

# **FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA**



## **ETHIOPIAN ROADS AUTHORITY**

**CONSULTANCY SERVICES FOR REVIEW OF CONCEPT DESIGN, COST ESTIMATE,  
BID DOCUMENT AND UPDATE OF ESIA AND FEASIBILITY STUDY AND RAP  
PREPARATION OF ADAMA-AWASH EXPRESSWAY**

**Revised Final Environmental and Social Impact Assessment Report  
Adama-Awash Expressway  
Lot I, Adama- Melkajilo (Km-60)**



**Net Consult Consulting Engineers and Architects Plc**

August, 2018  
Addis Ababa, Ethiopia



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## ACRONYMS AND ABBREVIATIONS

ADLI	Agricultural Development-Led Industrialization
BOE	Bureau of Education
BoFEC	Bureau of Finance and Economic Cooperation
CSA	Central Statistical Authority
CSE	Conservation Strategy of Ethiopia
EEPCO,	Ethiopian Electric Power Corporation
ETELCO	Ethiopian Telecommunication Corporation
EIA	Environmental Impact Assessment
EI	Environmental Inspector
EIS	Environmental Impact Statement
EISR	Environmental Impact Study Report
EMA	Ethiopian Mapping Authority
EMB	Environmental Management Branch
EMP	Environmental Management Plan
EMSB	Environmental Monitoring and Safety Branch
EPA	Environmental Protection Authority
EPE	Environmental Policy of Ethiopia
EPLAUA	Environmental Protection, Land Administration and Utilization Authority
ERA	Ethiopian Roads Authority
ESMT	Environmental and Social Management Team
EWCO	Ethiopian Wildlife Conservation Organization
EWNHS	Ethiopian Wildlife and Natural History Society
FDRE	Federal Democratic Republic of Ethiopia
LEPO	Land and Environmental Protection Office
MFI	Multilateral financial institution
MoARD	Ministry of agricultural and rural development
MoFEC	Ministry of Finance and Economic Cooperation
MWSO	Municipality water supply office
NGO	Non-Governmental Organizations
PAP(s)	Project Affected Person(s)
PCR	Physical Cultural Resource
RAP	Resettlement Action Plan
RE	Resident Engineer



RCS	Regional Conservation Strategy
REA	Regional Environmental Agency
ROWMT	Right of Way Management Team
ROW	Right of Way
RPF	Resettlement Policy Framework
RSDP	Road Sector Development Program
SC	Supervising Consultant
WB	World Bank



## **EXECUTIVE SUMMARY**

### **INTRODUCTION**

Adequacy of the transport sector plays pivotal role in the socio-economic development of a country. Acquainted of this fact, the government of Ethiopia in the Second Growth and Transformation Plan (GTPII) has determined to reduce the average time to reach the nearest all-weather road. In order to achieve this goal, the Ethiopian Roads Authority (ERA) has planned to construct Lot 1: Adama-Melkajilo (km-60) Express way based on Design-Build project delivery system and it is also a continuation of Government efforts to improve the standard of its import-export corridors.

The Ethiopian Road Authority (ERA) selected Net Consult Consulting Engineers and Architects PLC to undertake Review of Concept design, Tender Documents, Cost Estimate and ESIA, and prepare RAP report of the Adama-Awash Expressway.

The Adama-Awash Expressway Project is divided in two lots (Lot 1: Adama-Melkajilo (Km.60) and Lot 2: Melkajilo(Km. 60) - Awash) for implementation is the focus of this Environmental and Social Impact Assessment (ESIA) study report. Adama- Melkajilo (Km.60) express way project that starts at the out skirt of Adama town, from the end of Addis-Adama express way covers a total length of approximately 60km, and it requires opening of a new pavement of 4 lane dual carriageway and construction of various other road components such as link roads, bridges, culverts, and development of temporary site (Borrow and Selected Material sources, Quarry sites, Construction Camp & workshops for maintenance of the contractor equipment).

### **Project Description and Justification**

The Adama-Melkajilo (km-60) Express project is located in the central eastern part of Ethiopia, and traverses 3 Woredas of Oromia and Amhara regional states. The road project falls within the corridor of the existing Addis Ababa – Adama – Awash – Djibouti trunk road. The starting point will be at outlet of Adama city that can be accessed by travelling 90km southeast from Addis Ababa along the existing asphalt road. The end of the project is at Km. 60 near Melka Jilo small town in the Amora Bete kebele and can be reached after driving 60Km from the beginning of project.

The project road is the continuation of Addis- Adama express way road segment from Addis Ababa to Djibouti which has the highest traffic volume and load in the country as it is the main corridor to the port of Djibouti. Large portion of the traffic are heavily loaded trucks transporting import and export goods.



The proposed Expressway will run parallel to the existing asphalt road (partly traverse to the right side and for the rest of the route it traverses the left side by crossing existing asphalt road and railway. The geographic coordinates are 534109.811E, 944258.058N, and 571531.594 E, 988112.916 N at the start and end points respectively.

The project is designed to AASHTO's Freeway standards for main road with total length of 60km, and DC-5 standard for Link Roads, having a right of way (ROW) of 90m. It traverses flat and rolling land for about 55.7% and 44.3% respectively of the total length. There will be two lanes of 3.60m width on each carriageway that means 2x(2x3.6) which is equal to 14.4, 1.5m wide inner hard shoulder, 3m wide outer hard shoulder, 0.75m wide outer soft shoulder in each side of the expressway, and 9m median at the centre.

Other components include Link road to connect the expressway with the existing road at Welenchit and Nura Era having standard of DC5 (According to ERA Geometric Design Manual of 2013. The link roads have total width of 10m with the main carriage way of 2\*3.5 and paved shoulder of 2\*1.5m. An access road to Melkajilo town, from Nura Era link road, for a length of 6.3km, with road width of 7m gravel and geometric standard of DC4 is also part of the project. There will be 3 Interchanges to connect the express way & provide access through the link roads to towns of Welenchit and Nura Era. The link road to Adama town is already constructed.

The project road never cross Perennial River but there are 6 rivers requiring construction of major crossing structures. Further, 34 box culverts and 88 pipe culverts are required for stream crossings at different locations of the expressway. There is one existing asphalt road crossing bridge and one railway crossing will be constructed by the project. There will be also construction of 22 vehicular crossings, underpasses or overpasses concrete structures for the movement of vehicles across the expressway. Furthermore, there are 17 under or overpasses pedestrian bridges to allow the local people to cross the expressway freely without interfering with the expressway and to facilitate the social connectivity's of the local community. Three railway crossings one for the Main Expressway and two for the link roads need to be constructed across the railway line which is running almost parallel to the expressway.

Construction of embankment/fill by road projects usually concentrates run off from upper and surrounding micro catchments area. A substantial part of the road project area, about 55.7% of the total road route length, fall in flat plain topography with poor drainage. This will generally comprise open triangular or trapezoidal channels, where necessary the channels will be lined with concrete or stone pitching to protect from erosion. Discharge points will be provided at reasonable intervals to maintain the natural drainage line of the runoff water as far as possible. The project road also requires construction of other support structures such as retaining walls, terracing in degraded & rugged terrains.

There is no protected area like national park or wildlife reserve that can be crossed by the proposed Adama-Melkajilo (km-60) express way in the project road influence area, hence there is no irreversible adverse environmental and social impact expected.

The major land requirement for the project comes from laying the new dual carriageway pavement & ROW (90m), and together with the link roads (50m) a total of 568.71ha of land will be taken permanently. Material sites which include development of borrow pits & quarry sites will take up land. Establishment of construction camp and workshop also take land temporarily. Thus the total land take due to borrow pits, quarries, and establishing the camp & workshops is estimated to be about 30ha. The total land requirement for the project is therefore estimated to be about 598.71 ha.

### **Policy, Legal and Administrative Framework**

The relevant policy and legislative frameworks were reviewed to make sure that the proposed project is in line with the available national proclamations, wherever unwanted adverse environmental and social impacts encountered they need to be treated in accordance to the available legal framework. The most important policy documents include Environmental policy of Ethiopia (1997), Second Growth & Transformation Plan(GTP II), Health Policy, Population Policy, Women Policy, HIV/AIDS Policy, Resettlement & Rehabilitation Policy and AfDB Policies.

The Constitution of the Federal Republic of Ethiopia is the basic legal framework. Other relevant legislation include proclamation on Environmental Impact Assessment Proclamation, health, rural land use & administration, land expropriation for public purpose, forest development conservation & utilization, conservation of culture & heritage. These documents provide national policy proclamation regulations that the proposed project has to integrate with or adjust accordingly.

The Environmental & Social Management Manual (ERA 2008), Environmental Impact Assessment Procedural guideline (EPA 2003) were reviewed so as to undertake the study according to the national guidelines & requirements. African Development Bank's group Policy on integrated safeguards system (2013) and related ESA Procedure (AfDB 2001) were reviewed to identify policies that can be triggered by the project development & follow the funding procedure.

### **Description of the Project Environment**

The proposed road project directly traverses three Weredas, the first two are located in Oromia Region, East Shoa zone, named Adama and Bosete Weredas, and the third one is located in Amhara regional state North Shewa zone, named Minjar shenkora worda. The sub topics below describe the biophysical, social and cultural environment of the project area in Ethiopia.



## Physical Environment

**Topography:** The road project falls within the Ethiopian Rift valley system that extends from North to South part of the country, as part of the Great East African Rift Valley system.

The road route follows dominantly flat to rolling terrain for major stretches, except at some sections having mountainous and escarpments at intervals. Elevations along the route corridor varies between 800 and 1700 meters above sea level

**Climate:** The climatic condition of the project corridor could generally be described as semi-arid agro-ecological settings. According to the description on traditional classification, the average temperature of such agro-climatic zone is between 20°C and 25°C. While, the annual rainfall is 900-1400 mm for the moist lowland and less than 900 mm for the dry lowland. However, the data recorded for the project Weredas indicates that the area has a climate classified as Woina Dega to Kola and the maximum and minimum temperatures range between 20 - 42 °C and 15-25°C respectively.

The rainy season extends from May to September. Small rain falls between February and April and heavy rain is from July to September. The month of November, December and January are generally dry with ground frost at night.

**Soil and geology:** The soil of East Shewa zone where the major road length traverses is grouped into 9 soil types as per the FAO soil classification methods. These are Andosols (Mollic and Vitric Andosols) which was formed from volcanic ash parent material, Vertisols (Pellic Vertisols & Chromic Vertisols) which are heavy, mostly dark colored clay soils, Phaeozems (Haplic Phaeozems and Luvic Phaeozems), Fluvisols, Cambisols (Vertic Cambisols and Eutric Cambisols), Lithosols, Regosol, Luvisols, and Orthic Solonchaks.

The soil type around Adama area ranges from moderate to thin friable residual soils on step faulted plains and low plateau complex of the Ethiopian Rift with numerous fault scarps, sags and associated cones, vents and crater remnants. In the section of Adama-Wolenchiti, it traverses thick and very friable residual soils that are highly erodible. And the remaining section of the road traverses thick transported soils of alluvial fans (in section of the road with seasonal flooding of the area).

The project road generally lies in the Ethiopian rift valley, at a low altitude. The route corridor formations are mainly dominated by volcanic rocks and lacustrine sediments. The volcanic rocks are young ignimbrite of Fantale, ash flow tuffs, pantelleric ignimbrite and unwelded tuffs. The first 26 km of the route is covered by alluvium and lacustrine sediments which are sand, silt and clay.

**Water resource and quality:** The project road route falls within the Awash River basin drainage system. There is no perennial river that crossed by the project road, while numbers of seasonal rivers and streams exist in the area.

## Biological environment

**Important habitat flora and fauna:** There are no protected areas like national parks, wildlife reserve etc. traversed by the proposed Adama-Melkajilo (km-60) expressway route, as it passes predominantly through farm land. Very scattered acacia woodland used to be the dominant natural vegetation in the road project and surrounding environment as observed during field visit, and reconnaissance survey. The main terrestrial habitat in the road project section are mainly associated with the remnant acacia vegetation and scattered trees in the farmland. Natural vegetation is still the main source of fuel wood for people in the project area. The remaining natural vegetation, especially acacia species used for charcoal preparation. Similarly, some common wild animals currently existing in the proposed road corridor are Hyena (*Crocutacrocuta*), Wild cats and different bird species.

**Land use and land cover:** The principal land use pattern observed in the Weredas traversed by the proposed express way is mostly cultivated crop field, followed by pastureland for animal grazing and settlement areas. The alignment almost totally falls within potential and/or existing crop fields and vegetation of acacia species land cover especially on the hill side at the end of the project.

## Socio-Economic Environment

**Demographic Characteristics:** Based on CSA 2007 projected to 2017, the population in the influence area of the project is estimated to be about 499, 850; out of which 64% are male and 36% are female population. The major part of the Project area is rural, densely populated at the start and sparsely populate towards the end of the project.

**Economic activities:** Analysis of existing major sectors of economy for livelihoods is a paramount important during project and programs development period. To this end, Adama-Melkajilo (km-60) expressway project is no exception. Accordingly, during the study period the existing major economic practices for the livelihoods of the people living in general project affected area were assessed. Hence, major sectors of economic activities are based on Crop Production and Cattle Rearing. According to the RAP study findings, 123 households will be affected permanently, and 782 households will be affected partially by the Adama-Melkajilo (km-60) express way road construction. Furthermore, the road will expropriate 568.71ha farm land. The proposed express way will cross existing railway, pedestrian & livestock paths and community roads (mud), regional roads (gravel), and also the existing Addis-Adama-Djibouti asphalt road.

## Project Alternatives

Three alternative analysis was made to arrive at the best alternative options of the project. “No action scenario”, upgrading the existing asphalt road, constructing new expressway, and alternative route options were considered. Accordingly, the existing Addis-Adama-Djibouti asphalt road, has failed to support the growing traffic flow rate and axle load, long haul from export import and local transport demands as well as social and ecological safety rules. Therefore, the no-project alternative does not support the growth & transformation strategy which is formulated to bring about fast economic development in the country. Therefore the no-project option was not evaluated as a feasible option.

Thus, excluding the “No action scenario” option, three alternative options for implementation of the project have been identified and considered for the proposed Adama-Melkajilo (km-60) Road Project. These are:

Alternative 1: Expressway of 6 lanes

Alternative 2: Expressway of 4 lanes

Alternative 3: Upgrading the existing

During the feasibility study; three project Alternatives have been assessed for selecting the best project alternative using multi criteria analysis (based on Engineering/Design, Environmental, Social, Economic and financial Criterion).

From the analysis of the results of the pre-feasibility and feasibility studies indicates that Separate Expressway with 4 Lanes (Alternative 2) as the best feasible.

After thorough analysis of project implementation alternative, further three route option selection was conducted for the selected project Alternative 2 (Separate Expressway Project with 4-Lanes) for the Adama-Melkajilo (km-60) Expressway Project. Accordingly, the proposed three route options are:

**Option 1:** All parts of the Expressway stretched on the left side of the Existing Addis-Adama-Djibouti asphalt Road;

**Option 2:** All parts of the Expressway stretched on the right side of the Existing Addis-Adama-Djibouti asphalt Road; and

**Option 3:** Partly on the right, partly on the left of the Existing Addis-Adama-Djibouti asphalt Road; The three options fall within the same ecological zone and have Woinadega and Kola type climatic conditions. Options 1, 2, and 3 corridors have more or less similar climatic conditions and traverse parallel to each other. The width between the three alignments varies within 500- 700 meter along the stretch. So, most of the environmental settings are commonly shared by the proposed

Options. Option 1 displaces many urban and rural settlements from the very beginning of the project to the end and demands higher cost of compensation; while option 2 highly affect sugar cane plantation, large scale of farm lands. Furthermore, it poses large scale of displacement that entails the highest compensation cost. Comparatively, option 3 will reduce number of house to be displaced and farm land expropriation compared to option 1&2. Therefore, option 3 considered as best route option of the Adama-Melkajilo (km-60) expressway construction. The detailed engineering design, socio economic and environmental parameters considered to arrive at the selected route option were explained in the main body of the report.

## **Potential Impacts and Mitigation Measures**

### **Positive and Beneficial Impacts:**

The proposed Adama-Melkajilo (km-60) will bring significant benefits to the regional and country economy as it will:

- Create regional integration;
- Reduction in Travel Time and Costs;
- Reduced Air Pollution and reduced gaseous emissions;
- Create Employment Opportunities to locals, and
- Create of income generating activities.

### **Adverse Environmental Impacts and its mitigation measures:**

Some of the significant adverse impacts identified are:

- Soils erosion and flooding ;
- Competition for Water Resources and Water pollution;
- Land expropriation;
- Impacts due to Construction Camps;
- Impacts due to quarries, borrow pits and associated roads;
- Road Safety and hazards and
- Environmental Hazard

Appropriate and detailed mitigation measures were proposed for these adverse impacts in the main body of this document.

## **Monitoring Programme**

The purpose of environmental and social monitoring is to quantitatively measure the compliance of the contractor on the implementation of the proposed environmental and social mitigation measures as well as the effectiveness of the mitigation measures. The environmental monitoring





program will operate through the preconstruction, construction, and operation phases. It will consist of a number of activities, each with a specific purpose, key indicators, and significance criteria.

Environmental management and monitoring plans are necessary to minimize or offset adverse impacts or enhance beneficial aspects, in order to achieve the objectives of the proposed road project and ESIA study. The main objective of an Environmental & Social Management Plan (ESMP) is to set out how the adverse environmental and social impacts identified in the environmental and social impact study will be controlled during project construction and operation/service phases. Therefore, these measures need to be integrated with the overall project implementation during the construction and operation phases.

The overall road project and environmental and social management responsibilities are to be shared between several governmental, non-governmental organizations and interested parties, each with specific executive responsibilities for particular aspects, which are exercised during the various stages of project design, construction and subsequent operation and maintenance. The principal government agency concerned with the environmental and social management and monitoring is the project owner, Ethiopia Road Authority (ERA), and specifically the Environmental and Social Management Team (ESMT) of ERA during design and construction of the proposed expressway. That the team shall check as all the necessary environmental clauses included in the contract document, and its practical implementation accordingly at construction progresses.

The responsibility to implement majority of the routine maintenance activities during the operation phase which may include routine and periodic pavement, earthworks and drainage system maintenance fall on ERA operation & maintenance division. ERA may hire contractor depending on the type & extent of maintenance activity. The staff of the department or a designated unit in the department should acquire basic knowledge of the environmental monitoring activities to effectively assume the responsibility, training of personnel is, therefore, essential. The ESMT is expected to play an overall advisory role during this phase.

Mitigation measures proposed for socio economic issues like compensation to damaged properties, and lost/degraded plots of land should be handled by a committee, composed of representatives of all stakeholders including ERA, other local government administrative organs, NGOs, and the affected group as per the RAP.

The primary responsibility of environmental and social management during the project construction phase lies with the project construction contractor & supervision consultant. For this purpose, the supervision consultant shall establish Environmental Management Unit (EMU) responsible for undertaking an independent monitoring & supervision of proposed environmental and social mitigation measures, and other environmental issues during the project construction phase. The EMU should consist of an environmentalist & a sociologist who will be actively engaged to integrate environmental and social supervision work with the overall project





construction supervision activity and the Resident Engineer (RE). Once the construction is completed, the ESMT and the district offices will take over the management aspect in collaboration with other concerned development and regulatory agencies at regional and federal level.

During the project construction phase, internal monitoring will be conducted mainly by the contractor Environmental Management Unit (EMU) as part of the overall construction supervision consultant, and the ESMT. The RE and the environmental supervisor will prepare monthly progress reports which also highlight environmental performances of the project work and submit it to ERA. An overall supervision and monitoring of the environmental conditions and performances of the project will be made by the ERA's ESMT as it was legally delegated by Ministry of environment, forest and climate change. External monitoring can be conducted with government financing institutions like the Ministry of Finance and Economic cooperation (MOFEC), as well as the AfDB international financing institution that will check the project performances against their funding policy & environmental safeguard guidelines.

### **Public Consultations and Public Disclosure**

Stakeholders including local people and administrations traversed by the project, and most importantly Project Affected People (PAP). Public Consultations have been made in Weredas traversed by the project road including Adama, Boset and Minjar-shenkora Weredas. Consultation were also conducted in Kebeles and towns in or near the project road route corridor.

The main objective was to solicit information on available and practiced legislation and procedures, and collect the opinions of stakeholders regarding to various environmental and social issues related to the proposed road project.

The proposed expressway road was fully supported by all persons and institutions met during consultations. The existing route was rejected by the consulted persons because the upgrading option does not improve the existing traffic congestion to the travel needs of the population, hardly improve the existing road safety and traffic accidents. The upgrading of the existing alignment is therefore expected to have a minor impact in development of the area. The variation of compensation costs between the two routes is not anticipated to be much in volume.

The project is expected to provide a long lasting solution to the safety problems at the same time contribute to economic growth. Overall, the local people & various stakeholders are interested in the implementation of the proposed road project.

The estimated total ESMP implementation costs are capital cost required for installing mitigation & enhancement measures while the recurrent costs are mainly associated with monitoring aspects of the ESMP. The required cost for the ESMP shall be included in the road project cost.



## **Enhancement measures and Complementary Initiatives**

Complementary community initiatives are planned to enhance project benefits, improve socio-economic conditions of the local communities, and ensure project sustainability. The proposed interventions are tree planting; establish water supply schemes in the camp, Road safety campaign, HIV/AIDS prevention and Control. The complementary interventions are proposed based on the general understanding of the road project area & constraints grasped during the ESIA study and consultations, and hence require further onsite assessment & consultation with concerned stakeholders.

Further recommendations have been made in the ESIA for a Project Specific Gender Plan of Action, inclusion in the bidding documents, as part of the health and safety measures, the requirement for providing adequate facilities for female workers just as those for the male. These should include, but not limited to, provision of ablution corners, adequate and secure accommodation for women, resting space dedicated for women, code of conduct to prevent abusive language and unwanted approaches at the work place.

Once the project is completed, both women and men will benefit from its use in various forms one of which will be dedication of produce stores at the planned roadside services to be constructed as part of the project. The service providers for the HIV/AIDS, STI campaigns will ensure appropriate focus is given to adolescent girls and boys in program delivery.

## **Conclusion and Recommendation**

The existing Adama-awash-Mile road, one and the main import export corridor for the country is providing service for mixed motorized & non-motorized means of transport which significantly reduce its efficiency and also result in accidents. The accelerated development of the country and in particular the GTP-II requires an efficient and safest road network, and implementation of the proposed Adama-Melkajilo (km-60) expressway project is essential in fulfilling the goal set at the end of the plan.

Implementation of the road project will contribute to reduce accidents and the associated loss of resource and human lives. The present and potential high emissions from vehicular congestion, especially in town sections, and the associated impact on public health will be reduced by the project.

The major adverse impacts with the project result from land take for new road pavement & material sites development. This will result in loss of productive agriculture land, loss of settlement house, loss of scattered trees in the acacia woodland. Other adverse impact by the project includes erosion & sedimentation, water pollution risk, public health, HIV/AIDS. With implementation of the proposed mitigation measures & proper compensation the adverse impact can be avoided, minimized or mitigate to acceptable level. Additionally, for implementation of environmental and social management and mitigation cost was estimated to be about **14,578,520**



**birr.** Finally, it was concluded that there is no environmental and social impact that can be irreversible and halts the implementation of the proposed expressway road project.

It was recommended that the proposed road project shall implemented in environmentally friendly, economically viable and socially acceptable manner through practical implementation of the proposed mitigation measures in this ESIA.

## **CHAPTER ONE**

### **1. INTRODUCTION**

The adequacy of the transport sector plays pivotal role in the socio-economic development of a country. Cognizant of this fact, the government of Ethiopia in its Second Growth and Transformation Plan (GTPII) has determined to reduce the average time to reach the nearest all-weather road from its 1.5 hours at its baseline to 0.8 hours by the end of planned period. In order to achieve this target, several road projects has been aggressively launched in many parts of the country. Out of many new projects, Adama-Melkajilo (km-60) expressway road construction project, which covers about 60 km, is the one for which the Ethiopian Roads Authority (ERA) has plan to develop, and AfDB has shown interest to finance the project.

Towards effecting of this plan, ERA had required the services, Review of Concept design, Tender Documents, Cost Estimate and ESIA, and prepare RAP report of the Adama-Awash Expressway to be done by Consultant with relevant experience. To this end ERA appointed Net Consult Consulting Engineers and Architects PLC to perform the aforementioned consultancy services. This document serves as Environmental and Social Impact Assessment (ESIA) report of the Adama-Melkajilo (km-60) construction, through detailed analysis and assessment of baseline environmental and social impacts of selected route and construction material extraction sites; it determines the scope of the study area, proposes environmental and social management plan to avoid or mitigate negative impacts of the road project and enhances the positive impacts of the project. Moreover, it considers environmentally and socially sensitive ecological areas such as national parks, closed forest areas along the road corridor and environmental and social receptors of impacts due to the proposed asphalt road construction project.

