bi-annually	EPLAU and Project Proponent
	Landslides, Slumps and Slips	Survey Visual inspection &Photographic record,	Quality of road Degree of landslide Check replantation Check the presence of draining the sub-surface and artificial barriers		Every Year	EPLAU and Project Proponent
	Impact of Road Noise	Survey and field observation	Number of community complain about noise Check the plantation of tree buffer between road &surrounding habitation	Roads& Settlement areas		EPLAU and Project Proponent

9.3. Environmental and Social Monitoring

This part of the report presents the estimated total cost for environmental management, monitoring and training cost of the proposed road construction project. Hence; as it was mentioned above, the scale and magnitude for most of the project impacts; particularly the site specific one, is not known at this stage (prior to the detail geometric design and material investigation), the consultant's summarized cost estimate a preliminary one. This is true particularly for costs associated with compensation of PAPs, land acquisition and ROW issues. Therefore, these preliminary costs estimate to be refined and updated in the final land acquisition and RAP report.

The preliminary cost estimate was made based on past experience on similar projects and from the Consultant's EIA findings. Thus, the preliminary Costs related to environmental and social benefit enhancement and impact mitigation measures, etc. taken into account include:

- Costs related to erosion prevention, control and management (soil conservation and erosion prevention and management and land use management programs, tunnel safety measures) and mitigating land slides
- Costs related to the resettlement and compensation for loss of properties as well as livelihood (loss of houses, farmlands, plantation trees)
- Costs related to the loss of privately owned trees and natural vegetation restoration
- Costs for environmental monitoring, training and capacity building
    - Local training through workshops
    - Advisory group support
    - Routine monitoring visit for EMSB

9.4. Environmental Cost Estimate

The major cost components are road side tree plantation, capacity building and institutional strengthening, and compensation, Details of the cost breakdown are given below.

Roadside Tree Plantation

The total length of the gravel road is 2km.It is proposed to develop roadside tree plantation on both sides of the main drainage area. Hence 4,000 seedlings will be planted in one running km. About 8,000 trees shall be planted. Species having aesthetic value, serve as a noise barrier and best suit to the agro ecology are proposed to be planted on roadside. The species recommended for the roadside plantation are: Azadirachta indica (Kinin or Nim), Albezia gummifera (Sesa), casuarina equisetifolia (Arzelibanos), Jacaranda mimosifolia (Jacaranda Melia azandiarach), Graviliaa robusta, Mileiettia ferruqinea, Schinus molle and Phoenix reclinate. The cost breakdown of a tree plantation is presented as follow:

- Digging a hole- will be covered by the local community labor contribution.
- To plant a seedling-will be covered by the local community.
- Cost of a seedling-2 ETB per seedling. So the total cost for canal bank plantation is 16,000birr(8,000x2)

Capacity building and institutional strengthening

- Awareness creation and training for both direct project beneficiaries and affected parties. Awareness creation and training will be provided on: solid waste management, efficient & effective utilization of money, traffic accident, road maintenance and natural resource management.(for 80 local communities) for two days by 100 birr perdiem at two phases= (80x4x100) = 32, 000 birr).
- Training for trainers (6kebele experts, 2 Dessie City Infrastructure and ULGDP Co-ordination Core Process experts and 1 Dessie towns Ensuring Sustainable Environmental Protection Core Process. For four days by 200 Eth.Birr perdiem=18x200x4= 14,400birr).
- Costs required during operation phase of the project will be part of the day to day administrative and operational cost that the project is also estimated 262, 240 Eth. Birr**.**

Table 12.Dessie gravel Road Project Environmental Cost Estimate

No	Activity	Units	Quantity	Average unit Cost	Total cost
1	Road Side Plantation	No of seedlings	8,000	2	16,000
2	Institutional capacity building	No of trainees			
	3.1)Awareness creation and training for urban people	No	80x4	100	32,000
	3.2)Training for trainers	No	18x4	200	14,400
	Soil conservation structure work		Lump sup		100,000
3	Traffic sign post				40,000
4	Hiring Environmentalist	Month	12	4000	36,000
	Contingency				23,840
	Total				262, 240

10. Conclusion and Recommendation

10.1 Conclusions

The proposed Road Project will traverse an area characterized low to moderate slopes. Route selection has avoided some of the areas prone to flooding. The adverse direct or indirect impacts are anticipated in respect of environmentally sensitive areas. During construction drainage ways and Residential areas can be modified. The movement of livestock can also be impacted. However by applying the recommended mitigation measures the problems can be reduced. Respecting local customs in this kind of region is highly recommended. Moreover the safety livestock, children, women and disabled is important. The use of water from bore holes and other wells needs a prior agreement with the community..

By applying the mitigation and benefit enhancement measures recommended in this EIA report properly, there are no environmental grounds for not proceeding with implementation of the project in the form in which it is presently envisaged, since the long-term benefits of project implementation outweigh the largely short-term adverse impacts associated with construction, all of which can be mitigated satisfactorily if close monitoring is adopted.

10.2 Recommendations

- It is recommended that the proposed mitigating measures are properly implemented at the right time. To ensure its proper implementation regular environmental monitoring and audit are also recommended.
- City administration should create harmonious relationship between the local community and the project by holding regular discussions with local elders so as to develop strong linkages with and avoid unexpected complaints from local communities.

Annexes

Annex.1. References

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Annex. 2. TOR of the Gravel road EIA consultancy

1. Back ground

According to the regional proclamation No. 9/2003, Dessie city was given the Status of City Administration, which will be ruled by a Mayor. After the enactment of the above proclamation, the city was divided into 16 kebeles; 10 urban, 6 rural Among the critical problems identified by the city administration; lack of adequate road facilities is major problems of the city. The current practice is very spontaneous that has no any long-term strategy. Hence, the city administration took the initiative to reverse this situation through undertaking a detail road development plan. The city Administration prepared this TOR for the study of development plan to upgrade the existing road located at salaish -segnogebayee (kebele 01&02).

The source of finance for this assignment is city administration own budget.The preparation of development plan includes environmental impact assessment, resettlement action plan, design, and supervision of works during implementation.

2. Existing Situation of the road

Salaish-segno road is deteriorated narrow that cannot the present traffic load, with no proper drainage and walk way, so that the residents frequently complains about it. The area is the site of the big market and one of the four in and out lets of the city, the residents particularly women fill discomfort in using public transport dust, traffic and flood accident, therefore there is an urgent need to redesign and rehabilitate this road with adequate width, proper drainage and walk way. since the area is sensitive and densely populated, preparation of EIA and resettlement plan is mandatory

3. General Objective

The general objective of the project is to upgrade the existing road to better standard that can serve the present traffic load, and can tolerate the high flood running from tossa hill. To transform the present local market place to an economically active place to the level it best fits with the changing environment

4. Scope of work / special tasks/

The spatial coverage of the study area includes the salaish-segnogebaye (01 and 02kebeles) road, the scope of the work are:

- Design the road with 30 meter width, tow way separated by concrete wall where the hill side is elevated in order to create access for residents and reduce the height of retaining wall
- Design proper drainage at each water way and crossing culvert so as to allow the flood to pass straight.
- Design walk way on the drainage covered with concrete slab on both sides of the road
- Design the road in such a way that surface water will drain to the drainage ditch structures

- Identify possible negative impact that may occur on the Environment or human during or after construction of the project and prepare mitigation plan
- Consult the public, specifically the people affected by the project
- Prepare draft and final report with 5 copies
- Follow WB guideline in preparing EIA and RAP

5. Knowledge transfer

The city administration at large and the concerned experts in particular will be participated in every stage of the project study & plan preparation, expected to gain experience, and built capacity in such activities of the assigned project.

6. Major activities to be executed

6.1. Prepare preliminary Designs

After the completion of the situation analysis, the preparation of preliminary designs will be the prepared. The consultant is expected to use its professional capacity to come-up with innovative, functional, environmentally friendly, attractive, user friendly, modern and easy-to-implement type of design proposals. While conducting the study, the consultant is advised to take maximum effort to respect the city structural plan.