This ESIA study was carried out as per the contract agreement. It was undertaken in accordance with the requirements of the ESIA Guidelines of Ethiopia prepared by the former Federal Environmental Protection Authority (EPA) now called Ministry of Environment, Forest and Climate Change (MoEFCC), ERA's Environmental and Social Management Manual (2008) prepared for the road sector and African Development Bank's group Policy on integrated safeguards system (2013). The ESIA Report presents the findings of the ESIA study essentially following the requirements stated in the TOR of the consultancy services as well as the requirements of the ESIA Guidelines.

#### **1.1. Objective**

The objective of the (ESIA) study is to assess the baseline conditions of the existing physical, biological, socio economic and cultural environments of the proposed Adama-Melkajilo (km-60) expressway road construction project corridor, through alternative assessment for the selected alternative route, proposed construction material sources using ERA environmentally critical

areas as well as environmental risk assessment criteria in order to avoid, minimize or mitigate adverse environmental and social impacts that might be encountered due to this road construction project and to incorporate all the environmental and social issues in the detailed design of the road construction. It is intended to ensure that the environmental and social effects of the proposed road construction activities are adequately and appropriately considered before decisions are taken for their implementation.

The detail objectives are:

- ❖ To identify the scope of the study required for the site environmental and social impact assessment report,
- ❖ To describe existing baseline environmental, socio cultural condition of the proposed road corridor,
- ❖ To identify possible environmental and Social impacts (positive and negative) along the proposed road construction project
- ❖ To propose mitigation measures to avoid or minimize negative impacts associated with the proposed road construction to acceptable level,
- ❖ To prepare environmental and social monitoring and management plans
- ❖ To estimate the cost of environmental and social mitigation measures and monitoring plan.
- ❖ Finally to prepare and recommend environmental and social clauses that should be included in the bidding document.

## 1.2. Scope of the ESIA

The scope of the Environmental and Social Impact Assessment study include:

- ☞ Review of the relevant policies and development strategies, legal and institutional frameworks;
- ☞ Identification and description of the existing environmental and socio-economic situation of the project influence area along the road corridor including detours, construction material excavation such as borrow pits, quarry areas and crusher site, and contractor's facility(camps sites, workshops, waste disposal site and storage areas)sites, spoil disposal sites;
- ☞ Carrying out public and stakeholder consultations to gain relevant information about the existing environment and social condition of the road corridor, and the potential benefits as well as site specific adverse effects of the road construction project;
- ☞ Determination of the magnitude and significance of direct and indirect environmental and socio-economic impacts, both positive and negative, likely to result due to the construction and operation of the road project;
- ☞ Prepare and propose SMART i.e. systematic, measurable, achievable ,realistic and time bound that appropriate, site specific and cost-effective mitigation measures to avoid or

minimise to acceptable level of negative environmental and social impacts and enhancement measures for positive impacts,

- ☞ Preparation of appropriate environmental and social management and monitoring framework, which will ensure enhancement of the positive impacts and mitigation of adverse impacts.

### **1.3. Approach and Methodology**

This section describes briefly the approach followed and methodology adopted to obtain the primary and secondary data and information required for description of the baseline environmental and social conditions, prediction and evaluation of adverse and positive environmental and social impacts that help us to devise mitigation measures to avoid or minimize adverse impacts and enhance positive one through development of environmental and social management plans include the following:

- ☞ Review of national environmental policies, strategies, legislations and guidelines;
- ☞ Review of relevant previous studies in the region and relevant literature;
- ☞ Review of ESIA studies of road projects in the region or similar environment;
- ☞ Secondary data collection from Weredas' sector offices;
- ☞ Detailed field observation and investigations along the entire section of project alignment and collection of site specific baseline data and identification of potential adverse environmental and social impacts;
- ☞ Conducting consultations with key stakeholders in the project area including the project affected people;
- ☞ Conducting impact analysis (identification, prediction and evaluation) using methods used in good ESIA practices;
- ☞ Developing feasible and cost-effective mitigation measures in environmental and social management plan.

#### **1.3.1. Review of Relevant Policies, Development Strategies and Legislations**

It is essential and mandatory understanding and considering relevant national policies, development strategies, legislations, donors (AfDB) environmental and social safeguard operational policies and ESIA procedures while conducting environmental and social impacts of development projects. Hence, Ethiopia's environmental policy, development strategies, relevant African Development Bank's group Policy on integrated safeguards system, ESIA guidelines, environmental policies, guidelines, regulation, focused on those guidelines and regulations that are applicable international conventions to which Ethiopia is signatory were collected and reviewed. Based on the review and bio-physical and socio-economic condition of the proposed

road, the requirements of the policy and legal framework were followed in conducting this ESIA study and producing this Environmental and social impact assessment report.

### **1.3.2. Review of Previous Studies and Literature**

Relevant previous studies in the project area and published literature were collected from different sources. Furthermore, Secondary sources, such as, Regional, Zonal and Woreda socio economic profiles and studies; and also reviews of Central Statistical Agency annual abstracts and reports and previous studies made on the region where the project is located were done. Other documents that were reviewed include A 1:50,000 scale topographic maps and Google maps from satellite imagery.

These were reviewed and relevant data and information presented under the general description of this chapter were obtained and used in the baseline description and identify potential impacts of the road project. Lists of the reviewed documents are indicated under reference.

### **1.3.3. Field observation and Data Collection**

After thorough desk review, field observations were made to the proposed Adama-Melkajilo (km-60) expressway road construction project corridor to collect and assess baseline environmental and social conditions and information that would be affected by the very presence of the project. These include Land use/land cover, water resource, physical cultural resource, protected areas and forests, economic activities, Social services, road and transport facilities, health characteristics and the biodiversity (fauna and flora). It also included the identification of sensitive areas both from environmental and social point of view and recording these sites for reference. A 1:50,000 scale topographic maps, digital camera and a hand held GPS were used to survey the area and carried out the following major activities:

- ☞ Conducted visual observation physical environment and socio cultural conditions of the road corridor, collected primary baseline data and identified environmental and social issues likely to be happening due to the construction and implementation of the proposed road project.
- ☞ Collected relevant secondary data from local government offices.

### **1.3.4. Consultation with Public and Stakeholders**

During the field visit, consultations were made with key stakeholders of Adama, Boset, and Minjar Shankora Weredas administration and sector office heads. The main purpose and focus of the consultation was in order to inform them about the proposed road construction project and obtain relevant information on existing conditions or constraints of the study area, identification of potential impacts of the project road, on the need and support required from the Weredas, on data and information required from each Weredas and in identifying environmental and social sensitive locations.



Similarly, public consultation was made with the local community in different locations to solicit the views and opinions of the public about the project road construction and also to identify sensitive environmental and social locations. The public consultation were made with community members drawn from the different groups which includes community elders, town residents, farmers, traders, business men, professionals, politicians, women and youth of the community members. Before the start of consultation, the consultant briefly explained about the proposed road project including its total length, row width and alignment through which it travels and alternative alignments.

The methodology used for the public discussion was open ended where the participants can forward whatever they feel. In addition, their opinions, information and concerns about potential environmental and social issues and their mitigation measure were gathered through informal discussions and interviews.

The information and idea obtained during the consultations are considered in the impact analysis and development of mitigation measures in environmental and social management and monitoring plans as source of indigenous knowledge. The details of the public consultation process and the key findings are described in Chapter 5, and the minutes of the meetings are presented in Annex 2.

#### **1.3.5. Impact Identification**

After the collection of baseline data and stakeholders' point of views, positive as well as adverse environmental and social impacts due to the construction and operation of the proposed road construction project have been identified and their significance were analysed. The identification of impacts resulting from projects takes into consideration and brings together project characteristics and baseline environmental characteristics with the aim of ensuring that all potentially significant environmental and social impacts (adverse or beneficial ) are identified and taken into account in the ESIA study process.

There are different methods of impact identification depending on the nature and complexity of the project under consideration. For the project road under consideration, it has been sensed as sound that the simple matrix be applied as it is based on the following criteria and aims that suit the characteristics and anticipated impacts of the road project.

- i. Compliance with regulations;
- ii. Comprehensive coverage (bio-physical and social, economic impacts);
- iii. Uses qualitative and quantitative information;
- iv. Easy to use;
- v. Unbiased, consistent; and
- vi. Summarizes impacts for use in ESMP.



### **1.3.6. Impact Prediction and Evaluation**

The objective of prediction is to identify the magnitude, extent and duration of changes on the natural and socio-economic environments due to the proposed project activities or actions, in comparison with the baseline situation before the project commence any actions. The identified impacts have been evaluated and classified as impacts on physical, biological, socio-cultural and economic environments. In the case of the Project under consideration, the primary objective of impact prediction and evaluation is to explicitly identify and quantify (qualitatively or quantitatively) the nature and magnitude of the impacts resulting from implementation of the proposed road construction Project.

Once impacts have been predicted, there is a need to assess their relative significance. Criteria for significance assessment include the magnitude of the likelihood of the adverse impact and its spatial and temporal extent, the likely degree of the affected natural and socio-economic environments can be recovered or rehabilitated from adverse impacts due to project activities, ecological value of the affected environment, level of public concern and its political consequences.

When choosing prediction methods, one should be concerned about the appropriateness of the methods for the task involved in the context of available resource. Methods or models for prediction could broadly be classified as explorative and normative approaches.

Explorative methods include: approaches like trend analysis, scenarios, analogies and intuitive forecasting. On the other hand, the normative methods work backwards from desired outcomes to assess whether a project, in its environmental context, is adequate to achieve them.

In the context and framework of the road project under consideration, the explorative method is mainly adopted with combination of trend analysis or forecasting, analogies (transferring experience from other similar projects) and experience and professional judgment of the assessor.

The method of evaluation of impacts can be of various types including simple or complex, formal or informal, quantitative or qualitative, aggregated or disaggregated. The most formal evaluation method is the comparison of likely impacts against legal requirements and standards (like air quality standards, water quality standards, noise levels, etc.).

As such standards are not readily available in Ethiopia, the evaluation of the impacts of the project under consideration will depend on the qualitative, and wherever possible quantitative, approaches to evaluate the extent of the impacts in the short- as well as long-term.

### 1.3.7. Outline of ESMP and Mitigation Measures

Mitigation measures are measures envisaged in order to avoid, reduce and, if possible remedy significant adverse impacts that have resulted from implementation of proposed road construction project.

Therefore, corresponding to the magnitude and significance of adverse impacts due to the proposed road construction project and cumulative impacts in the area, appropriate site specific mitigation measures have been recommended to prevent or minimize the adverse impacts in the environmental and social management plan detailed in chapter 9. Implementation of mitigation measures follow the hierarchy given below:

- ☞ Avoid impacts at the source;
- ☞ Reduce impacts at source;
- ☞ Reuse than dispose wastes;
- ☞ Abate impacts at receptor;
- ☞ Rehabilitate/restore to its original or other valuable condition;
- ☞ Compensate in kind; compensate by other means; and enhance positive impacts.

### 1.4. Structure of the ESIA Report

This ESIA report is structured in to nine chapters.

**chapter one:-**is an introduction that provides background information on the road construction, presents objectives, scope of the ESIA, approaches and methods adopted and followed while data collection, and detailed project activities.

**Chapter two:** - provides a clear review on description of projects, and Impacts from road project development that are related to the site location condition, project's nature, scale and characteristics in the various development phase of the project starting from design, mobilization, construction, decommissioning and operation of the road project.

**Chapter three:** -provides a clear review on environmental policies and legal frameworks of the country and presents policy matters relevant to the project under consideration. That is, the Administrative, Environmental, Policy and Legal Frameworks; that of the Government and Donors-notably the African Development Bank.

**Chapter four:** - explains about the description of baseline environmental condition of the project area which consists of physical environment, biological environment and socio-economic condition of the road corridor.

**Chapter five:** - presents the process followed and outcomes of public and stakeholder's consultation and participation about the negative and positive impacts of the proposed road construction.

**Chapter six:** - presents detailed about the potential impact and mitigation measures proposed to overcome or minimize the adverse impacts due to the proposed road construction on the natural environment and socio economic condition along the road corridor.

**Chapter seven:** -presents analysis of alternative conducted with regard to project alternatives, route selection options and construction technology assessed to avoid or minimise adverse environmental and social impacts.

**Chapter eight:** explains about the detailed environmental and social management and monitoring plans that can be used to monitor the practical implementation of the proposed and bodies involved in monitoring activities such as institution involved in any ways of the practical implementation of the environmental and social management plan with estimated environmental and social mitigation and monitoring costs.

**Chapter nine:** - contains the conclusions drawn from the Study and major recommendations forwarded for the sustainability of the Project; and major environmental and social issues that should be included in the bidding documents are listed. Finally, this document has references used and Annexes attached to the Report.

## **2. DESCRIPTION OF THE ROAD UPGRADING PROJECT**

### **2.1. Overview**

Impacts from road project development are related to the site location condition, project's nature, scale and characteristics in the various development phase of the project starting from design, mobilization, construction, decommissioning and operation of the road project. The construction contract type and construction technologies can also influence environmental and social impacts management of an intended road project.

This chapter starts by providing brief description of the existing road condition and justification to the project. Then presentation on detail of components and activities envisaged in the updated road design based on discussion and exchange of information made with the highway and material engineers during office deskwork and onsite visit. Furthermore, possible design consideration communicated with the highway design engineer to minimize or avoid social and environmental issues/risks. At the end of the chapter, brief description of the contract in relation to environmental and social management of the project is provided.

### **2.2. Project Description**

The proposed Adama-Melkajilo (km-60) expressway road project:

- ☞ Has length of 60km ;

#### **Location:**

- ☞ Located in the Oromia and Amhara Regional States.
- ☞ Traverses the two Zonal administrations of those Regions, namely east Showa zone of Oromia and North Showa zone of Amhara.
- ☞ Three Weredas traversed are Adama and Boset of east Showa zone, and Minjar Sharkor of North Showa zone of Oromia and Amhara Regional States respectively.

#### **Accessibility:**

- ☞ The starting point of the road project is at outskirts of Adama town, can be accessed after 93km travel from Addis via the Addis-Adama-Mille trunk road, or Addis-Adama expressway for a length of 76km.
- ☞ The project road starts at 534202 E, 944468 N and ends at 571624 E, 988322 N.

#### **The landscape comprises:**

- ❖ topography of the road section is flat to Undulating rolling;
- ❖ Mountainous/hilly terrain on the left and right sides of the road at middle section;

#### **Elevation range:**

- ❖ Minimum of 800 meter above sea level
- ❖ Maximum of 1700 meter above sea level.

### Road standard and alignment:

- ❖ The Mainline Expressway - AASHTO's freeway standards and ERA DC-5 standard for Link and Access Roads are adopted for the road project.
- ❖ The road project will follow new alignment in the farm land, rural settlement and grazing lands general.

### Proposed structures for protect slope instability:

- ❖ Construction of masonry retaining wall to protect slope instability in the cut and fill section;
- ❖ Construction of about 120 km paved open ditch on the road sides;
- ❖ Channelization of 20 km unpaved earthen ditch in the rural section.

### Cut and fill:

- ❖ cutting will be done from spoil will be generated;
- ❖ Fill site in which spoil generated from cut section can be reused;
- ❖ There will be leftover spoils can be disposed in the spoil disposal areas;

### Land Expropriation and PAPs:

- ❖ The project expropriates 568.71 hectare of farm lands within the 90m of right of way, and construction material excavation.
- ❖ There are 782 Households will permanently be affected due to their lands are expropriated in the RoW.
- ❖ There are 123 households whose houses are in the ROW and require resettlement or physical relocation due to the proposed road upgrading. In general there will be 3296 persons to be affected by the proposed Adama-Melkajilo (km-60) expressway road construction project.
- ❖ There are totally 11 public utility lines such as electric pole and water pipeline that will be affected due to road construction; out of which electric poles are 5 and water pipeline are 6 in number. 534109.811E, 944258.058N, and 571531.594 E, 988112.916 N

Table 2-1: Project Description

Project Name	Adama-Melkajilo (km-60) Expressway Project
Project No:	
Funding	FDRE
Region/zone	Oromia regional state east Showa zone and Amhara regional state North Showa zone
Starting point	Adama at 534109.811E, 944258.058N
Ending point	Km. 60 at 571531.594 E, 988112.916 N
Length (km)	60 km
Road functional classification	Expressway
Climate classification	C2, C3 and C4
Elevation(m) (min-max)	800 -1700 m a.s.l.



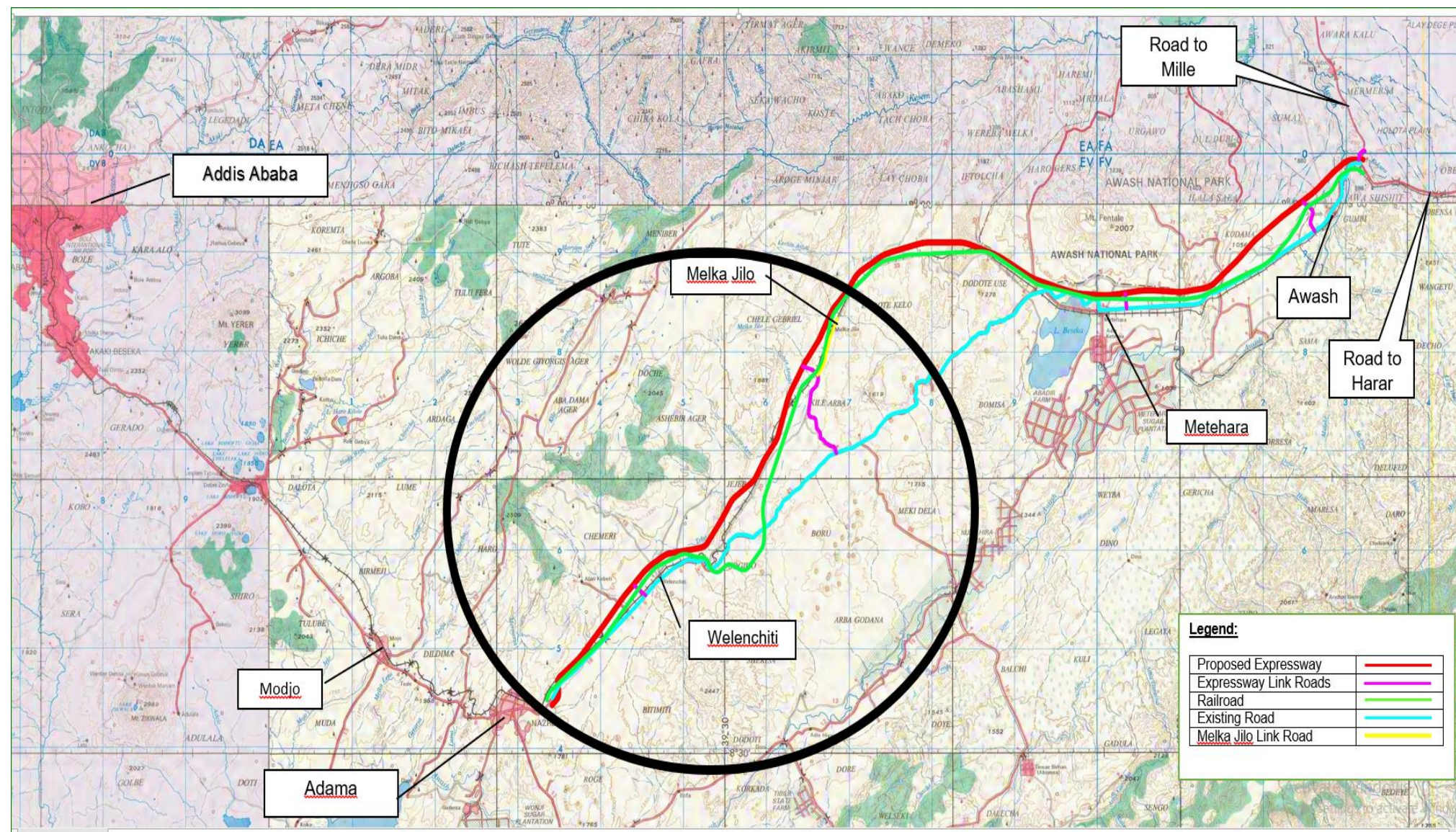


Figure 2-1: Location Map of the Project Area



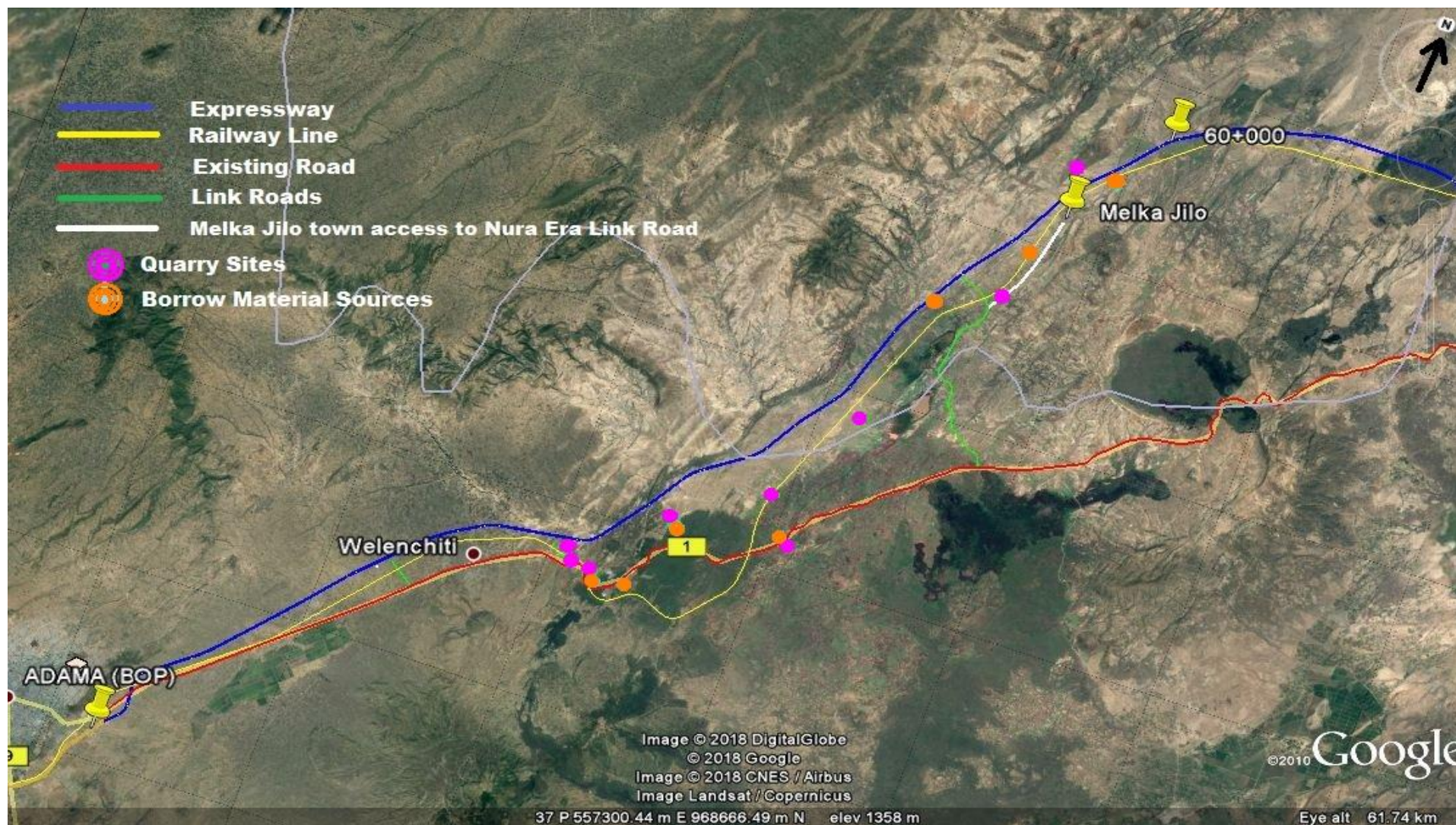


Figure 2-2: Map of Project Influence Area

## 2.3. Project Activities

The road project work comprises of, design, construction, and maintenance during warranty period activities. The design and feasibility study works mainly focus on site investigation and site surveying, material investigations, quarry and borrow site identification, assessment of existing environmental and social conditions.

The construction work activities include site clearing for proposed expressway road length as well as road width, excavation and grading, filling, compacting, improvements in drainage structures, waterways crossing, paving, quarry and borrow material development, establishing camps, garage site and material storage sites, temporary roads construction and maintenance.

The construction phase activity deploys a number of workforce, machinery and transport vehicles. The worker community deployed during the construction work includes both people coming from within and outside of the project area. Skilled and semi-skilled manpower will be mainly from outside while unskilled labour force required will be recruited from the localities of the road project area. The major part of the workers would be temporarily residents of the project area. Before the commencement of main road construction and ancillary facility development the following precondition has to be fulfilled:

- ☞ Developing grievance committee;
- ☞ Developing property valuation committee;
- ☞ Registration properties and lands acquired by project and valuation in cash or kind;
- ☞ Announcing the amount/ kind to be given as compensation to the PAPs;
- ☞ Paying compensation to the PAPs;
- ☞ Relocation or resettlement of houses, utilities (water pipeline, electric poles and telecommunication network line) and fences in the RoW and on the ancillary facility areas if any.

### 2.3.1. Main project activities

The construction of the road carriage way will constitute the principal activities of the project. It has several specialized physical components (drainages, bridges, culverts, soil retaining structures and over and underpasses etc.) that have to be undertaken to meet the required design standard by taking into consideration environmental and social issues.

Therefore, the major activity components of the principal work are briefly described as follows.

#### 2.3.1.1. Earthwork

Earthworks will mainly comprise site clearance, paving, excavations, embankment fills associated with vertical alignment adjustments to ease very depressed grounds and to improve sight distances and avoid water inundation. In addition, as the road line is new alignment need to be fixed to avoid the overflow and flooding problems. High rise embankments are required at several





locations, to protect the paved road from flooding damages and water inundation. At some locations retaining structures may also be required at steep sloped cut hill sides, at river crossings & to support the raised embankments, and to stabilize the fills.

#### **2.3.1.2. Construction of structures**

Even though there is no perennial river that can be crossed by the expressway, there are seasonal streams and drainage lines that encounter along the route and that require crossing structures, bridges, and culverts etc. New bridges and culvert structures will be constructed along the major new alignment section of the road over those seasonal streams and drainage lines. Accordingly, 3 bridges and 122 culverts were proposed throughout the stretch of the expressway road.

#### **2.3.1.3. Drainage and Channelization works**

Along the road stretches where necessary, especially in rural areas, lateral drainages will have to be constructed. These will generally comprise open triangular or trapezoidal channels, where necessary the channels will be lined with concrete or stone pitching to protect erosion. Discharge points will be provided at reasonable intervals to maintain the natural drainage line of the runoff water as far as possible. Energy dissipaters and erosion protection works at drainage outlet will be installed where necessary to reduce erosion effects.

#### **2.3.1.4. Construction of Over and Underpasses**

The Expressway is a closed type that shouldn't be interrupted by motorized and none motorized crossing, so that roads and foot path crossings should be constructed as over or Under Passes at different intervals as required to avoid defragmentation of social cohesion. Moreover, the following table elaborates the provisions for over and underpasses.

Table 2-2: Proposed over and underpasses

<b>No.</b>	<b>Type of Over/Under Pass</b>	<b>Number of Over/Under Pass</b>
1	Pedestrian Over Pass	3
2	Pedestrian Under Pass	6
3	Railway Over Pass	3
4	Vehicular Over Pass	15
5	Vehicular Under Pass	2
6	Existing Road Over Pass	1
<b>Total</b>		<b>30</b>

### 2.3.1.5. Link and Interchange Roads Construction

#### Link roads

Being the Expressway is aligned far from towns and densely settled areas, link roads will be constructed to access those settlement areas and that can serve also as inlets outlets route for the expressway.

Accordingly, two link roads were proposed for the Adama- Melkajilo (Km-60) expressway. Detailed explanation that indicate the location or chain age and the name of the town or villages to be linked with the expressway presented in the table below.

Table 2-3: proposed link roads

Sr.no.	Name of Link road	Station
1	Welenchiti Link	16+100
2	Nura Era Junction Link	47+800
3	Access road to Melkajilo Town from Nura Era junction for a length of 6.3km	47+800

#### Interchanges

Interchanges vary from single ramps connecting local streets to complex and comprehensive layouts involving two or more highways. Hence depending on the site condition three interchanges that means Adama East at 0+500, to Welenchiti at 16+100 and to Nura Era at 47+800 were proposed.

### 2.3.2. Ancillary Facilities

There is need of significant ancillary facilities that will enable the contractor to realize the performances of the major road construction activities. Among these construction material extraction site development and asphalt plant sites, construction workers camp site and workshops are important. The following ancillary facility and activities will be major areas of focus along the road corridor.

#### 2.3.2.1. Borrow Pits Development

Burrow pit development will be one of the material source required for sub-base construction of the express way along the road project, and may be needed for fill in sections where adequate spoil from cut to fill material is not available or quite impossible due to its quality. Furthermore, in the flat terrain areas, water inundation and flooding of the road pavement can be challenging. To

overcome this problem, high embankment fill will have to be constructed over substantial length of the road segment.

Therefore, several borrow pits are needed to be opened by the contractor along the alignments. The material investigation has identified potential material sites as part of the design service. The contractor, subject to the approval of the engineer, will determine the location of additional sites that may be needed upon commencement. Though major material sites are identified during the design, and the locations are defined accordingly.

There are adequate potential sources for borrow pit material along the road route, and within economical distances. Some of the borrow materials for Embankment/Fill for the project are identified at Sites listed as in tables below.

Table 2-4: Potential sources for borrow pit material along the Expressway corridor

Ref. No.	GPS Coordinates	Chain age	Offset	Type of Material	Status and assessed quantity
BP1	E553269 N958376	26+400Km	200m RHS	Boulder size black scoria	New source and >500,000m3
BP2	E554628 N958734	27+600Km	300m RHS	Red scoria	New source and >500,000m3
BP3	E556080 N962195	31+600Km	410m RHS	Scoria mixed with silty soil	New source and >500,000m3
BP4	E560862 N963336	34+300Km	50m LHS	Black and Red Scoria (cinder)	New source and >500,000m3
BP5		46+200Km	A long centerline	Natural Gravel Sub base source	Existing and ≤500,000m3
BP6	E567111 N980586	53+600Km	1Km LHS	Natural Gravel of Rhyolite welded tuff origin	Existing and ≤500,000m3
BP7	E569828 N985206	59+100Km	A long centerline	Natural Gravel material	Existing and ≤500,000m3

The dominant land cover of the material site is bush cover and shrubs, and no major impacts of vegetation clearance may be caused. Additionally, the following activities very important at borrow pit sites:

- ☞ Constructing dry pits latrines near these borrow areas;
- ☞ Site clearance (removal of the existing overburden the vegetation and top soil);
- ☞ Stockpile top soil (Minimize the storage period of topsoil stockpile to control erosion and run– off and maintain top soil quality);
- ☞ Tree planting and grassing;
- ☞ Handing over site to the community or local administration.

### 2.3.2.2. Quarry Sites

Large quantities of crushed stone will be needed for base course and surfacing material. To fulfil this demand, quarry sites are identified at different sites along the road corridor by the consultant during the design and any additional sites that may be required upon execution of the work will be determined by the contractor to meet further needs of the road construction work but it will be subject to the approval of the Engineer. Quarry sites for selected material are needed at about 10kms interval, while quarries of stone blocks for gravel are required at 30-kms interval along the road. Quarry material sources are available within reasonable haulage distances and adjacent to the road alignments; but need access roads to material sites are inevitable. The quarry sites identified and located by the material investigation team are indicated in the table below. Furthermore, the following facilities and activities are very important during quarry site developments:

- ☞ Constructing access road to quarry site;
- ☞ Constructing dry pits latrines;
- ☞ Site clearance (removal of the existing overburden, vegetation and top soil);
- ☞ Extracting stone quarry using jack hammer machineries or blasting;
- ☞ Leveling spoil stockpile after completing material excavation;
- ☞ Spreading topsoil stockpiled over leveled spoil stockpile;
- ☞ Tree planting and grassing;
- ☞ Handing over site to the community or local administration.

Table 2-5: Potential Quarry material sources

Ref. No.	GPS coordinate	Chain age	Offset	Type material of	Over burde n (m)	Accessibi lity	Quantity
Q1	E735756N717849	0+000	LHS,1.02 6Km	Fresh basaltic rock	0.5	Ok	Ample



Ref. No.	GPS coordinate	Chain age	Offset	Type material of	Over burden (m)	Accessibi lity	Quantity
Q2	E0551485 N0959576	24+100	RHS,50m	Basaltic rock with scoria	0.5	Ok	600, 000
Q3	E0551875N0959159	24+500	RHS,500 m	Fresh basaltic rock	0.5	Near to main road	50, 000
Q4	E0552975 N0958762	26+000	RHS, 50m	Fresh basaltic rock	0.5	Near to main road	160, 000
Q5	E0553826 N0959941	28+500	RHS,105 0m	Basaltic rock	1	Near to main road	3600, 000
Q6	E0555658 N0962554	31+600	LHS, 150m	Fresh basaltic rock	1	Near to main road	300, 000
Q7	E0561131 N0963142	34+200	RHS,50m	Fresh basaltic rock	0.5	Existing earthen road	100,000
Q8	E0559756 N0965222	35+700	RHS,2km	Fresh close up scoria	Nil	Ok	25, 000
Q9	E0562391 N0970184	42+000	CL	Not sampled	0.5	Near to main road	4000, 000
Q10	E0566493 N0978091	51+100	RHS,60m	Not sampled	0	Near to main road	3,000,00 0
Q11	E0567739 N0985316	58+500	LHS,1.5K m	Fresh to slightly basaltic & masonry stone	1	Existing earthen road	800,000

### 2.3.2.3. Water source for construction works

Large volume of water is required both for the construction activities and for the domestic uses of the workforce. Water is required for soil compaction in embankment, sub-grade and for concrete works. Searching for and identifying potential water sources is, therefore, essential tasks for the contractor.

The Weredas traversed by the Expressway are water stressed areas, and finding water sources at reasonable distances may be one of the constraint for the Contractor. Awash River is the only perennial river along the road route, and that can be dependable for the project as surface water source. However, there are some seasonal rivers and streams in the area within acceptable

distances and also along the road route. The Contractor may have to look into developing its own water sources, in areas where natural surface water source is scarce.

#### **2.3.2.4. Construction Camp Site and Workshops**

The Contractor will establish main construction camps at convenient location within the specified sites along the road corridor. The facilities will include offices and residential accommodation for senior supervisory consultant staff and contractor workforce, workshops and vehicle maintenance facilities and storage areas. Subsidiary camps may also need to be established, with considerably reduced facilities and preferably away from residential and urbanized areas. One central main camp will be required for the respective consultant and contractor work forces.

#### **2.3.2.5. Climate Change Abatement Activities**

As the road corridor is desert, it is highly prone to climate change that more intensifies adverse environmental and social impacts due to drought. Therefore, climate change and drought abatement is very important along the road corridor. Therefore, the contractor shall realize the climate change resilient economic strategy of the country through tree plantation in collaboration with NGOs, local government bodies to alleviate drought and combat desertification along the road.

## **CHAPTER THREE**

### **3. ENVIRONMENTAL POLICY, LEGISLATIONS, GUIDELINES AND INSTITUTIONS**

#### **3.1. Overview**

Understanding of available policies and administrative structures, under which the project implementation and the environmental assessment and management study operates, would assist in the efforts made for sustainable development and natural resource conservation measures. Implementation of proposed road projects should be planned and executed in accordance with the available policies and legal frameworks.

The policies, legislations and guidelines which govern the way in which environmental and social impact assessments are conducted in Ethiopia, and the framework in which the environmental and social management of the proposed road works would be undertaken have been identified and reviewed during the ESIA process. These are briefly described in the following sections.

#### **3.2. Relevant National Policies and Strategies**

##### **3.2.1. Conservation Strategy of Ethiopia**

The CSE was approved by the Federal Government, and it is an important policy document. It provides a strategic framework for integrating environmental planning into new and existing policies, programs and projects. The CSE provides a comprehensive and rational approach to environmental management in a broad sense, covering national and regional strategies, sectorial and cross-sectorial policies, action plans and programmes, as well as providing the basis for development of appropriate institutional and legal frameworks for implementation.

The plan is comprehensively presented the exiting situation within the country and gave priority actions plan on the short and medium term. In particular, it recognizes the importance of incorporating environmental factors into development activities from the outset, so that planners may take into account environmental protection as an essential component of economic, social and cultural development.

##### **3.2.2. Environmental Policy of Ethiopia**

The environmental policy of Ethiopia (EPE) of the FDRE was approved by the council of ministers in April 1997. The policy has the broad aim of rectifying previous policy failures and deficiencies, which in the past, have led to serious environmental degradation. It is fully integrated and compatible with the overall long-term economic development strategy of the country, known as Agricultural Development-Led Industrialization (ADLI), and other key national policies.

The EPE's overall policy goal may be summarized in terms of the improvement and enhancement of the health and quality of life of Ethiopians, and the promotion of sustainable social and economic development through the adoption of sound environmental management principles.

Specific policy objectives and key guiding principles are set out clearly in the EPE, and expand on various aspects of the overall goal. The policy contains sectorial and cross-sectorial policies and provisions required for the appropriate implementation of the policy itself.

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

The policy also establishes the authority of the Environmental Protection Agency (EPA) to harmonize sectorial development plans and to implement an environmental management program for the country. It also imparts political and popular support to sustainable use of natural, human-made and cultural resources at the federal, regional, zonal, Woreda and community levels.

### 3.2.3. Sectorial Policies

**Water Resource Policy:** The Ministry of Water Resources formulated the federal water resource policy in 1998 for comprehensive and integrated water resource management. The overall goal of the water resources policy is to enhance and promote all national efforts towards the efficient and optimum utilization of the available water resources for socio-economic development on sustainable bases. The document includes policies to establish and institutionalise environment conservation and protection requirements as integral parts of water resources planning and project development.

**Wildlife Policy:** The Wildlife Policy was developed in 2006 by the ministry of agriculture and rural development. The primary objective of the policy is to create conducive environment for the preservation, development and sustainable utilisation of Ethiopia's wildlife resources for social and economic development and for the integrity of the biosphere/ biodiversity. It covers a wide range of policies and strategies relating, amongst others, to wildlife conservation and protected areas with four categories from the highest protection ranking 'national park', followed by 'game reserve' and 'Sanctuary' to 'controlled hunting area'.

**National Biodiversity Conservation and Research Policy:** This policy was adopted in 1998 and provides policy directives with regard to conservation, development and sustainable utilization of the genetic resources and essential ecosystems of the country as well as the need to build national capacity to collect, evaluate, conserve and utilize the country's biodiversity. The need to regulate access to genetic resources through various measures, including legislation and building appropriate institutional structures and mechanisms is also emphasized. Moreover, strengthening capacity for information collection and documentation, encouraging networking and



generally integration of biodiversity conservation, research and development elements in education and general awareness programmes are considered important.

**National Population Policy:** This policy was issued in April 1993 and aims at closing the gap between high population growth and low economic productivity through a planned reduction in population growth combined with an increase in economic returns. With specific reference to natural resources, the main objectives of this policy are making population and economic growth compatible and the over-exploitation of natural resources unnecessary; ensuring spatially balanced population distribution patterns, with a view to maintaining environmental security and extending the scope of development activities; improving productivity of agriculture and introducing off-farm/ non- agricultural activities for the purpose of employment diversification; and maintaining and improving the accommodating capacity of the environment by taking appropriate environmental protection and conservation measures.

**National Policy on Women:** This policy was issued in March 1993 emphasizing that all economic and social programs and activities should ensure equal access of men and women to the country's resources and in the decision making process, so that they can benefit equally from all activities carried out by the Federal and Regional Institutions. Among the main policy objectives is that laws, regulations, systems, policies and development plans that are issued by the government should ensure the equality of men and women, and that special emphasis should be given to the participation of rural women.

**Ethiopia's Health Policy:** This policy was issued in 1993, with the aim of giving special attention to women and children, to neglected regions and segments of the population, and to victims of man-made disasters. The priority areas of the policy are in the field of information education and communication (IEC) of health to create awareness and behavioural change of the society towards health issues, emphasis on the control of communicable disease, epidemics, and on diseases that are related to malnutrition and poor living condition, promotion of occupational health and safety, the development of environmental health, rehabilitation of health infrastructures, appropriate health service management system, attention to traditional medicines, carrying out applied health research, provision of essential medicines, and expansion of frontline and middle level health professionals.

**National HIV/AIDS Policy:** The FDRE issued a national HIV/AIDS policy in 1998, which calls for an integrated effort of multi-sectorial response to control the HIV/AIDS pandemics. The policy urges communities at large, including government ministries, local governments and the civil society to assume responsibility for carrying out HIV/AIDS awareness and prevention campaigns. The general objective of the policy is to provide an enabling environment for the prevention and control of HIV/AIDS in the country. In order to address the problem and coordinate the prevention and control activities at national level, in 2000 national AIDS council was established under the

chairmanship of the country's president, and in 2002 HIV/AIDS prevention and control office was established.

**ERA's HIV/AIDS Policy at Work Places:** The transport sector, to which ERA belongs, is among the most susceptible sectors for the spread of HIV/AIDS. It was in recognition of this that ERA has issued sectorial policy for HIV/AIDS in the work places of ERA in June 2004. The policy acknowledges that HIV/AIDS is a reality in the work places, which may have detrimental effects on its work force. The policy is prepared with the objectives of developing and implementing an effective workplace programme. Some of the policy objectives of ERA's HIV/AIDS policy are to create awareness among its employees and promote effective ways to managing HIV/AIDS and to create supportive environment for those affected. The principles of the policy are to ensure that employees living with HIV/AIDS have the same right and obligations; to avoid discriminations and stigmatization of employees with HIV/AIDS to receive equal treatment; seek to minimize the social and development consequences, provide support counselling and educational services to infected and affected employees; to establish and maintain an employee assistance programme and ensure sustainable resource for the prevention and control.

#### **3.2.4. ERA's Resettlement/Rehabilitation Policy Framework**

ERA's resettlement/rehabilitation policy framework (RPF), issued in February 2002 and revised in December 2006, contains various elements that ERA should follow regarding compensation procedures. The RPF also clarifies the principles of reinforcement measures for the positive social impacts and mitigation measures for addressing negative social impacts induced by road projects. The policy framework stresses the need to consult and compensate project-affected persons (PAPs) in relation to resettlement/relocation and for loss of assets and properties that are affected due to construction of road projects. Regarding compensation procedures and establishing compensation rates, ERA establishes compensation committees at project area level by enlisting representatives from government offices and representatives of PAPs. The compensation committees have the function of conducting the registration of affected properties and the number of PAPs and determining the compensation rates. If a dispute arises regarding the amount of compensation to be paid to the project affected persons, recourse is available to the courts. However, aggrieved PAPs will also have a chance to make their complaints to the Right of Way (ROW) agent, the consultant and finally to the compensation committee.

### **3.3. The AfDB Group's Integrated Safeguards Policy Statement**

#### **3.3.1. Overview**

The Bank's Integrated Safeguards Policy Statement sets out the Bank's own commitments to and responsibilities for delivering the ISS to: ensure the systematic assessment of environmental and social impacts and risks; apply the OSs to the entire portfolio of Bank operations; support clients

and countries with technical guidance and practical support in meeting the requirements; implement an adaptive and proportionate approach to environmental and social management measures to be agreed with clients as a condition of project financing; ensure that clients engage in meaningful consultations with affected groups; and respect and promote the protection of vulnerable groups, in a manner appropriate to the African context. The Policy Statement also sets out the Bank's commitment to harmonise environmental and social safeguards among MFIs and to co-ordinate with co-financing partners. Further, it highlights the importance of compliance monitoring and supervision to ensure that the safeguards are implemented. Finally, it includes a list of goods harmful to the environment for which Bank-provided funds may not be used in either public or private investments.

The ISS is designed to promote the sustainability of project outcomes by protecting the environment and people from the potentially adverse impacts of projects. The Bank requires that borrowers/clients comply with these safeguards requirements during project preparation and implementation.

The Integrated Safeguards Policy Statement sets out the basic tenets that guide and underpin the Bank's approach to environmental safeguards. In addition, the Bank has adopted five OSs, limiting their number to just what is required to achieve the goals and optimal functioning and this section presents summary description of the operational safeguards focusing on those that are likely to be triggered by the proposed Adama-Melkajilo (km-60) expressway road project.

### **3.3.2. OS1: Environmental and Social Assessment (ESA)**

Environmental and Social Assessment is one of the 5 operational safeguards of the African Development Bank. This overarching safeguard governs the process of determining a project's environmental and social category and the resulting environmental and social assessment requirements: the scope of application; categorisation; use of a SESA and ESIA, where appropriate; Environmental and Social Management plans; climate change vulnerability assessment; public consultation; community impacts; appraisal and treatment of vulnerable groups; and grievance procedures. It updates and consolidates the policy commitments set out in the Bank's policy on the environment. The safeguards aimed to avoid adverse impacts of projects on the environment and affected people, while maximising potential development benefits to the extent possible; Minimise, mitigate, and/ or compensate for adverse impacts on the environment and affected people when avoidance is not possible; Help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

The Bank classifies a proposed project into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. The four categories are:

**Category 1:** If the proposed projects are likely to induce significant and/or irreversible adverse environmental and/or social impacts, or to significantly affect environmental or social components that the Bank or the borrowing country considers sensitive. Some programme-based operations or other regional and sector programme loans that have significant adverse environmental or social risks and are deemed to be Category 1. In some cases, projects are included in Category 1 because of their potential cumulative impacts or the potential impacts of associated facilities. Category 1 projects require an ESIA, both leading to the preparation of an ESMP.

The category 1 categorisation may be comparable with schedule 1 designation in Ethiopian EIA guideline document (EPA, 2000).

The proposed Adama-Melkajilo (km-60) expressway project would fall under category 1 because it is expected to bring a number of significant negative environmental and social impacts, among which the most important are destruction to vegetation, dust and noise pollution, farm land expropriation, and impact on road side infrastructures such as water pipeline, electric line and some houses located within the ROW. It would also cause adverse impacts due to borrow, quarry site material excavation. Construction camp location would take farm land and the liquid and solid waste from camp site would affect the surface and ground water of the area if not managed properly. Hence, it has been subjected to an ESIA study in order to identify potential impacts and propose mitigation measures in order to avoid or reduce the potentially significant adverse impacts to acceptable levels. In addition, an environmental and social management plan (ESMP) that encompasses mitigation measures, monitoring and institutional frameworks and responsibility required implementing the proposed mitigation measures during construction and operation phases.

**Category 2:** projects are classified as category 2 if the projects are likely to have detrimental site-specific environmental and/or social impacts that are less adverse than those of Category 1 projects.

Likely impacts are few in number, site-specific, largely reversible, and readily minimised by applying appropriate management and mitigation measures or incorporating internationally recognised design criteria and standards. An operation that involves resettlement activity for which an Abbreviated Resettlement Action Plan (ARAP) is required under the ESAPs is classified as Category 2. Most programme based operations and regional or sector programme loans designed to finance a set of subprojects approved and implemented by the borrower or client are included in this category unless the nature, scale or sensitivity of the intended pipeline of subprojects involves either a high level of environmental and social risk or no such risk.

Category 2 projects require an appropriate level of environmental and social assessment (SESA for programme operations, investment plans, and some corporate loans, or ESIA for investment projects) tailored to the expected environmental and social risk so that the borrower can prepare

and implement an adequate ESMP (for an investment project) or ESMF (for a programme operation), to manage the environmental and social risks of subprojects in compliance with the Bank's safeguards.

**Category 3:** A project is classified as Category 3 if it is likely do not directly or indirectly affect the environment adversely and are unlikely to induce adverse social impacts. They do not require an environmental and social assessment.

Beyond categorisation, no action is required. Nonetheless, to design a Category 3 project properly, it may be necessary to carry out gender analyses, institutional analyses, or other studies on specific, critical social considerations to anticipate and manage unintended impacts on the affected communities.

**Category 4:** A proposed project is classified as Category 4 projects involve Bank lending to financial intermediaries that on-lend or invest in subprojects that may produce adverse environmental and social impacts. Financial intermediaries include banks, insurance, reinsurance and leasing companies, microfinance providers, private equity funds and investment funds that use the Bank's funds to lend or provide equity finance to their clients. Financial intermediaries also include private or public sector companies that receive corporate loans or loans for investment plans from the Bank that are used to finance a set of subprojects. Financial intermediary subprojects equivalent to Category 1 and Category 2 are subject to the relevant OS requirements, as if they were directly financed Category 1 or Category 2 projects. However, if a client will use a Bank corporate loan to finance high-risk investment projects known at the time of loan approval, the loan can be considered Category 1.

### **3.3.3. OS 2: Involuntary resettlement**

The objectives of this involuntary resettlement are to avoid involuntary resettlement where feasible, or minimise resettlement impacts where involuntary resettlement is deemed unavoidable after all alternative project designs have been explored; ensure that displaced people are meaningfully consulted and given opportunities to participate in the planning and implementation of resettlement programmes; ensure that displaced people receive significant resettlement assistance under the project, so that their standards of living, income-earning capacity, production levels and overall means of livelihood are improved beyond pre-project levels; provide explicit guidance to borrowers on the conditions that need to be met regarding involuntary resettlement issues in Bank operations to mitigate the negative impacts of displacement and resettlement, actively facilitate social development and establish a sustainable economy and society and guard against poorly prepared and implemented resettlement plans by setting up a mechanism for

monitoring the performance of involuntary resettlement programmes in Bank operations and remedying problems as they arise.