6.2. Undertake presentation at each major stages

The consultant shall present his work at the end of each stage. The presentation will be both for the public and for the client. The purpose of conducting the presentations;

- To updating the client on the progress of the study
- To get reflections and decisions on critical issues from clients
- To get and citizens expectations and opinions
- Minutes of each presentation/meeting will be recorded and will be used as reference material.

7. Responsibilities of the Consultant

The selected consultant is expected to understand the urgency of the study and commit to finish the study in the agreed timetable. On top of this, the consultant will have the following responsibilities:

- To provide standard EIA/RPA accepted and certified by REPA
- To provide an implemental and clear gravel road design with acceptable quality
- To provide or cover its own stationery and design materials of any kind and quantity like computer papers, plotter paper, plotter cartridge, flush disk, and all other office stationeries
- If the consultant finds any need of diversion from the city plan proposal, the only thing he is required to do is to present and get the prior approval of the client on the intended diversion.
- To provide its working time framework prior to the commencement of the design work
- Provide monthly progress report

8. Responsibilities of the client

Being the owner of the project, the client will have the following responsibilities:

- Assign a permanent counterpart that will communicate with the consultant on the behalf of the client
- Provide the city plan to the consultant.
- Provide any available materials and/or information that can be useful for the study
- Approve and deliver timely scenarios, preliminary designs and regulations submitted by the consultant.
- Assist and facilitate conditions for the consultant to undertake the field survey and site visit activities
- Facilitate community meetings and dictions and organize progress evaluation work shops

9. Deliverables and expected outcomes

The consultant is expected to deliver the following outputs to the client in the following forms and quantities:

- Final report of the EIA and RAP study report ; 5 copies of color printed hard copy 2 copies of soft copy
- Final detail development plan and design of the market areas; 5 copies of color printed hard copy 2 copies of soft copy. This final design plan should incorporate the proposed road plan, the drainage plan, engineering working drawings, Perspectives Views, consultation and supervision plan and the likes
- Model of the study area prepared as final detail plan
- Completed laws and regulations 2 soft copies and 2 hard copies

All soft copies must be delivered on CD and no floppy disk will be accepted. And all maps must be color printed on a coated white paper and have the required title box with all legends. The presentation quality of all deliverables shall be given the due attention.

10. Professionals maximum and Minimum Requirement

The client is very confident that the consultant will employ experienced and qualified professionals to this job. These professionals are expected to be the same professionals whose curriculum vitae (CV) was attached in the technical document, which was submitted at the time of bid completion. Any change shall be made only with the prior approval of the client. The minimum required professional's mix that the consultant needs to mobilize is shown in the following table:

No.	Title	Profession	Job description	Quantity
1	Project Coordinator	Senior Architect with minimum of 10 years experience	Coordinates the overall study activity	1
2	Senior Architect/ planner	Architect/planer with min, 8 years professional	Head the technical team and undertake	1

		experience	the design work	
3	Urban planning expert	Professional urban planner with min.6 years experience	Undertake at planning and involve in socio-economic work	1
4	Civil Engineer	Senior civil engineer with min. 8 years experience	Undertake all civil engineering works	1
5	Economist	Economists with min. 6 years of experience	Play leading role in the socio economic study	1
6	Quantity Surveyor	Quantity Surveyor or related profession with min. 4 years experience	Undertake all the cost estimation works	1
7	Lawyer	Lawyer with min. 4 years experience relevant experience	Responsible for the production of	1
8	Surveyor	Surveyor with min. 4 years experience	Undertake all the surveyor works.	1
9	Sociologist	Sociologist with min. 6 years experience	Play leading role in the socio economic study	1
10	Environmentalist	Post graduate in environment science or related field of study with min. 4 years experience	Play leading role to cover all environmental considerations related to the sub-project	1

11. Time frame of the Project

The client is very keen to see study completed in very short time to respond for the growing demand of developers in the gravel road project. In light of this relation;

The timeframe planned to complete project

No.	Description	Months	
		1	2
1	Undertake physical and socio economic survey		
2	Present survey results and select two scenarios		
3	Produce the preliminary designs, EIA and ARAP		
4	Present and display the preliminary design, EIA and ARAP		
5	Prepare implementation regulation		

Cost calculation is not yet finalized in the Resettlement Action Plan (RAP) document. Hence we will include in the final report as compensation cost calculation is finalized.