Further, it seeks to ensure that when people must be displaced they are treated fairly, equitably, and in a socially and culturally sensitive manner; that they receive compensation and resettlement assistance so that their standards of living, income-earning capacity, production levels and overall means of livelihood are improved; and that they share in the benefits of the project that involves their resettlement.

The term resettlement refers to both physical and economic displacement. Resettlement is considered involuntary when the project-affected people are not in a position to refuse the activities that result in their physical or economic displacement. This occurs in cases of lawful expropriation or temporary or permanent restrictions on land use, and in negotiated settlements in which the buyer can resort to expropriation or impose legal restrictions on land use if negotiations with the seller fail.

This policy may be triggered by Adama-Melkajilo (km-60) expressway road project as its implementation may displace people residing in different scattered rural section and villages within the ROW and other ancillary facilities.

#### **3.3.4. OS 3: Biodiversity, renewable resources and ecosystem services**

This Operational Safeguard (OS) outlines the requirements for borrowers or clients to (i) identify and implement opportunities to conserve and sustainably use biodiversity and natural habitats, and (ii) observe, implement, and respond to requirements for the conservation and sustainable management of priority ecosystem services. It reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote the sustainable management and use of natural resources. It also aligns with the Ramsar Convention on Wetlands, the Convention on the Conservation of Migratory Species of Wild Animals, the Convention on International Trade in Endangered Species of Wild Flora and Fauna, the World Heritage Convention, the UN Convention to Combat Desertification and the Millennium Ecosystem Assessment. Its recommendations also align with the International Plant Protection Convention, which covers the movement of invasive alien species, pests and pest risk analysis for quarantine pests, including analysis of environmental risks and living modified organisms. Therefore, this operational safeguard is not triggered by the proposed Adama-Melkajilo (km-60) expressway road project as it never pass through biological diversity conservation area.

#### **3.3.5. OS 4: Pollution Prevention & Control, Hazardous Materials & Resource Efficiency**

This OS outlines the main pollution prevention and control requirements for borrowers or clients to achieve high quality environmental performance, and efficient and sustainable use of natural resources, over the life of a project. The specific objectives are to: manage and reduce pollutants



resulting from the project including hazardous and non-hazardous waste so that they do not pose harmful risks to human health and the environment; and set a framework for efficiently using all of a project's raw materials and natural resources, especially energy and water.

This OS draws on and aligns Bank operations with existing international conventions and standards related to pollution, hazardous materials and waste, and related issues. It also requires compliance with internationally accepted environmental standards, particularly the World Bank Group Environmental Health and Safety (EHS) Guidelines.

This OS applies to all Bank lending operations, both public and private sectors, and project activities funded through other financial instruments managed by the Bank. Its applicability is established during the environmental and social assessment process.

The borrower or client applies pollution prevention and control measures consistent with national legislation and standards, applicable international conventions, and internationally recognised standards and good practice, particularly the EHS Guidelines.

When national legislation and regulations differ from the standards and measures presented in the EHS Guidelines, borrowers or clients are normally required to achieve whichever is more stringent. However, if less stringent levels or measures are appropriate to specific project circumstances, the borrower or client provides full and detailed justification for any proposed alternatives through the environmental and social assessment process. This justification demonstrates that the choice of any alternate performance levels is consistent with the overall requirements of this OS and internationally agreed best available techniques and best environmental practice.

The United Nations term "cultural property" includes sites having archaeological (prehistoric), paleontological, historical, religious, and unique natural values. Cultural property, therefore, encompasses both remains left by previous human inhabitants (including middens, shrines, and battlegrounds), and unique natural environmental features.

The World Bank requires that before proceeding with a project that may risk damaging cultural property (e.g., any project that includes large scale excavations, movement of earth, superficial environmental changes or demolition) the cultural property aspects of the project site must be determined.

### **3.3.6. OS 5: Labour conditions, health and safety**

This OS outlines the main requirements for borrowers or clients to protect the rights of workers and provide for their basic needs. The specific objectives are to: protect workers' rights, establish, maintain, and improve the employee–employer relationship; promote compliance with national legal requirements and provide supplemental due diligence requirements where national laws are silent or inconsistent with the OS; align Bank requirements with the ILO Core Labour Standards, and the UNICEF Convention on the Rights of the Child, where national laws do not provide



equivalent protection; protect the workforce from inequality, social exclusion, child labour, and forced labour; and establish requirements to provide safe and healthy working conditions.

The borrower or client provides all employees with documents that contain information on their employment terms, conditions and rights, including national employment law. These documents should, as appropriate, include information on at least the following areas: working hours, wages and benefits, rest periods, overtime arrangements, leave entitlement for illness and maternity/paternity, and grievance mechanisms.

Working conditions and terms of employment. Where the borrower or client is party to a collective bargaining agreement with a workers' organisation, it respects that agreement. Where such agreements do not exist, or do not address working conditions and terms of employment, the borrower or client provides reasonable working conditions and terms of employment that, at a minimum, comply with national law and are otherwise consistent with this OS.

### **3.3.7. Climate Risk Management and Adaptation Strategy of AfDB 2016-2020**

The overall goal of the Bank's climate risk management and adaptation strategy is to ensure progress towards eradication of poverty and contribute to sustainable improvement in people's livelihoods taking into account climate change with specific objectives detailed as follows:

- ❖ To reduce vulnerability and promote climate resilience in past and future Bank-financed development investments making them more effective;
- ❖ To build capacity and knowledge within the RMCs to address the challenges of climate change and ensure sustainability through policy and regulatory reforms.

The Bank Group will develop its assistance on CRMA within the scope of its mandate and comparative advantage, and as an integral part of its medium term strategic orientations. CRMA activities will be gradually intensified as internal capacity in this area is strengthened. The Bank will systematically draw lessons from its growing operational activities in the area, with a view to strengthening the effectiveness of its assistance to RMCs. It will also work on strengthening collaboration with partner development agencies, including identifying and replicating good practices in their CRMA operations, analytical methods and tools, and harmonising or even financing joint activities. The Bank Group's CRMA activities will be guided by the following key principles:

- ❖ **Country Ownership and Alignment:** In line with the core principles of the Paris Declaration on Aid Effectiveness, the Bank Group, within the limits of its resources, will strive to respond promptly to the demands of its member states. Its operational activities in support of CRMA will be closely aligned to the priorities of the RMCs as outlined in national and sub-regional development plans, poverty reduction strategies, sector strategies, and National Adaptation Plans of Action (NAPA). Operational activities will be tailored to adequately analyse risk exposure characteristics and vulnerabilities of individual countries or regions.

- ❖ **Regional Integration:** Climate change and variability is a regional phenomenon and negative impacts can severely affect several countries in the region. As such, climate risk management and adaptation will require extensive cross-country collaboration and monitoring in the interest of protecting both global and regional public goods.
- ❖ **Selectivity:** Support to RMCs on CRMA will be highly focused and selective taking into account the Bank's comparative advantages and areas of competence vis-à-vis other sources of development assistance. This will also include giving priority to low carbon technology options.
- ❖ **Integration of Current Climate Risks and Long-Term Climate Change:** The meteorological drivers of climate variability are not adequately understood even in the climate science community. The Bank, therefore, will adopt an integrated approach to CRMA aimed at assisting RMCs to reduce their vulnerability to current climate variability and weather extremes, as well as to adapt to longer-term climate change threats and opportunities.
- ❖ **Partnerships:** In order to provide adequate support to RMCs and maximise knowledge generation, the Bank will actively strive to build synergies with the interventions of other bilateral and multilateral agencies, private sector, non-governmental and civil society organizations.
- ❖ **Carbon Accounting:** Considering that some of the Bank's investment will contribute to greenhouse gas emissions, particularly in the agriculture and energy sectors, the CRMA will progressively expand to account for these greenhouse gases with a view to offsetting them.

The bank also addressed sustainability of climate resilience and continuous adaptation of investments and other development interventions both for RMCs and the Bank require a positive enabling environment with particular respect to policies and legal reforms. The Bank will use some of its budget support instruments to address activities outlined under this intervention area. Some of the activities that this intervention area will support are:

- ❖ Support mechanisms to prevent and reverse land degradation and promote afforestation, and sustainable land use practices;
- ❖ Supporting governments in designing and mainstreaming climate risk management strategies into national sectoral developmental policies, as well as in implementing institutional reforms for enhanced performance. These could include the development of climate resilient plans, land tenure reforms, fishery sector regulation, and creation of an enabling policy, legal and regulatory conditions for climate risk insurance vehicles;
- ❖ Establishing anti-pollution standards for African rivers, basins and lakes, as well as strengthened trans-boundary cooperation in the management of freshwater resources.

- ❖ Strengthened regulatory oversight over extractive industries, particularly in the case of oil, gas, and precious stones industries which use extractive practices which are harmful to the natural environment.

### **3.4. Environmental Framework Legislations**

#### **3.4.1. The Constitution of FDRE**

The constitution of Ethiopia, adopted in 1995, contains a number of articles, which are relevant to environmental protection matters in connection with development projects, and forms the fundamental basis for the development of specific environmental legislative instruments. In the section, which deals with democratic rights, Article 43 gives the right to people to improved living standards and to sustainable development. Article 92 of chapter 10 which sets out national policy principles and objectives, includes the following significant environmental objectives:-

- ☞ Government shall endeavor to ensure that all Ethiopians live in a clean and healthy environment as stated in Article 44,
- ☞ Development projects shall not damage or destroy the environment,
- ☞ People have the right to full consultation and the expression of views in the planning and implementation of environmental policies and projects that affect them directly, and
- ☞ Government and citizens shall have the duty to protect the environment.

#### **3.4.1. Proclamation on Establishment of Environmental Protection Organs**

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

The proclamation re-established the EPA as an autonomous public institution of the FDRE. It also empowers every sector ministry or agency to establish or designate an environmental unit (sectorial environmental unit) that shall be responsible for coordination and follow-up so that the activities of the ministry or competent agency are in harmony with this proclamation and with other environmental protection requirements. Furthermore, the proclamation stated that each regional state should establish an independent regional environmental agency or designates an existing agency that shall be responsible for environmental monitoring, protection and regulation in their respective regional states.

### **3.4.2. Proclamation on Environmental Impact Assessment**

This proclamation (No. 299/2002) was issued in December 2002 with the aim to make an EIA mandatory for specified categories of activities undertaken either by the public or private sectors and to ensure EIA as a legal tool for environmental planning, management and monitoring.

The proclamation elaborates on considerations with respect to the assessment of positive and negative impacts and states that the impact of a project shall be assessed on the basis of the size, location, nature, cumulative effect with other concurrent impacts or phenomena, trans-regional context, duration, reversibility or irreversibility or other related effects of a project. Categories of projects that will require full EIA, not full EIA or no EIA are provided. To effect the requirements of this proclamation, the EPA has issued a procedural and technical EIA guideline, which provides details of the EIA process and its requirements.

### **3.4.3. Proclamation on Environmental Pollution Control**

This Proclamation (No. 300/2002), is mainly based on the right of each citizen to have a healthy environment, as well as on the obligation to protect the environment of the country and its primary objective is to provide the basis from which the relevant ambient environmental standards applicable to Ethiopia can be developed, and to make the violation of these standards a punishable act. The proclamation states that the “polluter pays” principle will be applied to all persons. Under this proclamation, the EPA is given the mandate for the creation of the function of Environmental Inspectors. These inspectors (to be assigned by EPA or regional environmental agencies) are given the authority to ensure implementation and enforcement of environmental standards and related requirements.

### **3.4.4. Proclamation on Development, Conservation and Utilization of Wildlife**

This Proclamation (No. 541/2007) came into effect in August 2007 and its major objectives are to conserve, manage, develop and properly utilize the wildlife resources of Ethiopia; to create conditions necessary for discharging government obligations assumed under treaties regarding the conservation, development and utilization of wildlife; and to promote wildlife-based tourism and to encourage private investment. Under its part two, the proclamation provides the categories of wildlife conservation areas to be designated and administered by the federal government, regional states, private investors, and local communities.

Part three of the proclamation contains provisions related to economic activities that may be undertaken within a wildlife conservation area, wildlife resource based tourism, and trading in wildlife and their products. Finally, part four of the proclamation comprises miscellaneous

provisions that include powers and duties of the MoARD, regional states and wildlife anti-poaching officers, penalty, repeal and savings, and inapplicable laws.

#### **3.4.5. Proclamation on Forest Development, Conservation and Utilization**

Proclamation No. 542/2007, issued in September 2007, provides for the development, conservation and sustainable utilization of forests in satisfying the needs of the society for forest products and in the enhancement of national economy in general. It provides the basis for sustainable utilization of the country's forest resources. The proclamation categorizes types of forest ownership as private forest and state forest. The proclamation then goes on to give some specific direction for the development and utilization of private and state forests. Part two of the proclamation contains provisions for the promotion of the utilization of private forest, while part three gives provisions for conservation, development and administration of state forest. Lastly, part four comprises miscellaneous provisions that, among others, include prevention of forest fire, production and movement of forest products, prohibitions, forest guards and inspectors of forest products movement, and powers and duties of the MoARD and regional states.

#### **3.4.6. Proclamation on Expropriation of Land Holdings and Payment of Compensation**

This Proclamation, Proc. No. 455/2005, issued in July 2005, deals with expropriations of land for development works carried out by the government and determination of compensation for a person whose landholding has been expropriated. It includes provisions on power to expropriate landholdings, notification of expropriation order, responsibility for the implementing agency, and procedures for removal of utility lines. According to the Proclamation, the power to expropriate landholdings mainly rests on Woreda or urban administration authorities. Article 3 (1) of the Proclamation states that a Woreda or an urban administration shall, upon payment in advance of compensation in accordance with this Proclamation, have the power to expropriate rural or urban landholdings for public purpose where it believes that it should be used for a better development project to be carried out by public entities, private investors, cooperative societies or other organs, or where such expropriation has been decided by the appropriate higher regional or federal government organ for the same purpose.

In addition, the Proclamation deals with determination of compensation having articles on the basis and amount of compensation, displacement compensation, valuation of property, property valuation committees, complaints and appeals in relation to compensation. As per this Proclamation, a land holder whose holding has been expropriated shall be entitled to payment for compensation for his property situated on the land for permanent improvements he made to such land, and the amount compensation for property situated on the expropriated land shall be determined on the basis of replacement cost of the property. For houses in urban areas, the amount of compensation should not be less than the current market value of construction. In





addition to the amount of compensation for the property expropriated, the Proclamation also gives a provision for cost of removal, transportation and erection. It is based on this provision given on Article 14 Sub-Articles (1&2) of the Proclamation that, The Council of Ministers produced “Regulations No.135/2007 Council of Ministers Regulation on the Payment of Compensation for Property situated on Landholdings Expropriated for Public Purposes. And similarly, The Amhara National Regional State has issued directives for the proper implementation of the Proclamation and the Council of Ministers regulations.

The Amhara National Regional State issued directives for the proper implementation of Proclamation No.455/2005 and Council of Ministers Regulations based on its mandate. The directives produced by Amhara region clearly states applicable legal and administrative procedures for forwarding complaints and appeals to concerned bodies.

According to procedures of Amhara National Regional Directives, a person who is dissatisfied with compensation payment or related issues can appeal to Valuation Committee or Woreda Environment Protection, Land Administration and Use Office within 10 days he/she received decision made on compensation payment and related. Then, the Office gives response in written to a person who forwarded his complaints within five days.

If still the person dissatisfied with the decision made by Valuation Committee or Woreda Environment Protection, Land Administration and Use, then the person dissatisfied with the decision made further can appeal to Compensation Payment Investigator Committee established at Woreda Level, and then the Compensation Payment Investigator Committee make their own decision within seven days. If a person dissatisfied is still not convinced with the decision made by the Office, he/she can appeal to the Woreda Court within 30 days and the decision made by the Woreda Court is the final.

In the case of Oromia National Regional State, they depend on Proclamation No.455/2005 and Council of Ministers Regulation No 135/2007 for conflict resolution and grievance redress mechanism and did not develop similar guideline like that of the Amhara National Regional State.

#### **3.4.7. Proclamation on Rural Land Administration and Land Use**

This Proclamation, Proc. No. 456/2005, came into effect in July 2005, and its objective was to conserve and develop natural resources in rural areas by promoting sustainable land use practices. In order to encourage farmers and pastoralists to implement measures to guard against soil erosion, the proclamation introduces a rural land holding certificate, which provides a level of security of tenure. The MoARD is charged with executing the Proclamation by providing support and coordinating the activities of the regional authorities. Regional governments have an obligation to establish a competent organization to implement the rural land administration and land use law.

According the Proclamation where land, which has already been registered, is to be acquired for public works, compensation commensurate with the improvements made to the land shall be paid to the land use holder or substitute land shall be offered. The proclamation imposes restrictions on the use of various categories of land, for example wetland areas, steep slopes, land dissected by gullies, etc.

#### **3.4.8. Proclamation on Research and Conservation of Cultural Heritage**

Proclamation No. 209/2000 provides legal framework for research and conservation of cultural heritage. The Proclamation establishes the Authority for Research and Conservation of Cultural Heritage (ARCCH) as a government institution with a juridical personality. In addition, it has provisions for management, exploration, discovery and study of cultural heritage and miscellaneous provisions.

As defined in the Proclamation, the objectives of the authority (ARCCH) are to carry out a scientific registration and supervision of cultural heritage; protect cultural heritage against man-made and natural disasters; enable the benefits of cultural heritage assist in the economic and social development of the country; and discover and study cultural heritage.

Article 41 of the proclamation is on fortuitous discovery of cultural heritage and sub-Article (1) states that, any person who discovers any cultural heritage in the course of an excavation connected to mining explorations, building works, road construction or other similar activities or in the course of any other fortuitous event, shall forthwith report same to the Authority, and shall protect and keep same intact, until the authority (ARCCH) takes delivery thereof. Connected to this, Sub-Article (2) states that, the authority shall, upon receipt of a report submitted pursuant to sub-article (1) hereof, take all appropriate measures to examine, take delivery of, and register the cultural heritage so discovered.

#### **3.4.9. Proclamation on Ethiopian Water Resources Management**

Proclamation No. 197/2000, issued in March 2000, provides legal requirements for Ethiopian water resources management, protection and utilization. The aim of the proclamation was to ensure that water resources of the country are protected and utilized for the highest social and economic benefits, to follow up and supervise that they are duly conserved, ensure that harmful effects of water use prevented, and that the management of water resources is carried out properly.

#### **3.4.10. Proclamation on Public Health**

The public health proclamation (No. 200/2000) entered into force as of March 9, 2000. Objectives of the proclamation include enhancing popular participation in implementing the country's health

sector policy, promoting attitudinal changes through primary health care approach and promoting healthy environment for the future generation.

#### **3.4.11. Regulations on Payment of Compensation for Property Situated on Landholdings Expropriated for Public Purposes**

Regulations No. 135/2007 came into force in July 2007, deal with payment of compensation for property situated on landholdings expropriated for public purposes. These Regulations were issued by the council of ministers pursuant to article 5 of the definition of powers and duties of the executive organs of the FDRE Proclamation No. 471/2005 and Article 14(1) of the Proclamation No. 455/2005 (discussed under 2.2.7) with an objective of not only paying compensation but also to assist displaced persons to restore their livelihood.

The Regulations contain provisions on assessment of compensation for various property types (including buildings, fences, crops, trees and protected grass), permanent improvement of rural land, relocation of property, mining license, burial ground, and formula for calculating the amount of compensation. In addition, it has provisions for replacement of urban land and rural land, displacement compensation for land used for crops, protected grass or grazing, and provisional expropriation of rural land. Further, the regulations contain provisions that specify properties for which compensation is not payable and regarding furnishing of data to compensation committee, records of property, evidence of possession and ownership, and valuation costs.

#### **3.4.12. Proclamation on Amhara and Oromia National Regional States Rural Land Use and Administration**

The main objective of this Proclamation is to promote proper management and utilization of the land and land resources for sustainable agriculture and other uses in the Amhara and Oromia National Regional States. The Proclamation determines the use, right, security and obligation of the land users in accordance with the land use and administration policy.

The Proclamation encompasses articles for environmental protection including prohibition of mismanagement and misuse of environmental resources such as wetlands and any activities that may cause deleterious effects on those resources. It also provides the government, with the participation of the local community, the right to demarcate priority forest areas, wildlife parks and sanctuaries to protect with all the components of its natural ecosystem for sustainable use. Furthermore, any individual or organization engaged in mining quarry development activities shall be obliged to rehabilitate the sites.

This legislation is triggered by the road project since it has the right to use the land required for the road works and other related activities, but also the responsibility to rehabilitate the sites affected by the project activities like construction material excavation from quarries and borrow

materials, construction and use of detours and access roads, and establishment of site facilities such as campsites, workshops, stone crushing plant and asphalt mixing plant.

### **3.5. International Conventions and Protocols**

In addition to national environmental legislations, the FDRE is also a party to a number of regional and international conventions and protocols on environment. The government has established an environmental protection authority, and this authority is designated as focal point for the implementation of these conventions and protocols. These conventions and protocols include the following:

- ☞ Convention concerning the protection of world cultural and natural heritage, ratified in 1972.
- ☞ International Plant Protection Convention.
- ☞ Convention on International Trade in Endangered Species (CITES), ratified in 1989.
- ☞ Vienna Convention on Ozone Layer Protection (1990);
- ☞ Montreal Protocol for Substances Depleting the Ozone Layer (1990);
- ☞ United Nations Convention on the Law of the Sea.
- ☞ Framework Convention on the Law of the Sea.
- ☞ Framework Convention on Climate, ratified in 1994.
- ☞ Convention on Biological Diversity, ratified in 1994.
- ☞ African Convention on the Conservation on Natural Resources.
- ☞ Convention on Desertification ratified 1997.
- ☞ Convention on Biodiversity (Rio convention) (1997);
- ☞ Framework Convention of United Nations on Climate Change (1997); and
- ☞ Convention on the Control of Trans-boundary Movement of Hazardous Substances.

### **3.6. Environmental Assessment Guidelines**

#### **3.6.1. EPA's EIA Guidelines**

In view of implementing the EIA legislation, EPA has prepared and issued a number of environmental guidelines. Among these are the technical and procedural EIA guidelines, which were issued in 2000 and 2003 respectively. They are intended to guide developers, competent agencies and other stakeholders in carrying out EIAs. The procedural guideline details the required procedures for conducting an EIA, the permit requirements, the stages and procedures involved in EIA process, and the roles and responsibilities of parties involved in the EIA process. It also includes the categories of projects (schedule of activities) concerning the requirement of EIA, and list of project types under each category.

The technical guideline specifies tools particularly standards and guidelines that may be considered when engaging in the EIA process, and details key issues for environmental assessment in specific development sectors. The guideline provides the categories, the relevant

requirements for an EIA and lists project types under each category. In accordance with this guideline, projects are categorized into three schedules:

Schedule 1:-Projects which may have adverse and/or 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.

Road projects that are likely to have significant environmental and social impacts would fall into Schedule 1. The proposed Adama-Melkajilo (km-60) expressway Road project is considered as Schedule 1 because it is expected to bring some significant environmental and social impacts because it passes through vegetation, farm lands, housing units in the scattered rural section and villages, and streams, of the road sections. The EIA laws and guidelines of Ethiopia require the preparation of environmental impact statement (EIS)/EIA report and its submission to the EPA or REA for projects requiring EIA. The legal documents also state that an EIS should contain sufficient information that enable the determination of whether or under what conditions the project should proceed.

### **3.6.2. ERA's Environmental Procedure Manual**

In order to standardize environmental procedures for design of new roads and rehabilitation of existing roads, the ERA, in consultation with the EPA, has prepared an environmental procedures manual for the use and technical guidance of design personnel of the ERA and consultants preparing projects for the authority. In the manual two project categories are described as follows:

#### **Category I Projects: Projects requiring a full ESIA study**

These are projects that are likely to have significant impacts on the environment. Therefore, a self-standing ESIA is required that in turn requires specific terms of reference for its fulfilment. Projects of such nature may include new/upgrading of major roads, new/upgrading of regional roads, and other works of similar extent.

#### **Category II Projects: Projects requiring an initial ESIA**

These are road projects that have the potential to cause some significant environmental and social impacts but not likely to warrant a detailed ESIA study. These are projects like rehabilitation of roads, and other works of similar extent.

According to this manual, Adama-Melkajilo (km-60) expressway road project should be subjected to a full scale environmental and social assessment study, i.e. category I project.