10. CONCLUSION AND RECOMMENDATION

10.1. Conclusion

Dessie gravel road Project will provide overall benefits to the people of the in general and 01,02 Kebeles in particular. The project has been evaluated to have many beneficial impacts such as improve employment opportunities, improve transportation, improve access to markets and social support networks, improve traffic conditions and reducing vehicle operating costs, and improves the living condition of the local people.

Although the implementation of Dessie gravel road Project has many benefits, obviously it will also bring a number of adverse impacts to the biophysical and socio-economic environment both during construction and operation phase. Slope destabilization, impact on soil resource, impact on water resources, impact of noise and vibration, accident from slips and falls of stone &soil materials, traffic accidents and safety risks, impact on flora are the main impacts on the biophysical environment during construction phase of the project. Loss of housing units, loss of fences, loss of plantation trees, loss of market places, impact on public utilities are impacts on socio-economic environment during construction phase. Accidents and safety risks, landslides, slumps and slips, and impacts of road noise are the main impacts arise during operational phase.

All significant negative impacts are possible of mitigation. To protect the environment and promote development, monitoring plan has been prepared to control and regulate the adverse

impacts for sustainable operation of the project. The project proponent should fund to implement the mitigation measures as outlined. Those mitigation measures should be considered vital to the project success and sustainability.

10.2. Recommendations

1. The project proponent should fund to implement the mitigation measures as outlined. Those mitigation measures should be considered vital to the project success and sustainability.
2. There should be awareness creation and training program for the local community as well as for concerned City Administration and kebele experts.
3. The community involvement process should be continuous that maintains a regular means of communication with area residents, to keep them informed of the status of the project as well as what the community expects from the project proponent and the government.

Annex .3. CV of EIA Team member

1. **Proposed position:** • **Environmentalist**
2. **Name of firm:** • **ADSWE**
3. **Name:** • **Wubneh Belete Abebe**
4. **Date of birth:** 5. Dec. 1971 **Nationality:** Ethiopian
6. **Education:**
   - MSc Degree in Environmental Sciences specialization environmental planning and management; at UNESCO-IHE, Delft, The Netherlands
   - B.Sc. Degree in Agricultural Engineering (12+5) at Alemaya University of Agriculture, (1989/90 to 1993/94)
   - Academic: Elementary and Secondary Education: Azezo, Fassiledes Elementary and Secondary School
7. **Membership in professional association:** 8. /
9. **Other training:**
   - TOT on knowledge management and WoCAT(EthioCAT) organized & delivered by MoA, Training given by Dr. Hanspeter (WoCAT specialist, Switzerland),for 4 days
   - TOT on PRA and LFA (Participatory Rural Appraisal and Logical framework analysis) organized and delivered by SIDA Amhara, for 12 Days at Dessie
   - On-farm research on Watershed management, Soil and Water conservation and agro- forestry, organized and delivered by SIDA Amhara, for 10 days, at Kombolcha
   - Management, Finance, Integrated Rural Development, Policy, Project and Development Planning, organized and delivered by Amhara region management Institute, for 73 days,
   - Local Level Participatory Planning (LLPPA) training, organized and delivered by WFP and SCF-UK for 10 days, at Dessie
   - Practical training on water harvesting for 20 days organized and delivered by Agriculture bureau at Woldeya
   - GIS & automated Land evaluation for 15 days organized and delivered by ADSWE, Training By Atkilit Girma (Msc), lecture & Consultant in Geo-information, Mekele University
   - Watershed and river basin management, short course given by UNESCO-IHE Institute for water education, Delft Netherlands
10. **Countries of work experience:** 11. **Ethiopia**

12. Language & degree of proficiency: 13. English: Excellent (speaking, reading, writing).

14. Amharic (Mother Tongue): Excellent (speaking, reading, writing).

15. Employment record: 16.

•	*From:*	17. July 2009	•	*To:*	18.	Date
•	*Employer:*	• **Amhara Design and Supervision Works Enterprise**				
•	*Position held:*	19. Project Manager, Land use planning project				

•	*From:*	20. Feb. 2009	•	*To:*	21.	June 2009
•	*Employer:*	• **Amhara Design and supervision works enterprise**				
•	*Position held:*	22. Environmentalist and watershed expert				

•	*From:*	23. April 2007	•	*To:*	24.	Jan 2009
•	*Employer:*	• **Amhara region agriculture and rural development bureau**				
•	*Position held:*	25. Watershed study and development expert and SLM project Coordinator at regional level				

•	*From:*	26. October 2005	•	*To:*	27.	April 2007
•	*Employer:*	• **UNESCO-IHE, Delft, The Netherlands**				
•	*Position held:*	28. MSc student				

•	*From:*	29. July 2,2003	•	*To:*	30.	October, 2005
•	*Employer:*	• **West Gojam Zone**				
•	*Position held:*	31. Soil Conservation and Water harvesting Expert				

•	*From:*	32. June 7 2002	•	*To:*	33.	Jan. 7, 2003
•	*Employer:*	• **Sayint district**				
•	*Position held:*	34. Agriculture office head				

•	*From:*	35. June 7, 1999	•	*To:*	36.	June 7, 2002
•	*Employer:*	• **Sayint district**				
•	*Position held:*	37. Regulatory team leader				

•	*From:*	38.	May 2, 1995	•	*To:*	39.	June 7,1999
•	*Employer:*	•	**Sayint district (South Wollo)**				
•	*Position held:*	40.	Soil and Water Conservation Expert				

41. Detailed Tasks Assigned	**42. Work undertaken that Best Illustrates Capability to Handle the Tasks Assigned**

43. Assist the international environmental expert.	*44. Name of project*	45.	Sena Irrigation Project, Wojegie irrigation project
	46. Year	•	**2008 - 2009**
	47. Location	•	**Bolso Sorie woreda,**
	48. Client	49.	SNNPR
	50. Main Project Features	51.	Diversion weir, Gravity Irrigation of 80ha and 100ha
	52. Positions held	53.	Environmentalist
	54. Activities performed	55.	Collection of environmental baseline, prepare EIA report

56.	*57. Name of project*	58.	Koga Irrigation and watershed management project
	59. Year	•	
	60. Location	•	**Mecha woreda**
	61. Client	62.	ANRS and MoWR
	63. Main Project Features	64.	Earth Dam project, gravity irrigation of 7000ha
	65. Positions held	66.	SWC expert and later, Environmentalist for MSc thesis study
	67. Activities performed	68.	Evaluation of EIS prepared and follow-up of implementation of Environmental management plan (EMP) and watershed management plan

69. Expertise duties

- Develops a system for gathering and reporting information on soil and water conservation/irrigation related project preparation,
- Plans, organizes and controls the overall activities of Natural resource management,

- Involve in the identification and preparation of Soil and Water Conservation/Irrigation related projects and the development of participatory and sustainable Soil and Water conservation/ irrigation system for the organization,
- Collaborates and works closely with all the other partners in activities related to soil and water conservation/ irrigation,
- Supervises the soil and water conservation/irrigation activities,
- Inspects Soil and water conservation/irrigation activities during progress and upon completion; insures that defects are corrected in accordance with instructions and plans,
- Coordinates and participates in the preparation, review analysis of budget proposals of agricultural and environmental projects/activities,
- Coordinates and participates in agricultural and environmental projects appraisal; participates in determining priorities among programs/projects,
- Coordinates and participates in the monitoring and follow up of agricultural and environmental projects, ensures timely preparation of progress, annual and periodic reports,
- Deliver Training on:
  - LLPPA, SWC and Land Use planning so many times for Government and NGO Staffs
  - Training government Woreda experts, Supervisors and Development Agents, on soil and water conservation and LLPPA,
- Guiding community meetings on development issues and training farmers on natural resource conservation
- Planning, Monitoring and Evaluating physical and biological soil and water conservation (SWC) activities,
- Planning and preparing documents of land use planning and watershed management,
- Coordinating and guiding community based development activities,
- Preparing Integrated watershed Management project proposals and implementing the so,
- Implementing, supervising, and monitoring agricultural, and environmental activities,