The manual outlines standard methods and procedures for a step-by-step approach to environmental management activities to be conducted during each phase of the road project cycle, including the preparation and supervision of works contracts as well as the execution of road construction, rehabilitation and maintenance works.



### **3.6.3. ERA's Standard Technical Specifications**

ERA updated its 2002 standard technical specifications in 2014, which specifies among others acceptable environmental standards for the preparation of the road project design and contract document. The standard under division 1600 deals with environmental protection and mitigation measures. It mainly covers landscape preservation, temporary soil erosion control, preservation of trees and shrubbery, preservation of water pollution, abatement of air, dust, noise and lighting pollution, preservation of historical, archaeological and cultural remains and clean up and disposal of waste materials. Moreover, under division 1400 it deals with accommodation, sanitary arrangements, water and other social services. These standards specified regarding the social and environmental protection have been used appropriately in the preparation of this ESIA study.

## **3.7. Institutional and Administrative Framework**

### **3.7.1. Federal and Regional Administration**

FDRE was formally established on August 21, 1995. The FDRE comprises of the federal states with nine regional state members. The new government structure takes power from the centre to regions and localities. The relative roles of government at the different levels (federal, regional and local) in terms of power and duties, including on fiscal matters, have been defined by the constitution, proclamations Nos. 33 of 1992, 41 of 1993, and 4 of 1995. 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.

The duties and responsibilities of the 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. The basic administrative units in each regional government are the Weredas, which its sub-units are the Kebeles. Further, based on their authority and responsibilities the regional governments have established sectorial bureaus, commissions and authorities.

### **3.7.2. Ministry of Environmental, Forestry and Climate Change**

As part of the effort to realize the government's climate resilient green economy strategy, the former environment protection authority has been upgraded into Ministry of Environmental Protection, Forestry and Climate change. The new ministry is responsible among other undertakings for spearheading the reforestation, and other wide-ranging tasks. It is expected to take measures aimed at preventing deforestation and environmental degradation which are common in many parts of the country. Participatory process of making the country's economy green and climate change resilient was initially planned to be undertaken under the ownership of

the then Environment Protection Authority (EPA). However, such effort did not receive the necessary attention either at the federal or regional level thereby necessitating the establishment of the new ministry. It is also understood that the rights and obligations of the EPA, stated under the proclamation No. 295/2002, is transferred to the newly established Ministry of Environment Protection, Forestry and Climate Change. The general role of the ministry is to provide for the protection and conservation of the broad environment, through formulation of policies, strategies, laws and standards, which foster social and economic development in a manner that enhance the welfare of human and the safety of the environment sustainable.

### **3.7.3. Sectorial Environmental Unit**

The Proclamation No. 295/2002 requires at the Federal level each sectorial ministry to establish in-house environmental protection unit to ensure harmony with respect to implementation of the environmental proclamations and other environmental protection requirements. This unit forms a lower level inter-sectorial co-ordination structure.

### **3.7.4. Regional Environment, Forest and Climate Change Authorities**

In accordance with the principles of government decentralization and the Proclamation no. 295/2002, each national 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 and ensuring public participation in the decision making process, be responsible for:

- ☞ Coordinating the formulation, implementation, review and revision of regional conservation strategies; and
- ☞ Environmental monitoring, protection and regulation.

The Proclamation also states that regional environmental agencies shall ensure the implementation of federal environmental standards or, as may be appropriate, issue and implement their own no less stringent standards. Finally, the Proclamation states that regional environmental agencies shall prepare reports on the respective state of the environment and sustainable development of their respective states and submit them to the EPA.

### **3.7.5. Ethiopian Roads Authority**

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. ERA is a legally autonomous agency and is in charge of the planning, construction and maintenance of trunk and major link roads, while responsibility of rural roads has been decentralized to regional Rural Road Authorities (RRAs). The highest body in the management hierarchy of ERA is the board.



ERA was re-established by Proclamation No. 80/1997 and its objectives are to develop and administer highways and to ensure the standard of road construction and to create a proper condition on which the road network is coordination promoted. Article 6 of the Proclamation provides the powers and duties of the authority. Sub-article 18 guarantees the ERA to use, free of charge, land, quarry materials and such other resources required for the construction and maintenance of highways, camps, storage of equipment and other required services. This is, however, provided that ERA shall pay compensation in accordance with the law for properties on the land it uses.

**ERA's Environmental and Social Management Teams:** The former ERA's Environmental and Social Management Team (ESMT) has recently subdivided into EMT (Environmental Management Team) and SMT (Social Management Team) under the planning and programme division of the engineering and regulatory department.

Major responsibilities are setting and implementing ERA's environmental and social guidelines in support of the national level requirements. The teams holds the capacity of advisory, co-ordination and supervision aspects under their respect field of area that are pertinent to the road environmental impacts and implication assessment as well as co-ordination with the respective ERA district offices. Each team is led by team leader, the environmental team has a total of eight experts while the social team equipped with seven experts. Furthermore, each team provided with supporting staff including office manager/secretary and drivers. The following table provides the various disciplines and number of allocated professionals based on consultation with ERA's ESMT.

Table 3-1: ERA's Environmental and Social Management Team (ESMT) composition

Environmental Team		Social Team	
Position	No of professionals	Position	No of professionals
Team Leader	1	Team leader	1
Geologist	2	Sociologist	2
Hydrologist	2	HIV/AIDS experts	3
Ecologist	2	Physiologist	2
Safety Officer	2	Office manager	1
Office manager	1	Driver	1
Driver	1		
Total	12	Total	11

**Right-of-Way Management Team:** According to the current ERA's organizational structure, each Directorate has its own Right-of-Way Management Team, which is responsible for making available the required land for road construction and maintenance, the establishment of materials sources (borrow pits and quarries) and campsites and for implementation of Resettlement Action



Plans (RAP). Right-of-Way Management Team in liaison with the respective Woreda and Kebele administrations/authorities and community representatives establishes compensation committee that carries out the inventory and valuation of the structures, crops, trees and others affected by the road project, and effects payments to the project affected people.

Therefore, according to the existing organizational structure of ERA, it is the ERA design and build directorate ROWMT responsibility for the implementation of compensation issues related to land acquisition and loss of properties due to implementation of the Adama-Melkajilo (km-60) expressway Road Project.

## CHAPTER FOUR

### 4. DESCRIPTION OF BASELINE ENVIRONMENT OF THE ROAD CORRIDOR

Baseline information on existing natural and socio-economic environment is fundamentally important for evaluation of environmental and social impacts of the proposed project. The baseline data on the current status of physical, biological and socio-cultural environments of Adama-Melkajilo (km-60) expressway road corridor have been assessed, assembled, evaluated and presented as follows.

#### 4.1. Physical Environment

##### 4.1.1. Topography

The expressway route project falls within the Ethiopian Rift valley system that extends from North to South part of the country, as part of the Great East African Rift Valley system. Topography of the project is flat to rolling with minor and major drainage crossings and wade sections. Elevations along the route corridor varies between 800 m a.s.l and 1700 m a.s.l.

Table 4- 1: Terrain status of Adama-Melkajilo (km-60) expressway project

From	To	Length	Terrain Type
0+000.000	6+800.000	6800	Rolling
6+800.000	24+800.000	18000	Flat
24+800.000	32+200.000	7400	Rolling
32+200.000	44+400.000	12200	Flat
44+400.000	55+600.000	11200	Rolling
55+600.000	58+800.000	3200	Flat
58+800.000	60+000.000	1200	Rolling

The direction of the road goes from southeast, running to the east north heading finally to most east direction when it approaches to km 60. It starts at outskirts of Adama town. It goes on a rolling terrain and on flat terrain alternating up to the end of the project. The project road's terrain for the most part is flat (55.7%), while some section rolling (44.3%).

Table 4- 2 Terrain Classification of the Project Road by Percentage versus Length

Terrain category	Length (km)	Percentage
Flat (0-5%)	33.4	55.7%
Rolling (5-25%)	26.6	44.3%
Mountainous (25-50%)	-	-
Escarpment (>50%)	-	-
Total	60	100.00%

##### 4.1.2. Climate

The climatic condition of the project corridor could generally be described as lowland (kola) type characterized by semi-arid agro-ecological settings. According to the description on traditional

classification, the average temperature of such agro-climatic zone is between 20°C and 25°C. However, the data recorded for the project Weredas indicates that the area has a climate classified as Woina Dega to Kola and the maximum and minimum temperatures range between 20 - 42 °C and 15-25°C respectively.

#### 4.1.3. Rainfall

The rainy season extends from May to September. The small rain falls between February and April and heavy rain is from July to September. The months of November, December and January are generally dry with ground frost at night. The annual rainfall is 900-1400 mm for the moist lowland and less than 900 mm for the dry low land. The main rainy season is in the Months from June-September, with concentration in the months of July and August.

#### 4.1.4. Drainage Patterns and Water Resources

The project road drainage basin is totally located in Awash River basin. Hence, the overall watershed area that draining towards Adama-Melkajilo (km-60) expressway road corridor serves as a sub catchment area for Awash River basin of the country in a localized basin approach context. There is no perennial river that crossed by the project road, while numbers of seasonal rivers and streams exist in the area. Additionally, there are artificial ponds along the road corridor specifically in the Amora Bete kebele near Markajilo at km 54+200 RHS offset 200m which needs great attention during construction time. Moreover, Table 4-3 elaborates the relative location and name of the river/stream and ponds along the road corridor.

Table 4- 3: Relative location station and name of water bodies along the road stretch.

No.	Station (km)	Name of the river/stream/ ponds
1	9+850	Mermersa
2	14+800	Geldi
3	28+800	Teba
4	29+950	Chore/Tebo
5	31+020	-
6	37+750	Shenkora
7	44+500	Gebre Arada
8	54+200 offset 200m	Jajabe Haro ponds
9	54+260	Melka Jilo
10	57+500	“





The drainage pattern along the road stretch is generally in left to right across the road as one goes from Adama to Km. 60 around Melka Jilo town, end of the project. The major surface run off generates from the hill side on the left side of the proposed road and it will be concentrated as the road diverts its natural flow direction and then flood over the farm lands along the road sides especially that found on left side of the road.

As proposed expressway road passes through almost in the flat sections and to a lesser extent through rolling sections, there are a number of minor drainage structures crossing the road compared to few relatively major streams. Relatively larger streams, crossing the road are characterized by high sediment flow condition with hardly well-defined and stable channel configuration. Furthermore, as water or erosion drains from hilly side on the left side of the road to the right which flat flooding area and easily undergoes water stagnation that will be one of the drainage problem along the road corridor. Therefore, to avoid this flooding and overflow on the road line, rising the road through filling is mandatory. This further, increases stagnation of water and formation of flooding on the agricultural lands nearby the road on the left side adversely affect the livelihood of the land user. Therefore, proper channelization and guided drainage line is very important in the road corridor. Moreover, there are artificial ponds near Km 58 right hand side of the road that the local community using it for the different purposes such as drinking, washing and cooking. Further, their animals also consuming from these ponds. Therefore, any soil disturbance in the catchment can easily fill it with sediment load.

**Ground water:** regarding ground water potential along the road corridor, it has potential from shallow to deep shallow ground water aquifer. According to different study reports such as ministry of water resource publication on Strategic Framework for Managed Groundwater Development, Published February 2011, the ground water potential aquifer is 100-140m along the proposed road corridor. The main problem with regard to ground water resource along the road corridor is high fluoride content. Therefore, care has to be taken before the development of the ground water for the drinking and other purposes through chemical testing to assess minimum permissible limit of fluoride concentration in the drinking water and other uses.

#### 4.1.5. Geology and Soils

The soil of East Shewa zone where the major road length traverses is grouped into 9 soil types as per the FAO soil classification methods. These are Andosols (Mollic and Vitric Andosols) which was formed from volcanic ash parent material, Vertisols (Pellic Vertisols & Chromic Vertisols) which are heavy, mostly dark colored clay soils, Phaeozems (HaplicPhaeozems and LuvicPhaeozems), Fluvisols, Cambisols (Vertic Cambisols and Eutric Cambisols), Lithosols, Regosol, Luvisols, and Orthic Solonchaks.

The soil type around Adama area ranges from moderate to thin friable residual soils on step faulted plains and low plateau complex of the Ethiopian Rift with numerous fault scarps, sags and

associated cones, vents and crater remnants. In the section of Adama - Wolenchiti, it traverses thick and very friable residual soils that are highly erodible. And the remaining section of the road traverses thick transported soils of alluvial fans (in section of the road with seasonal flooding of the area).

The following features are observed regarding soils of the route corridor:

- ❖ Thick and very friable residual soils highly erodible for about 10 km of the section from Adama - Wolenchiti, and the remaining section of the road traverses thick transported soils of alluvial fans (section of the road with seasonal flooding of the area).
- ❖ From Wolenchiti – end of road section, rock out crops of extensive young lava flows (bare lands) dominates.

The Sub-grade Soil Extension characteristics has been surveyed by the engineering team and summarized as in table below;

Table 4- 4: Soil character of the road corridor

Station		Visual description
From	To	
0+000	5+000	White to grayish sandy silt soil
5+000	8+000	Grayish sandy silt soil
8+000	11+000	Grayish to whitish sandy silt soil underlain by pumice
11+000	17+000	Grayish to whitish sandy silt soil
17+000	22+000	Grayish to whitish sandy silty clay soil
22+000	30+000	Rocky section
30+000	35+000	Grayish to yellowish soil covered with scoria & other volcanic rocks
35+000	42+000	Highly weathered scoria and rock section
42+000	43+000	Grayish silty clay soil.
43+000	45+000	Highly weathered scoria and rock section,
45+000	47+000	Whitish silty clay soil (disruptive soil)
47+000	49+000	Rocky section (volcanic area)
49+000	51+000	Grayish to yellowish silty clay soil (disruptive soil)
51+000	55+000	Yellowish material and soil
55+000	56+000	Thin deposit soil underlain by volcanic rock
56+000	57+000	Grayish silty clay soil
57+000	58+000	Thin deposit soil underlain by volcanic rock,
58+000	60+000	Rocky section

#### 4.1.5.1. Geological hazards

The Rift valley area in general and the project road route in particular fall within a seismic and earth quake Hazard zones. Several volcanic eruptions had occurred in the past, while there are areas still suspected of volcanic activities and likely occurrence of Earth quake. Volcanic ashes deposits from previous eruptions demonstrate the actual situation and likely impacts for development activities in the area.

## Earthquake Risks and Seismic Hazard

According to records of The Institute of Geophysics, Space Science and Astronomy of Addis Ababa University, The project road is located outside of earth Quake hazard zones of the rift valley system.

### Risk of Slope instability

It is well known that escarpment and mountainous terrains may be affected by different types of landslides which range from shallow slope failures of unconsolidated deposits to deep-seated and large-scale instabilities of bedrocks.

In general, slopes tend to approach a critical state of stability over varying intervals of time, and then fail following an event, or combination of events, that impact upon them to such an extent that they perform the function of "triggering" slope failures. These factors include: rain; vegetation changes; road construction, ageing effects and seismic events.

Thus, slope failures may happen in mountainous and escarpment sections where there is deep cut and natural conditions are disturbed. Furthermore, Table4-5 elaborates the area prone to slope instability due to cut for road construction.

Table 4- 5: Areas prone to slope instability along the road stretch.

S/N	Chain age		Remarks
	From	To	
1	0+000	0+600	Recommended mitigation shall be implemented properly
2	4+100	5+700	
3	23+000	23+700	
4	23+980	24+560	
5	24+900	25+700	
6	26+900	25+780	
7	29+000	29+200	
8	30+300	32+000	
9	37+200	37+400	
10	39+300	39+600	
11	46+300	49+700	
12	53+100	54+500	

#### 4.1.6. Air Quality

Due to the fact that the road corridor is predominantly rural and vegetation covered area, currently, there is no significant dust or air pollution problem except the dust blown during dry season from farm lands along the road corridor. However, construction activities may increase concentration of airborne dust and particulate matter, PM10 and PM2.5.

Concentrations of nitrogen oxides ( $\text{NO}_x$ ) are likely to be low in the Project Area, as there are no significant local sources of emissions; however, there is potential for elevated concentrations to occur in the vicinity of the roadside due to vehicle exhausts. This is likely to be exacerbated by the extensive use of older and poorly maintained vehicles and/or generators during construction period of the proposed road.

Concentrations of sulphur dioxide ( $\text{SO}_2$ ) are likely to be low, as there are no significant local sources of emissions.

#### **4.1.7. Noise**

Given that largely rural nature of the project area, lack of industries, very minimum transportation and construction activity at the moment along the road corridor, noise levels are likely to be low.

### **4.2. Biological Environment**

#### **4.2.1. Land Use and Land Cover**

The principal land use pattern observed in the Weredas traversed by the proposed express way is mostly cultivated crop field, followed by pastureland for animal grazing and settlement areas. The alignment almost totally falls within potential and/or existing crop fields and vegetation of acacia species land cover especially on the hill side at the end of the project.

Major environmental problems identified due to land use land cover changes along the road will occur mainly during construction period. The degree of land acquisition will depend on the width of right of Way (ROW), which is about 90m as it is envisaged to construct DC5 design standard expressway. ROW problems are explicitly observed at outskirts of Adama town in the village and other scattered rural villages along the road. As a result the land use will be change permanently from farm land and vegetation to road. However, some impacts may occur off-road for the exploitation of material sites, access road, camp site, crusher site and some storage areas.



Figure 4-1: Existing Land use Land cover from km1+500 -2+000, km 4+200 and km 50+100 LHS along the proposed road project.

Moreover, the following Table 4-6 indicates the site specific land use land cover of the road corridor.

Table 4- 6: Land use land cover versus length along the road stretch

Chain age		Land use land cover	Length (km)	Land use type along the road stretch					
From	To								
0+000	0+990	Farm land	0.99	Farm land	Mixed land use	Open land	Residential areas	Grazing land	Vegetation
0+990	1+270	Mixed land use	0.28						
1+270	1+680	Open land	0.41						
1+680	2+040	Farm land	0.36						
2+040	2+205	Residential	0.165						
2+205	2+250	Farm land	0.045						
2+250	2+440	Residential	0.19						
2+440	3+020	Mixed land use	0.58						
3+020	8+220	Farm land	5.2						
8+220	9+370	Mixed land use	1.15						
9+370	9+380	Residential	0.01						
9+380	9+400	Vegetation	0.02						
9+400	10+205	Farm land	0.805						
10+205	10+215	Vegetation	0.01						
10+215	10+555	Farm land	0.34						
10+555	10+560	Vegetation	0.005						
10+560	11+125	Farm land	0.565						
11+125	11+135	Vegetation	0.01						
11+135	13+125	Farm land	1.99						
13+125	13+880	Mixed land use	0.755						
13+880	23+092	Farm land	9.212						
23+092	23+150	Grazing land	0.058						
23+150	26+274	Farm land	3.124						
26+274	26+414	Vegetation	0.14						
26+414	26+570	Grazing land	0.156						
26+570	28+450	Farm land	1.88						
28+450	28+860	Vegetation	0.41						
28+860	29+686	Grazing land	0.826						



29+686	36+480	Farm land	6.794						
36+480	36+520	Mixed land	0.04						
36+520	39+480	Farm land	2.96						
39+480	39+506	Grazing land	0.026						
39+506	39+605	Farm land	0.099						
39+605	39+905	Grazing land	0.3						
39+905	40+564	Farm land	0.659						
40+564	40+675	Grazing land	0.111						
40+675	41+050	Farm land	0.375						
41+050	41+185	Grazing land	0.135						
41+185	41+300	Farm land	0.115						
41+300	41+750	Grazing land	0.45						
41+750	41+906	Farm land	0.156						
41+906	41+956	Grazing land	0.05						
41+956	42+717	Farm land	0.761						
42+717	42+744	Grazing land	0.027						
42+744	42+960	Farm land	0.216						
42+960	43+000	Grazing land	0.04						
43+000	43+135	Farm land	0.135						
43+135	43+157	Grazing land	0.022						
43+157	44+455	Farm land	1.298						
44+455	44+490	Vegetation	0.035						
44+490	45+200	Grazing land	0.71						
45+200	45+260	Farm land	0.06						
45+260	45+815	Grazing land	0.555						
45+815	48+100	Farm land	2.285						
48+100	48+300	Grazing land	0.2						
48+300	48+975	Farm land	0.675						
48+975	49+020	Grazing land	0.045						
49+020	49+475	Farm land	0.455						
49+475	49+735	Grazing land	0.26						
49+735	49+860	Farm land	0.125						
49+860	50+167	Grazing land	0.307						
50+167	51+014	Farm land	0.847						
51+014	51+050	Vegetation	0.036						
51+050	51+260	Grazing land	0.21						
51+260	51+575	Farm land	0.315						
51+575	52+845	Grazing land	1.27						
52+845	52+850	Vegetation	0.005						
52+850	60+000	Farm land	7.15						
	Total length (km)		60						
	Length (km) by land use			<b>49.991</b>	<b>2.805</b>	<b>0.41</b>	<b>0.365</b>	<b>5.758</b>	<b>0.671</b>
	Percentage by land use type			<b>83.3</b>	<b>4.7</b>	<b>0.7</b>	<b>0.6</b>	<b>9.6</b>	<b>1.1</b>

As indicated in the table 4-5 above the adverse impact of the expressway construction on land use land cover is permanent land use change from farmland (83.3%), grazing land (9.6%), mixed land use (4.7%), vegetation cover (1.1%), open land (0.7 %) and residential area to road land use.

#### 4.2.2. Flora

The major ecosystems found in Ethiopia include Afroalpine and Sub-Afro alpine, dry evergreen Montana forest and grassland complex, moist evergreen Montana forest, Acacia-camphor woodland, Combretum-terminalia woodland, lowland semi-evergreen forest, desert and semi-desert scrubland, and inland waters.





The corridor traversed by the Project is mainly covered with vegetation type of semi-arid agro-ecological zone. The major vegetation observed along the corridor are different species of thorny Acacia and Prosopis trees mostly in combination with bushes and shrubs.

The section between Adama-Wolenchiti has a good Agro-forestry practice, which is at the moment suffering considerable removal of sparse Acacia trees found due to the farmlands shifted from pervasively intensively cultivated farmland as a result of expansion of Wonji Sugar Plantation project that found starts from Soloke Kurfa Kebele of Adama woreda at km 5+050RHS offset about 1.5km and extends to Boset woreda. The sugar plantation cannot be affected by proposed express way but due to repetitive land accusation from local community for the sugar plantation and railway as well as expressway has cumulative adverse impact on the flora in the area. Increased demand for agricultural land due to population growth, encroachment for grazing, fuel wood and construction practices has significantly affected the original vegetation cover all along this section of the project area.

One of the major unavoidable impacts of roads is the effect on the terrestrial vegetation in the vicinity by the virtue of the construction. Major environmental impact that likely to be happen due to large widths of right of way (90m) for the expressway. The impact on natural vegetation would be associated with operating the quarry and borrow areas, and constructing access road to borrow material pits, camp sites and quarry sites.

Loss of vegetation and other natural habitats for plant will occur due to the proposed road construction. However, this loss is not considered to be significant and will not affect areas, which support conservation worthy terrestrial ecosystem.

#### **4.2.3. Fauna**

The proposed road project passes through agricultural land, scattered or spares vegetation cover and grazing lands, there is no significant wildlife found in the area. However, there are some Hyena, Leopard, fox and wild cat are found along the road stretch.

A number of wild lives like nocturnal animals such as hyena, Hyena, and Leopard which live in the bushes land may be affected.

Although no wildlife sanctuaries or protected site habitats have been identified in the road route, impediments to wildlife movements is expected to be high.

Therefore, maximum care should be taken in some specific area during construction or operation of the project road. The wildlife species present in the road corridor include those listed in Table below.

Table 4- 7: Major wildlife species in the project area (fauna)

No.	Scientific Name	Common Name	Amharic
1	<i>Tragelophus imberbis</i>	Lesser Kudu	Dikula
2	<i>Graphiurus parvus</i>	Dormouse	Midaqua
3	<i>Phacochoerus aethopicus</i>	Common Warthog	Kerkero
4	<i>Crocuta crocuta</i>	Hyena	Jib
5	<i>Panthera pardus</i>	Leopard	Abushemane
6	<i>Canis mesomelas</i>	Black back jackal	Kebero

#### 4.2.4. National Parks and Protected Areas

Ethiopia issued a number of regulations aimed at conserving and protecting the remaining natural ecosystems of the country in national parks, wildlife sanctuaries, national priority forest areas and controlled hunting areas. Accordingly, the road corridor is neither contiguous with, nor in close proximity with any of nationally protected areas like national parks; wildlife reserves, and controlled hunting areas. There is no also regional priority forest area which exists near the project road influence area. Awash national park is very far (about 23 km) from Melka Jilo, end of Lot I of Adama- Awash expressway.

### 4.3. Socio-Economic Environment

The socio-economic assessment has been carried out with the objective to provide a comprehensive analysis of the existing socio-economic conditions of the proposed Adama-Melkajilo (Km- 60) expressway road project that started at the outskirts of Adama town in the Adama woreda, traverse Boset woreda and ends at Melka Jilo in Minjar Shankor woreda.

#### 4.3.1. Administration

The proposed express road project traverses Dabe Solke, Didibisa, Guraja Furda and Merebe Marmara in Adama Woreda; Mereko Oda Lega Degelu Wanga, Tiri Biriti, Tedecha Hadhecha, Buta Wegre and Borchata in Boset; Weredas of Oromia Regional State and Kiticha and Amora Bet in Minjar Shenkora Woreda of Amhara Regional State.

The Kebele is basic administrative unit and frontline actor in the regional government structure. The Woreda (district) administration plays fundamental role in the decentralization policy of the government. Woreda is administratively independent. In other terms, the Woreda administration has authority on overall socio-economic, administrative and political matters pertaining to each Woreda.

The Woreda council is authorized to decide on budget distribution, human resource management, maintaining peace and order, socio-economic development and administration of the woreda.

They become increasingly important and play crucial role in providing all rounded services to their population. Thus, the Woreda administrations are key partners for the implementation of the proposed road project as well as facilitation of communication with the entire population.

Table 4- 8: Number of Kebeles traversed by the proposed road project by woreda and zone

Sr.no	Region	Zone	Woreda	Kebeles Crossed by the Road
1	Oromia	East Showa	Adama	6
			Boset	4
2	Amhara	North Showa	Minjar Shankora	2
Total	2	2	3	12

Source: Adama, Boset and Minjar Shankora Weredas' Administration offices

### Complaint Handling Mechanisms:

According to information gathered from each woreda administration there is office for complaint handling or grievance redressing "Complaint Hearing" in each word to receive from the community due to lack of good governance in the woredas. This office receive all complaints from all corners of the woreda and direct to the administrative bodies to see the cases. Then the answer will be given for the person complaints. With regards to development projects that required land expropriation in the past grievance redressing committee were formed from the affected people and government sector offices. Therefore, these woredas has good experience in complaint handling mechanisms as they manged Ethio-Djibouti Railway and Wonji sugar plantation projects before. However, due to turnover of experts from each woredas, re-establishing complaint handling committee and building their capacity for the success of the proposed express way project is very crucial.

### 4.3.2. Demographic Character

#### 4.3.2.1. Population

Based on projected CSA 2007 to 2017, the population in the traversed woreda by the project is estimated to be about 527,515, out of which 49 % are male and 51% are female population. The major part of the Project area is rural, densely populated at the start and sparsely populate towards the end of the project. The density is characterized by densely populated settlement along the start, particularly in the East Showa zone of Oromia Region and Followed by North Showa of the Amhara Regional State. The following table 4-9 shows detailed population of each woredas' by sex.

Table 4- 9: Population of Weredas crossed by proposed expressway.

Woreda	Total Population		
	Male	Female	Total
Adama	92236	96001	188237
Boset	88036	89890	177926
Minjar-shenkora	83123	78229	161352
Total	263395	264120	527515

Source: CSA 2007, population projected to 2017.

#### 4.3.2.2. Ethnicity, Language and Religion

Based on projected 2007 National population and housing census results, interview and Focus Group Discussion carried out in the field sites, major ethnic groups, language and religious facility services were identified and recorded in general project affected areas. Accordingly, analysis of the survey result reveals majority of population constitutes Oromo ethnic groups. The remaining belongs to Amhara, Afar, Guragae, Tigre, Combats and Wolayita etc. Concerning religion, the largest percentage of population is Muslims and Ethiopian Orthodox Christian. Following that, other Christian religions (Protestants), and traditional religions

There are no ethnic minorities or tribal people in and around the project area whose traditional life style could be compromised through the development of the proposed project. Therefore, no indigenous people development plan will be required.

#### 4.3.2.3. Household size

The 2007 Census Report revealed that average household size in the Oromia Regional State is 5 persons per household while In the Amhara regional state, the average household size is 4.8 persons in each household. The average household size for Boset and Adma Woredas are 5 and 5.3 persons respectively; while the average household size for the Minjar Shankora is 4.39 persons.

#### 4.3.2.4. Land holding system

The FDRE Constitution under article 40, that deals with "Right to property", provides details about land rights in Ethiopia. Article 40 (3) of the constitution answers the core question of land ownership issue in Ethiopia: The right to ownership of rural and urban land, as well as of all natural resources, is exclusively vested in the State and in the peoples of Ethiopia. Land is a common property of the Nations, Nationalities and Peoples of Ethiopia and shall not be subject to sale or to other means of exchange.

With regard to the land holding registration and certification, it is ongoing processes along the road corridor in the woredas crossed by Adama- Awash express road project such as Adama, Boset and Minjar Shankora woredas. According to the information gathered from each woreda, currently only land registration was completed and certificate has been given only for those registered during first round. For example in the Amora Bete kebele administration there are 2001 land holders registered out of which, 1001 ( about 50%) land holders had been given certificate while the rest 1000 land holders are waiting for the certification. Similarly, in the Boset and Adama woredas of east showa zone, registration that full filled all the necessary information such as cadastral and x, y coordination is not finalised yet. Therefore, only registration card was given for the land holders in each kebeles. Regarding joint registration, data was not found but according to the information from the woredas, if the household head is male, the certification will be given by the name of the husband, while if the household head is female it will be given by her name.

#### **4.3.2.5. Settlement and Housing**

There are major settlement sites and houses within the route corridor of the road project beginning from Adama town to the end of the project Km. 60 around Melka Jilo town. The types of housing units vary in their style associated with purpose, types of construction materials and type of community (urban or rural). In view of this, most of the housing units of the three Weredas (both in rural and urban areas) are constructed from wood and mud made wall and corrugated iron sheet covered roof. However, some rural communities construct low cost traditional houses made of wood and covered with grass.

#### **4.3.2.6. Gender issues**

Women in the project area have social, economic and political constraints to exercise their rights as their men counterparts. They have low social status and poor access to and benefit from basic social services. On the top of reproductive responsibility, women have an additional responsibility to generate income to meet household needs. Men are largely the decision makers for agriculture, livestock production and other issues related to major household are assets. Women are primarily responsible for domestic chores such as cooking, fetching water and fuel wood, cleaning, washing and childcare.

In the woredas crossed by the road project, women do not have role in customary decision-making issues, and on the whole are not involved in rangeland management decisions. Men are the decision makers of livestock production, management and grazing land. Women's responsibility outside the household chores is primarily in petty trade and livestock herding. Girls are expected to participate in household activities regardless of their attendance to school.

As disclosed by woreda women affairs offices, gender inequality in the project area is exacerbated by the following major problems:

- ☞ Negative attitude, norms and value systems of the society;
- ☞ Harmful traditional practices which includes female genital mutilation, abduction, and rape;
- ☞ Excessive workload and overwhelming responsibilities;
- ☞ Low social status of women and poor access to and benefit from basic social services;
- ☞ Male dominated resource right and decision making power;

In general, the poor economic development of the area, food insecurity, absence of potable water, the social, cultural and religious setting of the area aggravates the worsening situation of women directly or indirectly.

#### 4.3.2.7. Health Service Conditions

##### A. Health Institutions and Health Coverage

Adama woreda has 10 health centres and 37 health posts and 1 hospital. The hospital is owned by wanji sugar factor and administered by the factory. The other health facilities are found at the rural kebeles.

There are 7 health centres, 21 clinics, 33 health posts, 8 pharmacy and 1 hospital in Boset woreda. Similarly, Minjar Shankora woreda has 5 health centres, 30 health posts, 9 clinic, 9 pharmacy and 1 hospital. Furthermore, there are referral hospitals at close proximity of the road corridor in Adma town. Table4-10 below show the health institution available in each woredas.

Table 4- 10: Health Institutions by Type and Woreda.

Name of Woreda	Health Institutions (Number)					
	Hospital	Pharmacy	Health post	Health center	Clinic	Total
Adama	1	-	37	10	-	
Boset	1	8	33	7	21	
Minjar shankora	1	9	30	5	9	

Source: Compiled from data obtained from each Woreda, 2018

##### B. Health Personnel

The number of health professionals indicates availability of better staffing in the health facilities. There are adequate number of health officers, clinical nurses and laboratory technicians in the health centres and at least 2 community health extension workers in each Kebele. Furthermore, the number of mid-wife nurses are sufficient to provide antenatal care, delivery services and postnatal care for pregnant mothers particularly in woredas traversed by the road project.





Table 4- 11: Health Personnel in the Project Affected Woredas, 2018

Woreda	Doctor	Nurses	PH	Env. Health	H. Ext. Workers	HO	Lab. Tech.	HMIS	Pharmacist	Midwifery	Supportive staffs	Total
Adama		65	3	2	75	24	10	7	13	19	63	281
Boset		44	0	5	81	22	10	7	4	10	61	244
Minjar shankora	8	48	1	3	60	22	9	7	16	16	111	301

Source: Compiled from data obtained from each Woreda, 2018

### C. Ten Top Diseases

The ten top diseases of the Woredas traversed by the proposed expressway road are described in the Table 4-12 below.

Table 4- 12: Ten top diseases of the project affected Woreda in 2018

Rank	Adama Woreda			Boset Woreda			Minjar shankora Woreda		
	Diseases	No. cases	%	Diseases	No. cases	%	Diseases	No. cases	%
1	Acute febrile illness(AFI)	5700	17.01	Acute upper respiratory infection	10729	20.44	Acute upper respiratory infection	8977	22.59
2	Acute upper respiratory infection	4872	15.48	Acute febrile illness(AFI)	9551	18.20	Acute febrile illness(AFI)	8241	20.73
3	Typhoid fever	4672	13.94	Diarrhea (non-bloody)	8027	15.29	Infections of the skin and subcutaneous tissue	3620	9.11
4	Urinary tract infection	3081	9.2	Pneumonia	4087	7.79	Dyspepsia	3079	7.75
5	Helminthiasis	3078	9.19	Urinary tract infections	3990	7.60	Trauma(injury, fracture)	2974	7.48
6	Diarrhea (non-bloody)	2803	8.3	Infections of the skin and subcutaneous tissue	3813	7.27	Diarrhea (non-bloody)	2968	7.47
7	Other unspecified diseases of skin & subcutaneous tissue	2572	7.68	Helminthiasis	3586	6.83	Unspecified infectious and parasitic diseases	2591	6.52



Rank	Adama Woreda			Boset Woreda			Minjar shankora Woreda		
8	Pneumonia	2396	7.15	Typhoid fever	3166	6.03	Other unspecified diseases of skin & subcutaneous tissue	2489	6.26
9	infections of the skin and subcutaneous tissue	2198	6.56	Malaria (confirmed with p. falciparum)	2984	5.69	Unspecified diseases of eye and adnexa	2457	6.18
10	Trauma(injury, fracture)	1819	5.43	Other unspecified diseases of skin & subcutaneous tissue	2549	4.86	Typhoid fever	2350	5.91

Source: Compiled from data obtained from each Woreda, 2018

#### D. HIV/ AIDs prevalence

In Ethiopia, the HIV/AIDS pandemic, in recent years, has emerged as a major health hazard, affecting mainly the age group between of 15 to 49 years.

Road construction and similar projects are considered as having high potentially for the spread of the HIV/AIDS virus due to their mobility.

This is partly because construction workers are mostly young and sexually active group of the population and are forced to live in working camps. It is believed that this type situation exposes the active force to contract and spread the virus quickly.

HIV/AIDs disease is a growing concern in the project area as it is the case elsewhere in the country. To identify the status of HIV/AIDS prevalence along the road corridor, data on HIV/AIDS problem was collected from project woredas health office and presented in Table 4-13 below. The data show that only those people who volunteer to test, it is evident there could be more HIV/AIDS cases if more people tested.

Table 4- 13: HIV/AIDS cases registered in the project woredas, up to 2018

Woreda	Tested	Positive	Rate (% of infection)	ART
Adama	21619	289	1.33	285
Boset	86684	663	0.76	1218
Minjar Shankora	7226	37	0.5	37
Total	115529	989	0.85	1540

Source: Project woredas' health office

The project woredas' health office expressed their fear of further increase of HIV/AIDS cases due to proposed expressway construction in relation to influx of labour force for the project construction, hence they urged that concerned body and stakeholders to considering necessary prevention measure by the project implementer.

#### 4.3.3. Water supply

As the road project is situated in the rift valley, its climate is governed by high temperature, low and unreliable distribution of rain fall. The scarcity of rainfall has an impact on the existence of both surface and ground water. The two rivers Awash and Tabo are the only surface water resources flow in the Boset woreda. Awash flows in northeast direction along the boundary of Boset and Arsi Zone, while Tabo starts from Minjar shankor woreda and flows along the northeastern direction within Boset. These surface water resources are sources of drinking water for the rural community.

Water supply coverage of the woredas traversed by proposed road project ranges from 48% to 53%. Out of the kebeles the express way passes, Amora Bet is among the least in water supply coverage where the dominant water supply source for both livestock and human population is pond. There is acute problem of clean water supply in the proposed road project area.

The main water supply schemes in general project area are Modern Hand Dug Well, Motorized System Springs, Deep Well and ponds. The details are outlined and presented in the Table 4-14 below.

Table 4- 14: Major water supply schemes in the woredas crossed by road.

No.	Type of Major Water Supply Schemes	No. of Schemes		
		Adama	Boset	MinjarShenkora
1	Modern Hand Dug Well	7		51
2	Motorized System	30	11	
3	Spring Development	4		10
4	Deep Well		6	14
5	Ponds	16		3
<b>Total</b>	<b>50</b>	<b>17</b>	<b>78</b>	<b>Total</b>
	Coverage of clean water supply (%)	52.56	48.06	47.94

Source: socio economic profile of each woredas 2008 E.C

#### 4.3.4. Education

Education plays a crucial role in the process of social and economic transformation. In its broader social objectives of increasing the stock of knowledge enriching the culture and elevating the

factor for scientific outlook of the population, raising output and productivity. Education stands as a key poverty reduction. Taking into account the role education plays in the socio-economic development, the Ethiopian government has paid great attention to promoting education in various regions of the country including the study project area. Accordingly, the project area regional bureau has made also various efforts for the developments of education in the region to this end, general project Woredas are no exception. Hence, performance of educational services that have been assessed in general project area during the study period reveals the followings:

### A. Educational Coverage

As per the information gathered from project area education offices, currently the coverage reached 85% in both primary and secondary levels of schools.

### B. Number of Schools

According to data obtained from respective Education offices in the project area, there are 264 primary and 7 Secondary schools in the general project areas crossed by the project. All school types are owned by the government.

### C. Number of Students

The total number of students enrolled for 2016 in general project area at primary levels are 96397 (49,820 males and 46,577 females). While, at secondary levels the figure becomes 10,423 (5,667 males and 4,756 females). Number of students enrolled in all level of schools is significantly increasing in almost all area as compared with the past decades. However, the enrolment of students in secondary level and the number of female students still remains less. High student dropout rate, low participation rate of girls and lack of preparatory school in the nearby for the rural communities, was identified as the major problem of education in the project area. The details are presented here below in the Table 4-15 below.

Table 4- 15: Numbers of Schools and Students by Woreda and Gender (2016/2017)

Town Administration and Woredas	No. of primary schools	Number of Students(year2016)			No. Of Secondary schools	Number of Students		
		Male	Female	Total		Male	Female	Total
Adama Town Administration	3	4,374	3,894	8,268	1	1,988	1,744	3,732
Adama	73	18,443	17,271	35,714	1	1,977	1,568	3,545
Boset	66	14,524	13,728	28,252	1	683	470	1,153
Minjar Shenkora	47	12,479	11,684	24,163	1	1,019	974	1,993
Total	189	49,820	46,577	96,397	7	5,667	4,756	10,423

Source: socio economic profile of each woredas,

### D. Number of Teachers by Sex

As per the information gathered from project area education offices, the total number of teachers in all woredas in which the project cross are 2726 (1612 Males and 1114 Females). Based on data sources obtained from general project area, the assignment of teachers in both primary and secondary levels of schools, in each woredas in which the road project passes were carried out via proportional allocation methods, by taking into consideration the number and type of school level, number of students in each school level, the required teachers qualification and student to class room ratios in each school levels. The following Table 4-16 detailed teachers' number by sex.

Table 4- 16: Number of teachers by sex in the woredas crossed by proposed road project

S/No.	Number of teachers by sex			
	Name of woreda	Male	Female	Total
1	Adama	668	440	1108
2	Boset	472	337	809
3	Minjar Shankora	472	337	809
Total		1612	1114	2726

Source: socio economic profile of each woredas, (2016)

### E. Student to Class Room Ratio

Regards to student to classroom ratio, at primary level 60:1; while, in, secondary school levels, 45:1. In both school levels the figures are similar to the national average.

### F. Student to Books Ratio

Concerning student to book ratio, in both levels is 1:1, which is similar to the national average.

### G. Accessibility of School

based on data sources obtained from project area education offices and by field observation, In general project area, the primary level of schools were established for students within a reasonable walking distance (5-10km) from their homes. While, the secondary level of schools less than 7km.

### H. Major Educational problems

Based on information sources obtained from general project area education offices, major educational problems so far existing in general project area and hinders provision of quality education services includes the followings:

- ☞ Scarcity of available teaching materials and teaching aid facilities;
- ☞ Scarcity of basic needs among the community such as food, water, clothing etc.;

- ☞ Absence of power/energy in some Rural Schools;
- ☞ Lack of appropriate budget;
- ☞ Lack of School furniture;
- ☞ Shortage of Teachers,
- ☞ School dropout ,due to economic problems

#### 4.3.5. Economic Activities

Depending on the analysis of existing economic activities in Oromia and Amhara is dependent for livelihoods are based on mixed agriculture (crop and livestock husbandry) in the rural settlements, while in the urban centres there are different business such as trade, service providers in the restaurants and hotels.

##### 4.3.5.1. Crop production

Crop production is the dominant economic practices for means of subsistence in the project affected areas). Based on data sources obtained from sector offices of agriculture, in the project affected Weredas, Major crops grown in the area are annual and perennial types.

The major annual crops produced in the area are cereals: such as, teff, sorghum and maize, The major perennial crops types identified in the project area and recorded during field assessment period are mango, lemon, orange, papaya, sugarcane, hops and chats .Based on field observation and data sources obtained from agricultural sector office of Weredas. The following Table 4-17 and Table 4-18 indicates the crop produced in the crossed woredas.

Table 4- 17: Crop production status of Adama worda

No	2007			2008	
	Types crop	Area ( He)	Yield (Quintal)	Area ( He)	Yield (Quintal)
1	Teff	10084.25	60853.86	13211	226725
2	Wheat	2780	52,500	4026	91308
3	Barley	1320.5	13,732.89	1811	36940
4	Maize	1811	18,887.375	2599	90669
5	Sorghum	356	448.15	348	4608
6	Bean	189.5	2503	267	3670
7	Peas	269	2654.22	337	3950
8	Haricot bean	3146.75	15530.28	3846	50942
9	Lentils	248	1485.95	254	2304
	Total	20,205	168,595.72	26,699	511,116

Source: socio economic profile of each woredas, (2016)



Table 4- 18: Crop production status of Boset woreda

No	2007			2008	
	Types crop	Area ( He)	Yield (Quintal)	Area ( He)	Yield (Quintal)
1	Teff	14427	258150	12,739	58,981.57
2	Wheat	1962	49160	1342	9729.5
3	Barley	1327	38200	653	3487
4	Maize	7199	287600	9894	204805.8
5	Sorghum	2748	105120	3212	28265.6
6	Bean	37	518	47	129.7
7	Peas	50	700	67	316
8	Haricot bean	11745	187921	8712	50965
9	Lentils	227	2951	40	71.6
	Total				

Source: socio economic profile of each woredas, (2016)

#### 4.3.5.2. Livestock Rearing

In Ethiopia, livestock rearing is an old tradition of people to maintain a large number of domestic animals as a source of social security and mean to compensate the deficiency in quality and productivity of crop production by increased quantity of livestock.

Livestock rearing in the project corridor is the second main stay of the population in Adama, Boset and Minjar-Shankora Weredas. On the other hand, it is known that domestic animals like horses, donkey and camel serve as the main means of transportation for the rural population and others like oxen serve as means for plough and meat production.

Regarding the livestock population, cattle, goats, sheep, donkey and camels are the major types of livestock rearing in the project corridor. All the farmers in the project area have a practice of livestock rearing. Moreover, the climate in Adama, Boset, and Minjar Shenkora is suitable for the animals' production.

Table 4- 19: Boset woreda Livestock and poultry population

No	Type of Animals	2007	%	2008	%
1	1.1. Cattle	239,625	35.68	545,527	64.6
	1.2. Sheep	63,656	9.46	42,050	4.9
	1.3. Goats	189,138	28.13	102,000	12.07
	1.4. Horses	870	0.12	2,376	0.28
	1.5. Mules	746	0.11	335	0.039
	1.6. Donkeys	42,134	6.26	32,883	3.8
	1.7. Camels	28,940	4.3	13,349	1.5
2	Poultry	107,095	15.93	105,880	12.5
	Total	672,204	100	844,400	100

Table 4- 20: Adama woreda Livestock population

No 1	Types of live stock	No of live stock			
		2007	%	2008	%
1.1	Cattle	101092	42.55	102958	41.80
1.2	Sheep	42425	17.85	45030	18.28
1.3	Goats	51432	21.65	53432	21.69
1.4	Donkeys	41035	17.27	401	0.16
1.5	Horse	706	0.29	43205	17.54
1.6	Mules	382	0.16	750	0.30
1.7	Camels	474	0.199	500	0.20
	Total	237,546	100	246,276	100

#### 4.3.5.3. Other Economic Activities

Off farm market based economic activities, employments (in governmental and private organizations) and remittances from the relatives are other forms of livelihoods enhancement in general project areas.

In most of the urban areas of the project, the livelihood of the bulk majority of the people especial women along the existing Trunk Roads of Addis-Djibouti and Addis–Dire Dawa, within project influence area are mainly engaged in businesses related to the consumption of the passing-by drivers of trucks and passengers which include hotels and restaurants.

Apart from these, in the urban centres like Adama, industry is growing in number and type, where significant numbers of people are employed. To mention few of them, Huge Turkish Textile factory, and Detergent factory and Flour factory in Adama. In the rural sites, most of income generation schemes for livelihoods in which communities are currently engaged are traditional, uniform and mostly to meet daily needs. Some of the activities widely undertaken includes: collection of remittance from the relative's, sell of fuel wood and agricultural products, gathering wild honey, sector of employments.

Low awareness in business development works, lack of skill and experience in income generating schemes, limited capacity of the private sector to absorb the growing number of unemployed, lack of alternative employment from private investment, weak saving culture of the community, and shortage of credit and saving facilities are some of the major problems cited in the project area.

#### 4.3.5.4. Investments

Investment activities along the road corridor is not as such in the kebles crossed by express way within the Boset and Minjar Shankora woredas. Contrary to this there are 73 investments which are established in many types of investments in the Adama woreda in the kebeles the expresse way passes and neboghor kebles. These are Kuriftu, koboluto, Adulala Boku, Bate Germama, A/Malkasa, Adulala Hax Haroriti, Bokuu kurabu and Ulaga melka oba. The following table

detailed information of investments activities that have great contribution to economic development Adama district.

Table 4- 21: Implemented investment Activities in year fiscal 2007.

No	Type of investment	No. of Project	Capital	Approved Land (He)	Job opportunity	
					permanent	Temporary
1	Agriculture	33	95,340,000	48.9504	91	248
2	Hotel	1	84,224,000	46	143	167
3	Industry	4	284,296,000	11.1	247	152
4	Agro_ industry	3	1,468,000	5.285	37	84
<b>Total</b>		<b>41</b>	<b>465,328,000</b>	<b>111.3354</b>	<b>498</b>	<b>651</b>

Table 4- 22: Implemented investment Activities in 2008 fiscal year.

No	Type of investment	No. of Project	Capital	Approved Land (He)	Job opportunity	
					permanent	Temporary
1	Agriculture	34	125,340,000	49.95	94	277
2	Hotel	1	84,224,000	42	143	321
3	Industry	4	284,296000.7	11.1	230	155
4	Agro_ industry	3	14,680,000	5285	37	121
5	Fuel station & hotel	1	6,877,000	0.34	4	9
<b>Total</b>		<b>43</b>	<b>515,417,000.7</b>	<b>5391.39</b>	<b>508</b>	<b>883</b>

#### 4.3.5.5. Factors Affecting Agricultural and livestock Productivity

There are several problems affecting agricultural productivity in the projected area. The major ones reported by the agricultural officials of respective Woredas are summarized below:

- ❖ Unreliable climatic condition;
- ❖ Shortage of water and inadequate animal feeds;
- ❖ Animal diseases that results in high animal mortality;
- ❖ Poor/traditional way of livestock, crop and honey production;
- ❖ Negative impact of pesticides and herbicides on beehives;
- ❖ Habitat loss through land use changes, increasing monoculture;
- ❖ Lack of knowledge about the habit and management of bees.