70. Independent studies

- MSC thesis research on EIA follow-up of Koga irrigation and watershed management project, Amhara region
- EIA study and report of Sena diversion irrigation project, SNNPR
- EIA study and report of Wojegie diversion irrigation project, SNNPR
- EIA study and report of Dorado livestock fattening project, Bahir dar, Amhara region
- Northwest Amhara development corridor Land use planning and environmental studies project, as environmentalist and project manager

71. Other experiences and duties

- Local Level Participatory Planning (LLPP) coordinator, in Amhara Region-Sayint, from Dec. 1996 to Dec. 1998,

- Area Based watershed on-farm research coordinator, in Amhara Region, South Wollo zone, from July 1996 to Nov. 1997

72. Research and studies

73. MSc thesis research

- EIA implementation and Follow-up: A case study on Koga irrigation and watershed management project-Ethiopia (2007)

74. Senior Research project

- The effect of time and frequency of irrigation water application on the emergence of Maize (Alemaya University of Agriculture) in March – May 1994.

75. Certification

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I understand that any willful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Signature of staff member or authorized representative of the staff	**Date:**	28	04	2011
		Day	*Month*	*Year*

Full name of authorized representative:

1.Proposed position:
- **Socio-Economist**

2.Name of firm:
- **ADSWE**

3.Name:
- **Tadesse Belay**

4.Date of birth: 76. Sep. 1974 **Nationality:** Ethiopian

5.Education:
- MSc Degree in Development Economics (2006/07-2008/09) in Ethiopian Civil Service College (ECSC)
- BSC Degree in Agricultural Economics at Alemaya University of Agriculture, (1993/94 to1996/97)
- Academic: Elementary and Junior Secondary school at Gundewyen and High Schools in Mertulemariam Town (1982/83- 1992/93)

6.Membership in professional association: 77. /No/

7.Other training:
- Two weeks intensive training in "the study, design & implementation of small scale irrigation & environmental rehabilitation projects for practicing professionals".
- Ten days intensive training in project analysis

  Project analysis
  - Project cycle
  - Participatory approach in project formulation
  - Valuating cost and benefit, the financial and economic analysis
  - Monitoring methods and tools
  - Overall indicators
- GIS and Automated land Evaluation
  1. Topics covered during the training:
     A. ARCPad, ArcGIS 9.2 & Geoprocessing tools
     B. DIVA_GIS
     C. ArcHydro
  2. Introduction to land evaluation and on:
     - Economic and Biophysical
     - Automated land evaluation software (ALES)
     - Automated land evaluation under ArcGIS 9.2
  3. Introduction to ERDAS Imagine 9.1

8.Countries of work 78. **Ethiopia**

experience:

9.Language & degree of proficiency: 79. English: Excellent (speaking, reading, writing).
80. Amharic (Mother Tongue): Excellent (speaking, reading, writing).

10.Employment record: 81.

•	*From:*	82. April 2009	•	*To:* 83.	Date
•	*Employer:*	• **Amhara Design and Supervision Works Enterprise**			
•	*Position held:*	84. Study quality control & Contract Administration Division Head, in Land use planning & Env'tal impact study Work process 85.			

•	*From:*	86. January 10, 2005	•	*To:* 87.	April 2009
•	*Employer:*	**88. Kobo Girana Valley Development Program Office (KGVDP)**			
•	*Position held:*	89. Senior Planning and Programming expert and acting head of planning, monitoring & Resource Mobilization Service			

•	*From:*	90. February 1998	•	*To:* 91.	January 2005
•	*Employer:*	**92. Commission of Sustainable Agricultural and Environmental Rehabilitation in Amhara region**			
•	*Position held:*	93. Socio-Economic expert in Study, design and supervision department from February 1998 to January 2003. 94. Socio-Economic expert in Planning and Programming service from February 2003 to January 2005			