## CHAPTER FIVE

### 5. PUBLIC CONSULTATION AND PARTICIPATION

#### 5.1. General

The environmental policy of FDRE stipulates that environmental and socio-economic impact assessment should incorporate public and stakeholders' consultation prior to the commencement of any project activities. Public consultation and participation involves information exchange, collaborative decision making and participation. It's central to socio-economic impact assessment by which project owners disseminate information to pertinent authorities and project affected population and conduct joint consultation for effective facilitation of project implementation. Accordingly, consultations and discussions about Adama-Melkajilo (km-60) expressway that has 60 km length and starts at outskirts of Adama Town and extends to Km. 60 around Melka Jilo/Jajabe Haro in Minjar Shenkora Woreda were carried out at two levels.

During this review process public and stakeholders' consultation was conducted on April 17- 23, 2018, in all the three Weredas traversed by Adama-Melkajilo (km-60) expressway project. In all the three Weredas, both the public and stakeholders have expressed that the road construction is of a paramount importance to the socio economic development of the area and as well the country.

The outcomes of the public consultation from each woreda is summarised as follows and the minutes of the consultations are attached in the annex section.

As part of environmental and social impact assessment, public consultations were carried out in the study area. Concerned stakeholders including representatives of the local communities, local authorities or administrators and representatives of different sector bureaus and offices were consulted. The main purposes of public consultation are:

- ☞ Disclose/disseminate information among the community about the Adama-Melkajilo (km-60) expressway project.
- ☞ To identify the attitude and views of the community towards the project.
- ☞ To identify anticipated project impact on the socio-cultural life of the community.
- ☞ To identify the stakeholders and their specific role in the particular project activities.
- ☞ To share information about the road project design and activities with local authorities and communities;
- ☞ To obtain information about the needs and priorities of PAPs and their reaction towards the project;
- ☞ To gain cooperation and participation of local authorities, PAPs and communities
- ☞ To aware PAPs about various options of relocation and resettlement;
- ☞ To ensure transparency in all activities related to land acquisition, compensation and resettlement;
- ☞ To identify positive and negative impacts along with possible mitigation measures;

- ☞ To familiarize with road construction impacts and their role during implementation of the mitigation measures

Table 5-1: Number of public & stakeholders consulted by sex & location

S/N	Woreda/kebele	Number of participants		Total
		Male	Female	
1	Adama	3	0	3
2	Boset	4	0	4
3	Minjar Shankora	3	0	3
4	Amorabet kebele	15	0	15
5	Tedecha kebele	12	8	20

## 5.2. Outcome of Public and Stakeholders Consultation

### 5.2.1. Woreda Level Consultation

The first level of consultation and discussions were carried out with Adama and Boset Woreda Administrations found in East Shoa Zone of Oromia National Regional State, and also at Minjar Shonkora Woreda Administration of North Shoa Zone of Amhara National Regional State. The consulted woreda lever administrative bodies of the consulted Weredas forwarded their point of views and comments as follows.

- ❖ All the Weredas have reported that they have experiences in assigning valuation committee members, taking inventories of movable and immovable properties with concerned stakeholders, and participated in compensation payment process. They have also confirmed that they are ready to participate and perform different activities required from them during the process of taking inventories of movable and immovable properties, valuation of properties and compensation payments to be made prior the commencement of the construction of the Expressway.
- ❖ it was also raised that adequate awareness trainings should be given for those who would engaged in the process of implementation of compensation payment on issues of inventory taking, valuation process, calculating compensation payment to be made for those who would be affected based on Proclamation No. 455/2005, Part Three, “Determination of Compensation” Article 7, “Basis and Amount of Compensation” Article 8, “Displacement Compensation” payments to be made also taking into to consideration the Council of Ministers Regulation No.135/2007.
- ❖ Woreda Administrations confirmed to be engaged in mobilizing community members labour force to transport parts of the residence houses that would be demolished from the Expressway site and to be moved to the new area/site within the same Kebele where to be reconstructed ; of course, outside of the 90meters ROW; mobilize community labour

force to be engaged in supporting those households whose residence houses required to be reconstructed including those vulnerable groups like women and children headed households.

- ❖ In addition to this, other issues of giving special attention for those who are aged and above 65 years and ways of means of supporting them were raised and discussed, and the Woreda Administrations confirmed that they will take full responsibilities to handle vulnerable groups and also to involve community members to support them based on existing norms and practices.
- ❖ Finally, they raised that appropriate mitigation measures shall be implemented to overcome adverse environmental issues such as vegetation clearing, soil erosion and water contamination due to the project activities.



Figure 5-1: Partial Pictures of Wereda level participants of consultation

### 5.2.2. Community Level Consultations

Consultations were conducted at Community/Kebele level about the Adama- Awash Lot I Expressway project passing through different Kebeles in Tedecha from Boset and Amora Bet from Miniar Shenkora Weredas. The total participants of the consultations and discussions held at the two Kebeles were 38 persons among which women were eight and the rest 30 were male. The output of the consultations were coined up as follows.

- ❖ They explained that as they have experiences in losing parts of their farmland, trees and tree fruits and even their houses due to the newly constructed railway line that passes through their farmland. They have also reflected during the discussions and consultations



that compensation payments are made for affected properties, and appreciating the Expressway and willing to participate in any aspect it is required from them.

- ❖ They remarked that payment for compensation shall consider that accurate inventories of properties to be affected, accurate valuation and proper calculation for properties valued. Finally they requested fair amount to be paid as replacement cost for their affected properties.
- ❖ The community of Amora Bet kebele, asked that an old “Jajabe Haro” that found at about km 54+200 RHS offset 100m artificial pond which was constructed during His Imperial Majesty should not be touched/affected;
- ❖ Further they requested about 1km road construction has to be made to connect Melka Jilo rural town, with population of about 10,000 to the Expressway, again construction of about 5km road to connect Melka Jilo rural town with Link Road to be constructed to connect to Nura Era junction on the main existing asphalt road; and provision of employment opportunities to youth;
- ❖ They also suggested that priority should be given for local community in employment opportunities particularly for those households and household members who would be affected due the Expressway.
- ❖ Overall, the consultations and discussion made with community/Kebele representatives indicated that they are willing to participate in any activities required from them.
- ❖ All the local administrators consulted have reflected the interest of their respective communities and from a socio-economic benefit point of view, the project is a high priority issue for their communities.
- ❖ Further, they explained that as the project provide considerable benefit for socio-economic development of the surrounding areas and it will solve the sever transportation and communication problems.
- ❖ Finally, they proposed Mitigation Measures that has to be implemented to minimise or avoid adverse impacts such as:
  - Appropriate compensation for project affected persons.
  - Timely orientation and information to construction workers about the local norms and expectations to be fulfilled.
  - Promote the local community to participate in project activities with a sense of responsibility.
  - Give high attention for the roadside trees, particularly for the indigenous wood land trees in the small scale community forest areas.



Figure 5-2: partial pictures of community consulted at kebele level

### 5.3. Summary of the Consultation

Although the group discussions were held in different areas, very similar opinions were expressed with regard to the points of discussion mentioned above.

In general the project area communities have a very positive attitude towards the proposed project since the existing road infrastructure has an influence on their socio-economic life.

As a sort of summary of the discussion in all levels, the majorities of the community were aware of the project and highly appreciate the project due to the social and economic benefit it gives for them.

However, the most important issues, which all bodies were much concerned about, were the damages to be caused on the vegetation and land acquisition along the proposed road and requested for:

- ☞ Minimizing environmental and social impacts due to the construction of expressway such as vegetation clearing, land accusation and dust emission
- ☞ Receiving fair compensation
- ☞ Ensuring adequate land allocation and livelihood restoration

Concerning the damage to be caused on private properties particularly houses, and trees; they indicated that the compensation and rehabilitation issues would be easily managed by a committee that would comprise of representatives from concerned parties such as the local administration, sector offices, community representatives, the project owner, etc.

Apart from these the community, clearly expressed their attitude towards the proposed project on Commercial sex and spread of HIV/AIDS is another fear of the community as it has already



expanding fast due to the easy transportation system when compared to the past when the mobility of the people was constrained. Hence, they urged that the construction contractor has to work with local health office and health centers to alleviate HIV/AIDS spread through awareness creation and distribution of condoms properly. Furthermore, there are schools along the road which could be easily affected by the spread of HIV/AIDS during the construction period; therefore, awareness creation campaigns should be conducted in collaboration with schools principals and HIV/AIDS clubs in these schools.

With regard to the loss of lands for temporally period of time for excavation of construction material, the contractor should properly use these areas and as soon as the sites being abandoned, it should be reinstated and hand over to the owner or local administration for the other purposes. Additionally, they expressed that to prevent influx of people to the project area; priority should be given for the local community for the semiskilled and unskilled labourers. Finally they urged that the contractor should respect the local community culture and norms and should work in closed relation with local administration to control unnecessary violation rule and regulation of the country as well as the culture of the community.

## **CHAPTER SIX**

### **6. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

#### **6.1. Overall Appraisal**

This chapter provides the environmental and social impacts assessment, site specific impact identification that likely to arise due to construction of proposed Adama-Awash (Lot I) expressway road project and its subsequent operation period. Furthermore it provides evaluation of impacts that help to identify significance of impacts and to suggest appropriate mitigation measures for the adverse impacts and enhancement measures for the positive impacts.

Almost all the road section falls in the rural setting and it opens new alignment that has about 90m right of way. Therefore, anticipated environmental and social impacts of the aforementioned expressway project will have both positive and negative impacts.

The anticipated adverse impacts and positive impacts or environmental and social benefits that are assumed to be derived, due to the implementation of the project. Some of the positive impacts that emanate from the implementation of the proposed express road project are detailed in the sub topic under here.

#### **6.2. Positive Impacts**

The proposed roads project would provide several positive impacts. The major positive impacts are described below:

##### **6.2.1. Reduction of traffic generated gaseous emissions**

Due to the efficiency and lower traffic congestion, emissions from motor exhaust will be reduced. The dust emission will equally be reduced as separate and isolated asphalt paved road is used for the traffic flow only.

##### **6.2.2. Regional Integration**

The proposed Adama-Melkajilo (km-60) will bring significant benefits to the regional and country economy following adequate, safe, cost effective and reliable transport service. Businesses and communication between regions, and most importantly import and export from the central part of the country to Djibouti through Adma-Awash will be facilitated and strengthened. At the moment this trade and communication between regions and Djibouti is constrained mainly due to the lack of standard transportation facilities, poor existing road condition and congestion in urban centres and crossings. The road project also facilitates communication with link roads along the route. This will create efficient inter-zonal and regional accessibility and significantly reduce distances travelled by the communities of the area.



### **6.2.3. Impact on Traffic Safety**

Traffic accident and traffic jam on the existing high way is significant, and it is costing human life, properties, animals and wildlife significantly. The implementation of the project would improve the road condition through upgraded design and improved pavement surfacing. On the other hand the traffic jam and interferences by none motorized of transport and pedestrians will be avoided and traffic accidents due to that factor will be avoided, provided that the proposed mitigation measures and benefit enhancement measures are incorporated in the design and construction of the road.

### **6.2.4. Improve Access to Tourist Site and Port Djibouti**

The availability of efficient transportation can result in improved access to the tourist destinations of the eastern parts of the country. Access to the port of Djibouti will also be facilitated.

### **6.2.5. Job Opportunity to Local People**

The construction of the project road is expected to create employment opportunities and job for the local communities in particular for the unemployed youth and women. The youth and women residing in the project area will benefit from the employment opportunities created due to the construction of the road. It can be assumed that this will be a significant contribution to the reduction of poverty at the household level.

The participation of the local community in the construction of the project road, employment for semi-skilled and unskilled labor force should be encouraged from the project area and more opportunity or priority in employment should also be given for women and in particular to female headed households. If such employment mechanisms are adopted the project would contribute to the creation of jobs and income, and improvement of the local economy; increase the revenue capacity of the Weredas in the project area, and will also bring in new skills and knowledge to the locality.

The creation of temporary jobs can be considered as a positive impact of the road construction to the local people. Some individuals may gain skills that can be applied in other road construction projects too. Further direct opportunities include entrepreneurial development as a result of the increased population and increased road usage. This includes items such as supplies, accommodations, food outlets, restaurants etc. The general economic growth of the region due to increased access and increased traffic flow will create further indirect job opportunities. Markets will be much more accessible, thereby providing people the opportunity to increase production and access to external markets with their products.

### **6.2.6. Facilitate Humanitarian AID**

Being drought prone the area of the road corridor, construction of the proposed projects would greatly facilitate humanitarian work in times of crises and emergency services like supply of foods and other services during famine, for emergency services prevention and control of epidemic diseases, etc.

### **6.2.7. Access and Opportunity to the Employment of Women**

The impact due to the construction of the project road is expected to be significant on women living in the direct and indirect influence area. The major impact could be creation of employment opportunities in the road construction work and also following after its completion. Women in road projects could work in different capacities, such as, as daily laborers, time keepers, store keepers and in similar other activities during the project implementation.

Experiences from past road construction works show that contractors fail to provide equal employment opportunity to women mainly considering that women might not be active and efficient like men. This wrong assumption needs to change and that women should be given equal employment opportunity in those areas which they deem to be fit since there are several activities that do not require physical capacity of women or do not affect their health conditions. The construction works could also improve the income generating activities that are carried out by women. In most places in the country, it is common to see that income generating activities such as, catering services, coffee and tea shops, kiosks and bars are managed and run by women; and in some areas it is particularly run and managed by female-headed households. Hence, women engaged in these activities could earn increased income through sales of goods and services to the construction workers.

### **6.2.8. Economic Growth and Development**

With enhanced movement and accessibility along the road, the economy of people served by this road would be improved, contributing its share to the overall economic improvement of the country. Other benefits such as availability of public transportation, the reduction of vehicle operation costs, and reduction of travel time, reduction of gaseous and dust emission and associated health impacts would be achieved.

With the road construction, there will be good opportunities for commerce and trade to improve and provide better quality services. Moreover, lowering the costs of motorized transport may enable a more steady supply of goods and services into the area and facilitate the movement of agricultural products to markets.

Construction of the project roads will complement the regional/ the national road network by increasing the total length of all-weather roads by about 60 km and providing a strategic link of Addis-Adama-Awash- Mille-Djibouti trunk roads.



These and other positive impacts would help to increase the overall economy of the people along the road and that of the country.

#### **6.2.9. Reduced Travel Time and Vehicle Operation Cost**

Construction of the Expressway will considerably reduce travel times and the associated vehicle operating costs to and fro Djibouti. This would be manifested by cheaper travel and transport cost as well as lower cost of living in the project road influence zones. When the construction of the Expressway is completed the vehicle maintenance and operational costs would be greatly reduced.

#### **6.2.10. Avoid the Existing Drainage Problems**

A well-designed road will mitigate the drainage problems in the road corridor. The new road prism and drainage structures will improve drainage on the road surface, across and alongside the road, thus minimizing erosion and siltation problems during the operation phase.

### **6.3. Negative Environmental Impacts and Mitigation Measures**

To prepare and recommend proper mitigation in environmental and social management plan to ameliorate the adverse environmental and social impacts of the proposed road, impact identification was done along the road corridor based on sensitive environment identified.

For each specific site practical engineering activities and adverse impacts due to these activities on the receiving environment proper mitigation measures were proposed under each impact identified.

#### **6.3.1. Negative impacts on physical environment**

Possible impacts on physical environment include impacts on soil such as soil erosion, soil pollution or contamination, impacts on water resources (including disruption of downstream flows, increased sedimentation, water pollution), impacts on landscape quality, impacts on slope stability (like land-sliding), air pollution (esp. dust emission), and noise pollution. Furthermore, Table 6-1 below indicates the significance, nature (likelihood), duration and magnitude of the impacts.



Table 6-1: Impact matrix.

Impacts	Nature			Duration		Magnitude			Extent		Significance			
	None	Positive	Negative	Long	Short	High	Moderate	Low	Local	Regional	High	Moderate	Low	None
Impacts on Flora			X	X			X		X			X		
Soil erosion and gully formation			X		X		X		X			X		
Risk of flooding			x	x		x			x			x		
Diversion of storm water from ponds			x	x			x		x			x		
Slope Instability			X	X			X		X			X		
Water resource & drainage line			X		X		X		X				X	
Impacts on Air Quality			X		X			X	X				X	
Noise and Vibration Impact			X	X			X		X			X		
Loss of farm Lands			X	X		X			X		X			
Loss grazing lands			X	X		X			X		X			
Water Supply & Competition			X		X	X			X		X			
Impact on flora & climate change			X		X		X			X			X	
Impacts on Fauna/Wildlife			X		X			X	X				X	
Impact on Public Utilities			X		X			X	X				X	
Disruption of accessibility & traffic safety			X	X		X			X		X			
Historical, Cultural & religion	X													
Impact on Residential Dwellings			X	X				X	X		X			



Impacts	Nature			Duration		Magnitude			Extent		Significance			
	None	Positive	Negative	Long	Short	High	Moderate	Low	Local	Regional	High	Moderate	Low	None
Impacts due to influx of people			X		X	X			X		X			
community Health and safety			X	X		X			X		X			
Occupational Safety and Health			X		X		X		X			X		
Impact on Women & Vulnerable Groups			X		X		X		X			X		
Impact due to camp sites and other workshop areas			X		X			X	X				X	
Impacts Due to Operation of Asphalt Plant			X		X		X		X			X		
Risk of Spread of Malaria			X		X			X	X				X	
Impact from Explosives			X		X			X	X				X	
impacts from Wastes generated			X		X			X	X				X	
Impacts due to borrow pit & quarry site operation			X	X		X			X		X			

The following sub sections provide description discussion of the significant adverse impacts along with mitigation measures included in the road design.

#### **6.3.1.1. Adverse Impacts on Soil contamination and Erosion**

Soil is an important component of the natural environment, and is a primary important for many biological and human activities, including agriculture. Its protection in relation to road development deserves considerable attention.

Loss of topsoil and impairment of natural soils caused by earthworks, operation of heavy machinery, quarries and borrow pits, and establishment of construction facilities (workers camps and workshops) is the main soil erosion issue of concern for the proposed project.

Earthworks for construction of carriageways and structures like bridges and culverts, and land clearing for establishment of the contractor's site facilities will remove the topsoil and expose it to runoff water erosion. In addition to these direct effects, in the case of embankments, the upslope extension of erosion gullies can affect lateral drainage works and pavement margins. In the case of cuttings, this can also affect upslope agricultural land outside the right-of-way. Material eroded from both cuttings and embankments, blocks drains and impairs their function.

The project involves construction of major structures such as bridges on drainage lines as well as the construction of approach roads will involve massive excavations. Additional loss or impairment of soils will be caused by construction of temporary roads such as access to material sites, exploitation of quarries and borrow pits, and moving heavy equipment.

Heavy machinery used in the road construction, operation of borrow pits and quarries will likely cause soil compaction. This will harm the soil's potential for future agricultural use or vegetation. The physical characteristics of the area such as sloppy topography make the project area venerable for erosion and flooding.

The sealing of the soil surface by compaction leads to the destruction of the soil physical properties and its various functions. Besides the loss or impairment of soils due to the above discussed activities, soils in the impact zones can be impacted as a result of disposal of waste materials from road cuts and other excavation works, and disposal of wastes from contractor's camps and used oils and lubricants and spills of oils and fuel from engines of vehicles and diesel operating machinery as well as accidental spillage. Pollution of soils can result from waste waters, sewage and cleaning of equipment, storage and handling of hazardous substances.

Implementation of the project will also cause changes to the local natural landscape, which will be mainly related to extraction of construction materials from quarries and burrow pits and cutting and filling in sloping lands that will ultimately end up in marred landscape. In general about **5,436,675.2m<sup>3</sup>** of construction material is required to fill the road stretch.

## Mitigation Measures

The following proposed mitigation measures are appropriate and practicable if implemented to minimize soil contamination and erosion due to road construction and excavation of construction materials.

- ❖ Provide adequate cross sectional area to drainage structures to allow sufficient passage for the discharge and shall put energy dissipaters, where important, for safe disposal of the discharge.
- ❖ Protect slopes with stabilizing structures such as V-cut surface drainage behind the top of cut slopes and cut off drains, retaining walls, wire basketry, gabions, and other physical structures including check dams, and other energy dissipating structures such as chutes, cascades, etc.
- ❖ Implement Bio-engineering conservation techniques to protect and stabilize unstable slopes, and also shall use appropriate local variety grass species, which have multiple purposes, like vetiver grass, together with a physical engineering measures as soon as possible after completion of the works.
- ❖ Construct cut-off drains above cut slopes.
- ❖ Rehabilitate existing road side gullies and landslides sites and also at other following Engineer's instruction and approval.
- ❖ Pave side drains, depending on site conditions, for instance, nature of the soil, gradient/slope of the area, and other factors and construct all energy-dissipating structures at the drainage outlets and discharging points.
- ❖ Provide cross drainage structures as close as possible to minimize concentrated flow from side ditches and to let the flood lead to the nearest stream easily without scouring the side walls.
- ❖ Pay items should be included in the Bills of Quantity for the control of erosion at all locations and Penalty clause will be included in the works contract that makes the Contractor responsible for non-conformance in complying with necessary clauses.
- ❖ Minimizing extension of work activities beyond the imperative area for the construction of the road within the RoW and exploitation of material sources such borrow pits
- ❖ Preventing soil pollution by hazardous substances by collecting and putting it in a sealed container at camp sites and workshop areas.

### 6.3.1.2. Diversion of Storm Water from Artificial Ponds

As it was conformed during field visit and community consultations in each woredas, it was reported that the water flows from left to right side of the proposed road due to the terrain of the area; while most of the artificial ponds almost all are found to the right side of the proposed road. This will divert the storm water that was entered into the ponds along the road side as the storm water will be collected into the road side ditches. Hence this will negatively impacted the water

harvesting potential of the local community and the impact is long lasting that limited to the local with moderately significant.

### **Mitigation Measures**

To overcome this adverse impacts the following mitigation measure shall be considered during the construction time of the express way road project:

- ❖ Proper channelization with open paved ditches that connect with artificial ponds has to be constructed;
- ❖ 10m x 20m x 3m artificial ponds has to be constructed along the road side in such a way that two in Adama woreda, two in Boset woreda and one in the Minjar shankor worad in the Amora Bet kebele;
- ❖ Before construction of the artificial ponds the contractor has to consult the local community and stakeholder for site selection and thrier interests that mediate all the users of the ponds.

#### **6.3.1.3. Impacts on Slope Instability and Gully Formation**

According to the socioeconomic profile of each woreda, current status was based on traditional and modern ways of soil conservation through erosion protection and gully treatments. These are terracing and counter ploughing are traditional, while check dam construction and gully treatment are modern methods of soil conservation practiced in the road corridor. Furthermore, they planned to continue in the future soil conservation using watershed management by mobilising community during off-farm time.

Due to the proposed express way, land sliding problems may occur during construction works at some location where the road along foot of mountains, if slope cut is not properly done. This may encounter along the proposed project, between Wolenchit-Km.60 of the road section where cut and fill is expected.

Road construction project are important contributor to soil erosion, primarily because they concentrate and distribute runoff as channel flow rather than a uniform overland or subsurface flow. Roads also dissect fields and interrupt established drainage; at crossings they risk disrupting peak flows, accentuating backwater, and accelerating bank erosion.

During construction, soil erosion can be a serious environmental problem at any section(s) of the project as the alignment traverses different landscapes. The water concentrated in side ditches and diverting drains will cause severe erosion resulting in deeper and wider gullies in the ditches and diverting drains themselves and at downstream areas. During site visit of the road corridor we could not found any efforts all the woredas' made for soil and water conservation activities. However, environment, forest and climate change authorities of each woredas' told as they have a plan annually during off-farm time by organising the farmers through prioritizing highly degraded lands and erosion prone area.



## Mitigation Measures

A clause shall be included in the Works Contract that requires the Contractor to implement both physical structures and bio - engineering mitigation measures to avoid soil erosion, slope failure and to stabilize road side slopes as required. Bio-engineering measures including grassing & vegetation cover to stabilize slopes and to serve as sediment trap along the Right-of-Way edges so as to reclaim marginal areas. Physical structures like masonry retaining walls, gabion, benching of excessively steep slopes etc. Shall be implemented as found appropriate by the geotechnical and engineering design parameters. Penalty clause shall be included in the Works Contract that makes the Contractor responsible for non-conformance in complying with the relevant clauses. Furthermore, the contractor shall deployed practicable mitigation measures to minimise slop instability through undertaking the following proposed mitigation measures.

- ☞ Avoid loading of sensitive slopes with fill or dump materials;
- ☞ Minimize excavating in such sensitive slopes to the extent possible;
- ☞ Avoiding side-casting of excavation materials on down-slope by depositing it only in approved disposal sites;
- ☞ Controlling surface water infiltration to reduce seepage forces by providing adequate side drains, interceptor drains, etc.;
- ☞ Use existing material sources that have been used for the road construction and maintenance by previous road along the road.
- ☞ Avoid indiscriminate disposal of surplus or unsuitable excavation materials by depositing it only at approved disposal sites and, on completion, by landscaping and planting such sites with appropriate tree, shrub or grass species to improve the aesthetic quality of those sites,
- ☞ Reserving spoil materials and utilizing it in back-filling of quarries or borrow pits when exploitation of those sites is completed.

### 6.3.1.4. Impacts on Air Quality

The proposed project along the selected route option will have adverse impact on air quality. This occurs as a result of dust and smoke releases during construction period. The major effects on air quality during the construction period will be an increase in suspended particles from blasting, excavation, and movement of heavy machinery and other vehicles over unpaved or dusty roads. Good site practices must be followed by the contractor to minimise dust production and vehicle emissions.

However, the impacts will be minimized acceptably by taking proper dust abatement measures (e.g. watering) where necessary, and by using properly handled /maintained machineries.

## Mitigation measures

Emissions of dust particulate matters, pollutant gases shall be reduced to acceptable levels by adopting the recommended measures. An environmental clause will be included in the works

contract that requires the contractor to implement the following mitigation measures to minimize the possible air pollution:

- ❖ The Contractor shall reduce dust from construction sites, access roads by watering at least three times a day when the same are located in sensitive areas, road side crops and villages .Availing adequate water trucks and operators must be considered.
- ❖ Use of modern and well-maintained equipment (with mufflers where appropriate or bag filters), regular maintenance of diesel powered machinery and vehicles to reduce excessive exhaust emissions
- ❖ Regular maintenance of emission intensive plants like stone crusher and bitumen mixer and application of dust suppressant mechanisms.
- ❖ Locating the aggregate production and bitumen mixing plants at a maximum distance away from sensitive areas such as residential areas, health units, schools and religious areas.
- ❖ Avoiding burning of materials such as tires, plastic, rubber products or other solid waste materials that creates heavy smoke, hazardous smoke or nuisance odor and disposing of any volatile chemicals to near, schools, religious places, and drinking water supply sources.
- ❖ Construction contractor and his workers must comply with relevant health and safety standards pertaining to noise emissions, such as wearing ear protection when operating plants or heavy machinery.
- ❖ Implementing well-designed traffic management plan that considers traffic safety and working hours for materials transport thereby minimize transport-related disturbances to local residents and road users, and reduce traffic accidents.
- ❖ Avoiding disposing of any volatile chemicals to the air; and

#### **6.3.1.5. Noise and Vibration Impact**

It is predicted that Noise and vibration impacts might result from construction activities in general as well as during the operation and maintenance phase. Particularly, the most noticeable sources of noise will be from machinery, heavy earthmoving equipment. Other operations generating significant noise include concrete mixing plants, blasting in areas of rock excavation and stone crushing.

During construction, vibration will increase temporarily because of the operations of machineries and equipment like vibrating rollers, and explosives. Some rural villagers may be affected by noise and vibration during construction and the impact is temporary and short term.

During the construction phase, the noise and vibration impacts adversely affect the workforces especially on the operators working with heavy machines such as excavator, roller, bulldozer and

loader. Furthermore, workforces working in the crusher plant and asphalt plants adversely affected by noise.

#### **Mitigation measures:**

It should be noted that a clause will be included in the Works Contract that requires the Contractor to implement the following mitigation measures to minimize possible noise and vibration impacts:

- ❖ The Contractor shall not operate noisy operations like crushing plants near the noise Sensitive areas such as settlement areas, health institutions, and schools.
- ❖ Construction activities that generate disturbing noise levels are to take place during conventional working hours wherever possible
- ❖ The Contractor shall screen equipment producing high levels of noise when working near the settlement areas, clinics and religious areas.
- ❖ The Contractor shall minimize the use of explosives and promote a systematic blasting schedule.
- ❖ The Contractor shall provide safety equipment pertaining to noise, such as ear protection mufflers whenever necessary for the workers.

#### **6.3.1.6. Impacts on Water Resources and Drainage Line**

The direct effect on water resource in the project area is very minimum as there is no perennial rivers along the road stretch, only seasonal streams are traversed by the road. Surface water quality deterioration associated with high silt material during the construction phase is of critical. Accordingly, the following impacts should be anticipated during the construction and operational phases.

Apart from the surface water quality degradation problem due to the sedimentation of eroded soil, the road project can cause both surface and ground water pollution. The likely sources of impacts include redirecting water courses at bridges and culverts; heavy excavations for foundation of structures, discharge of sewage and other liquid wastes from contractor's site facilities, and spillage of pollutants.

The major surface run off generates from the hill side on the left side of the proposed road and it will be concentrated as the road diverts its natural flow direction and then flood over the farm lands along the road sides especially that found on left side of the road which pose moderate adverse impacts that may be long lasting and localized to its extent and significant.

The road may interfere with and modest flow of surface water resulting in concentrated flows at certain points and increasing flow velocities. These changes can contribute to soil erosion, flooding, channel modification, downstream scouring and sedimentation in river and stream courses.

Adverse impacts on local water resources and drainage are usually related to flow modification and enhanced erosion due to the earth moving works during construction. Modification of the natural flow of surface water and drainage patterns resulting in concentrated flows at certain points and increased speed of flows was observed in significant part of the project areas especially along the Adama-Wolenchit section. These changes will contribute to soil erosion, flooding, channel modification and siltation of streams and other waterways. The impacts on water resource can also extend to the downstream during rainy season as sediment can easily be carried by erosion.

Accidental spillage of oil and greases used for the machinery and vehicles during construction works and waste generated in camps and garages could also be sources of pollution to the water resources in the project influence area. The following Table 6-2 indicates the drainage line crossed by the proposed expressway.

Table 6-2: Specific location of the drainage line along the road stretch.

Station	Northing	Easting	Proposed Type of structures	Remarks
0+195.310	944399.402	534244.599	Slab/Box Culvert	In all drainage lines proper channelization is very important, that means directing the water flow to the nearest watercourse.
0+364.664	944521.963	534361.474	Pipe Culvert	
0+649.329	944728.259	534557.628	Slab/Box Culvert	
0+974.545	944980.046	534761.536	Pipe Culvert	
1+410.056	945400.551	534849.889	Slab/Box Culvert	
1+659.745	945649.811	534835.258	Slab/Box Culvert	
1+799.744	945789.570	534827.049	Slab/Box Culvert	
2+197.405	946186.546	534803.731	Slab/Box Culvert	
2+468.896	946457.497	534786.571	Slab/Box Culvert	
2+793.977	946780.110	534809.896	Pipe Culvert	
2+950.050	946924.976	534867.409	Slab/Box Culvert	
3+444.534	947277.585	535207.339	Slab/Box Culvert	
3+709.979	947442.210	535415.569	Pipe Culvert	
3+879.436	947547.304	535548.501	Pipe Culvert	
4+039.435	947646.533	535674.014	Slab/Box Culvert	
4+099.436	947683.744	535721.082	Slab/Box Culvert	
4+499.436	947931.817	536034.865	Slab/Box Culvert	
4+886.734	948172.012	536338.684	Slab/Box Culvert	
5+099.436	948303.926	536505.540	Slab/Box Culvert	
5+389.196	948483.630	536732.845	Slab/Box Culvert	
5+645.004	948642.281	536933.520	Pipe Culvert	
6+100.000	948939.557	537277.912	Pipe Culvert	
6+414.180	949155.483	537506.101	Slab/Box Culvert	
6+629.302	949308.506	537657.291	Pipe Culvert	
6+769.931	949410.715	537753.880	Pipe Culvert	
6+889.070	949498.096	537834.876	Pipe Culvert	
7+125.901	949676.237	537990.947	Pipe Culvert	
7+237.914	949760.489	538064.762	Pipe Culvert	
7+312.523	949816.607	538113.927	Slab/Box Culvert	
7+737.915	950137.888	538392.747	Pipe Culvert	



Station	Northing	Easting	Proposed Type of structures	Remarks
7+897.914	950258.893	538497.431	Pipe Culvert	
8+237.914	950512.651	538723.740	Pipe Culvert	
8+797.915	950933.862	539092.768	Pipe Culvert	
9+177.914	951219.683	539343.180	Slab/Box Culvert	
9+817.914	951701.066	539764.927	Pipe Culvert	
10+357.915	952107.234	540120.775	Pipe Culvert	
10+777.915	952423.142	540397.546	Pipe Culvert	
11+299.414	952818.781	540737.277	Pipe Culvert	
11+650.000	953088.424	540961.337	Pipe Culvert	
12+000.000	953357.818	541184.781	Pipe Culvert	
12+340.922	953620.006	541402.691	Pipe Culvert	
13+259.873	954327.029	541989.709	Pipe Culvert	
14+152.255	955009.985	542563.995	Pipe Culvert	
14+474.022	955245.172	542783.615	Slab/Box Culvert	
15+381.054	955894.398	543417.034	Pipe Culvert	
16+123.696	956427.452	543934.113	Pipe Culvert	
16+464.652	956672.183	544171.511	Pipe Culvert	
16+924.637	956995.943	544498.391	Pipe Culvert	
17+277.579	957261.168	544731.876	Pipe Culvert	
17+691.346	957549.752	545028.575	Pipe Culvert	
17+855.502	957662.615	545147.773	Pipe Culvert	
18+472.046	958070.507	545610.395	Pipe Culvert	
19+004.594	958380.981	546043.370	Slab Bridge	
19+379.808	958586.826	546357.038	Pipe Culvert	
20+128.685	958971.226	546999.719	Pipe Culvert	
20+375.989	959097.691	547212.241	Pipe Culvert	
20+669.654	959247.863	547464.605	Pipe Culvert	
21+100.000	959440.442	547848.823	Pipe Culvert	
21+850.000	959603.890	548578.755	Pipe Culvert	
22+565.134	959709.105	549286.107	Slab/Box Culvert	
22+809.904	959745.117	549528.213	Slab Bridge	
22+977.000	549693.195	959769.657	Pipe Culvert	
23+909.618	959906.913	550615.960	Pipe Culvert	
24+799.463	960037.831	551496.121	Pipe Culvert	
25+034.536	960072.417	551728.636	Pipe Culvert	
25+279.461	960108.452	551970.897	Slab/Box Culvert	
26+079.722	960445.750	552683.240	Slab/Box Culvert	
26+309.061	960616.085	552836.539	Pipe Culvert	
26+658.793	960899.096	553042.020	Pipe Culvert	
26+842.748	961048.050	553149.964	Pipe Culvert	
27+538.792	961611.662	553558.400	Pipe Culvert	
27+778.792	961805.998	553699.231	Pipe Culvert	
28+078.793	962048.919	553875.270	Pipe Culvert	
28+668.503	962526.737	554220.884	Bridge	
28+775.000	554284.869	962614.134	Pipe Culvert	
28+969.394	962770.069	554397.872	Slab/Box Culvert	
29+318.793	963055.306	554599.629	Pipe Culvert	
30+020.000	554976.503	963647.475	Pipe Culvert	



Station	Northing	Easting	Proposed Type of structures	Remarks
30+198.792	963798.375	555070.973	Bridge	
30+585.036	964125.755	555275.927	Pipe Culvert	
31+358.756	964775.401	555695.747	Pipe Culvert	
36+688.162	968488.439	559400.279	Pipe Culvert	
40+128.776	971256.628	561429.263	Bridge	
40+427.615	971534.257	561539.943	Pipe Culvert	
40+725.802	971815.034	561640.339	Pipe Culvert	
41+026.839	972098.496	561741.695	Pipe Culvert	
41+327.023	972381.154	561842.763	Pipe Culvert	
41+627.362	972663.958	561943.884	Pipe Culvert	
41+983.106	972998.932	562063.659	Pipe Culvert	
42+327.025	973322.772	562179.453	Pipe Culvert	
42+827.403	973793.936	562347.924	Pipe Culvert	
43+327.691	974265.015	562516.366	Pipe Culvert	
43+827.508	974735.651	562684.648	Pipe Culvert	
44+326.479	975205.490	562852.646	Pipe Culvert	
44+457.483	975328.853	562896.756	Bridge	
44+957.265	975790.970	563087.125	Pipe Culvert	
45+237.218	976042.180	563210.780	Pipe Culvert	
45+727.872	976481.583	563429.105	Slab/Box Culvert	
46+077.219	976794.439	563584.554	Pipe Culvert	
46+577.219	977242.213	563807.037	Pipe Culvert	
48+877.219	979248.185	564922.705	Slab/Box Culvert	
49+377.219	979650.061	565220.187	Pipe Culvert	
49+877.219	980051.937	565517.669	Pipe Culvert	
50+417.219	980485.963	565838.950	Pipe Culvert	
50+637.219	980663.978	565968.235	Pipe Culvert	
51+126.861	981061.397	566254.006	Pipe Culvert	
51+637.219	981501.231	566512.376	Pipe Culvert	
51+837.219	981678.064	566605.811	Slab/Box Culvert	
52+337.218	982120.146	566839.399	Pipe Culvert	
52+826.767	982552.987	567068.104	Slab/Box Culvert	
53+697.219	983322.610	567474.759	Pipe Culvert	
54+165.839	983736.947	567693.687	Bridge	
54+297.212	983852.617	567755.975	Slab/Box Culvert	
54+796.799	984268.186	568032.488	Pipe Culvert	
55+297.130	984640.245	568366.601	Slab/Box Culvert	
55+797.130	984999.977	568713.866	Pipe Culvert	
56+137.130	985245.984	568948.567	Slab/Box Culvert	
56+677.130	985633.106	569325.051	Pipe Culvert	
57+247.036	986043.133	569720.868	Bridge	
57+753.595	986416.899	570062.580	Pipe Culvert	
58+237.130	986789.427	570370.841	Pipe Culvert	
58+766.410	987197.629	570707.751	Pipe Culvert	
59+157.130	987500.242	570954.919	Pipe Culvert	



## Mitigation Measures

Effective implementation of the following mitigation measures for adverse impacts on water resources can be minimized. Hence, environmental clause shall include in the Works Contract that requires the Contractor to full fil the following mitigation measures;

- ❖ Provide adequate cross sectional area to drainage structures to allow sufficient passage for the discharge and shall put energy dissipaters, where important, for safe disposal of the discharge.
- ❖ Protect slopes with stabilizing structures such as V-cut surface drainage behind the top of cut slopes and cut off drains, retaining walls, wire basketry, gabions, and other physical structures including check dams, and other energy dissipating structures such as chutes, cascades, etc.
- ❖ Implement Bio-engineering conservation techniques to protect and stabilize unstable slopes, and also shall use appropriate local variety grass species, which have multiple purposes, like vetiver grass, together with a physical engineering measures as soon as possible after completion of the works.
- ❖ Construct cut-off drains above cut slopes.
- ❖ Rehabilitate existing road side gullies and landslides sites and also at other following Engineer's instruction and approval.
- ❖ Pave side drains, depending on site conditions, for instance, nature of the soil, gradient/slope of the area, and other factors and construct all energy-dissipating structures at the drainage outlets and discharging points.
- ❖ Provide cross drainage structures as close as possible to minimize concentrated flow from side ditches and to let the flood lead to the nearest stream easily without scouring the side walls.
- ❖ Avoid disposal of construction spoil from earthworks and bridge construction sites at or near the rivers, natural waterways and streams;
- ❖ Avoid disposal of hazardous substances such as oil, fuel, detergents and cement at and near water point to avoid water pollution risks due to spillages.
- ❖ Avoid disposal of solid and liquid wastes generated by construction works near water sources and water points; and
- ❖ Execution of the potentially impacting road construction and drainage works during the dry season when river flows are minimal or non-existent, to minimize interference in river flows and reduce erosion, sedimentation and water pollution risks;
- ❖ Avoidance of leakages from vehicles and construction equipment by regular and effective maintenance.

### **6.3.1.7. Impacts on Water Supply Systems and Competition for Water**

It is obvious that contractors use substantial volume of water for various construction purposes such as for adjustment of moisture content of fill, sub-base and base courses, and watering of haul routes to suppress dust. In addition, the water requirements at the base camps will be relatively high, although these will be much lower than those needed in connection with construction. The probability of meeting contractor water requirement from water resource is very less as the road corridor has shortage of water supply.

All watercourses in the project area are almost seasonal and even the existing water sources are used for drinking, irrigation, and cattle watering purposes by the local community. Therefore, any amount of withdrawals by contractors could reduce water availability to existing downstream users. In view of the widespread need for contractor abstraction over a large part and the serious implications of reduced supplies for the local communities especially for low flowing watercourses potential impact is considered to be very significant. Thus, use of water from existing sources for the road works and campsite requirements may cause significant competition with existing users.

### **Mitigation Measures**

The following mitigation measures are suggested to overcome the competition on the water resources:

- ❖ The contractor shall make his own arrangements for water supply for construction and other purposes without affecting the quality or availability of groundwater or surface water resources to existing uses both for domestic and other economic uses.
- ❖ In the event of any valid dispute regarding the effect the contractor's arrangements on the water supply of others, the contractor shall be responsible, at his own expense, for providing an alternative supply to those affected, which is not inferior in quantity or quality to that previously enjoyed.
- ❖ The contractor shall not interfere with farmer's Irrigation canals and should not damage canals and water crossing structures;
- ❖ maximum precautions shall be taken not to affect the quality as well as quantity of the existing water supply sources used by the local communities for human, animal or irrigation purposes;
- ❖ Do not abstract water from rivers, streams, artificial ponds and springs for the use of road construction unless permitted by the local administration, water office or local community include the developed water supply sources of the villages & towns along the road & perennial streams during low flows.

## **6.3.2. Negative Impacts on Biological Environment**

### **6.3.2.1. Negative impacts on Flora**

During the field visit and study period, impacts of Adama–Awash (Lot I) expressway project on flora has been assessed. Accordingly, construction of the project will have vegetation damage and loss of flora, due to the land use change for the road ROW formation; quarry area; construction of the camp site, access roads.

The road will be constructed primarily within 90ms right-of-way. The proposed project route corridor is mainly covered with vegetation type of semi-arid agro-ecological zone such as species of thorny Acacia and Prosopsi trees mostly in combination with bushes and shrubs are found. Therefore, there will be significant, unavoidable, significant permanent impacts on the vegetation within the RoW and ancillary facilities. Being the area is semi-arid even a removal of single tree will adversely affect as it contribute in stabilising the micro climate, ecological functions such as soil conservation and preserving flora and fauna of the area. Furthermore, out of the total land use along the road right of way, 1.1% is vegetation cover that going to be cleared and deforested, therefore, this has a moderate adverse impact on the climate change along the area.

### **Mitigation Measures**

The mitigation measures recommended to minimize loss of roadside vegetation and small scale protected community forests include the following

- ❖ Adopting 'half-width' construction method as the RoW is very wide passing through areas containing important indigenous or exotic trees or vegetation that would be affected if detour roads are constructed;
- ❖ Limit earthworks and earthmoving activities to the imperative area necessary for the road works to avoid any unnecessary loss of trees or vegetation,
- ❖ Avoid side-casting of excavation materials on down-slope where it may affect indigenous trees/ vegetation,
- ❖ Replanting appropriate tree species at areas affected due to temporary activities and at locations to be recommended by the Weredas' natural resources conservation or environmental protection experts to compensate for trees/vegetation lost. In the planting program, indigenous tree species shall be given priority in species selection.
- ❖ Replanting trees and shrubs in areas adjacent to the road and at areas affected due to operation of quarries and borrow pits. Indigenous and exotic species which are environmentally friendly and adapted to the agro-ecology of the areas are proposed.
- ❖ Proper siting of construction camps and facilities i.e. not at or near areas of conservation worthy vegetation, and controlling cutting of vegetation by the construction work force.

- ❖ Controlling cutting of the vegetation due to activities induced by easy physical access, such as establishment of settlements, production of fuel wood and charcoal, construction work for commercial purposes, expansion of cultivation, etc.
- ❖ Establish a nursery at the project area to propagate and plant indigenous and endangered tree species in areas adjacent to the road and at areas affected due to operation of quarries and borrow pits.
- ❖ Plant at least 10 seedlings for each and every affected mature trees and water them
- ❖ Aware construction work force, not to cut tree for any purpose without prior approval of Environmental supervisor and local forestry department
- ❖ Avoiding side-tipping of spoil/excess excavation materials on down-slope where it can affect vegetation/trees;
- ❖ The Contractor Shall select location of campsites in collaboration with local authorities, RE and with ESMT of ERA, and camps shall only be established at places/locations approved by ERA's ESMT and the RE in collaboration with local Officials and community members
- ❖ The RE and the contractors shall take photograph of the campsite before the construction of any structure in order to compare the level of environmental degradation before and after the establishment of the camp site and to plan rehabilitation work. Any removal activities of trees for camping shall be done in the presence of environmentalist from the supervision Team and a Forester from Local Forestry Department
- ❖ The contractor should undertake the clearing operation along ROWs of the proposed project during the construction period in consultation with ERA's ESMT, the RE and the proposed projects targeted administrative site of environmental protection and forestay department office,
- ❖ The Contractor shall take lists of all the tree species found in the proposed quarry sites, borrow areas and detour roads and other affected sites on ROW. The exact number of trees to be affected in the presence of Environmentalist from the Supervision Team and a Forester from the Woreda Forestry unit.

#### **6.3.2.2. Adverse impact on the climate change**

It was explained that under land use land cover identifications in the table 4-5, about 1.1% of the land use along the road stretch is covered by vegetation and it will be removed during construction time. In addition to this there are trees going to be cut down due to land accusation for ancillary faculties. Moreover, the road corridor climate condition is semi-arid to arid which highly prone to desertification and vulnerable to climate changes. Therefore, removing vegetation and trees in the RoW, other construction material extraction sites and ancillary facilities will instigate climate change with moderate adverse impact on the regional to global is significant.

## **Mitigation Measures**

The recommended mitigation measure for climate change adaptation are the following:

- ❖ Watershed management through water and soil conservation,
- ❖ Compensatory tree planting along the road corridor in collaboration with local administration;

### **6.3.2.3. Negative impacts on Fauna/Wildlife**

The proposed road project passes through agricultural land, scattered or spares vegetation cover and grazing lands, there is no significant wildlife found in the area. However, there are some Hyena, Leopard, fox and wild cat are found along the road stretch.

A number of wild lives like nocturnal animals such as hyena, Hyena, and Leopard which live in the bushes land may be affected.

Although no wildlife sanctuaries or protected site habitats have been identified in the road route, impediments to wildlife movements is expected to be high. Furthermore, deliberate poaching to the wildlife nearby the project which is outside the RoW may occur during construction by construction work forces.

#### **Mitigation measures**

If the road construction labour force interested and involved in buying and eating of wild meet, local people may hunt wildlife and avail for sell to construction labour. If this happened, the impact of the road construction on wildlife would be significant.

Therefore, the contractor shall prevent his workers from involving in eating and trading of bush meet and other parts of the wildlife in addition to practically implementing the following mitigation measures.

- ❖ Strictly prohibit illegal hunting by the workforce and killing of wild animals due to deliberate killings or reluctances of drivers like over speeding of vehicles,
- ❖ Avoiding disposal of excavation materials on the small scale protected community forests.
- ❖ Do not use and trade wild meet and other parts of wildlife.
- ❖ Avoid illegal hunting.

### **6.3.3. Negative Impacts on the Human and Social Economic Environment**

#### **6.3.3.1. Impact on Farm and Grazing Lands**

Along the proposed project alignment there are major direct adverse impact is due to permanent land expropriation for new expressway corridor ROW and associated structures, link roads & interchanges. Temporary land expropriation due to activities such as access development of material extraction sites (quarry and borrow sites), establishment of camp and spoil disposal sites.

Land in the proposed corridor is currently used for crop cultivation and grazing that provides the major means of livelihood to the rural population

Thus, temporary and permanent land scarcity may have some adverse socioeconomic impacts that could cause loss of few earnings from cultivated land or grazing along the road alignment. This loss in livelihood would be minimized by limiting land take, and paying fair compensation for any lost valuable crops.

### **Mitigation Measures**

Adverse impacts on land under various uses will be reduced or compensated through implementation of following mitigation measures:

- ❖ Limiting land taking to the area absolutely necessary for the road works;
- ❖ Timely inform land owners to harvest these road side trees and crops from the ROW;
- ❖ Minimize dust impact on road side crops by regularly spraying water;
- ❖ Restore areas affected due to temporary activities like access roads to productive state by removal of pavement materials, loosening of compacted soils and spreading of the topsoil preserved for this purpose; the topsoil removed from the road widening and other areas