11..Detailed Tasks Assigned	**12.Work undertaken that Best Illustrates Capability to Handle the Tasks Assigned**	
95. Spatial Socio economy expert in Amhara Design & Supervision Works Enterprise	*96. Name of project*	97. North west amhara Land Use Planning & Env'tal impact assessment study project
	98. Year	• **2010 - 2011**
	99. Location	• **North west Amhara Growth Corridor,**
	100. Client	101. Amhara Land Administration & Use Bureau
	102. Main Project Features	103. Land Use Planning on about 2 million ha.
	104. Positions held	105. Spatial Socio-Economist

11..Detailed Tasks Assigned	**12.Work undertaken that Best Illustrates Capability to Handle the Tasks Assigned**	
	106. Activities performed	107. Collection of Spatial socio-economic baseline Data, prepare Socio-economic Evaluation report
108. Planning Specialist in Kobo Girana valley Development program office	*109. Name of project*	110. Small scale Irrigation project
	111. Year	112. January 10, 2005 to April 2009
	113. Location	• **Kobo woreda, at Waja & Hormat**
	114. Main Project Features	115. Drip & Sprinkler Irrigation project, 10 projects irrigating about 35 ha each, irriating 350 ha totally.
	116. Positions held	117. Senior Planning and Programming expert and acting head of planning, monitoring & Resource Mobilization Service
	118. Activities performed	119. Preparing socio-economic Feasibility report and follow-up of its implementation.
120. Socio-economy expert in Commission of Sustainable Agricultural & Environmental ehabilitation in Amhara region	*121. Name of project*	122. Small scale Irrigation project
	123. Year	124. February 1998 to January 2005
	125. Location	• **At different woredas of the Amhara Region**
	126. Main Project Features	127. Dam & Diversion Irrigation project, 13 implemented projects irrigating irriating 868 ha totally.
	128. Positions held	129. Socio-Economic expert of the study Team
	130. Activities performed	131. Preparing socio-economic Feasibility report.
132. Socio-economy expert in Tefera Berhie General Water works Consultancy Service (Part timer)	*133. Name of project*	134. Small scale Irrigation project
	135. Year	136. April 2009 to Sep 2010
	137. Location	• **At 2 woredas of the Amhara Region & 4 Woredas of SNNRP**
	138. Client	139. Amhara water resource Development Bureau & SNNRP water resource Bureau
	140. Main Project Features	141. Diversion Irrigation project, 9 implemented projects irrigating irriating 1000 ha totally.
	142. Positions held	143. Socio-Economic expert of the study Team

11..Detailed Tasks Assigned	12.Work undertaken that Best Illustrates Capability to Handle the Tasks Assigned
	144. Activities performed 145. Preparing socio-economic Feasibility report.

146.

147.

148. Expertise duties

- Develop Methdologies for gathering Data, Analysing Data and writing reports for irrigation and related project preparation,
- Plans, organizes and controls the overall activities of the implementation of these irrigation projects.
- Preparing fund raising proposalfor funding agencies.
- Prepare implementation progress report for different clients (For funding agents, for management bodies situated at different levels).
- Coordinates and participates in the preparation, review analysis of budget proposals of agricultural and environmental projects/activities,
- Coordinates and participates in agricultural and environmental projects appraisal; participates in determining priorities among programs/projects,
- Coordinates and participates in the monitoring and follow up of agricultural and environmental projects, ensures timely preparation of progress, annual and periodic reports,
- Guiding community meetings on development issues and in identifying their own problems, set solutions their identified problems in pariticipatory and rapid approach.

149. Research and studies

150. MSc thesis research

Thesis work: The Impacts of Irrigation on agricultural Productivity and Poverty Reduction: A Case Study in KGVDP Constructed Modern Small Scale Drip and Sprinkler Irrigation Schemes, Kobo Woreda, North Wollo Zone, Amhara Region.

Term papers for the partial fulfilment of the master program:

- Flower production in Ethiopia
- Review of EEA/EEPRI report on Industrialization and Industrial Policy in Ethiopia
- Trends and Contribution of Foreign Direct Investment in Ethiopia
- Review on Food Security in china
- The impact of Globalization in developing countries

13. Certification

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I understand that any willful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Signature of staff member or authorized representative of the staff	**Date:**	28	04	2011
		Day	*Month*	*Year*

Full name of authorized representative: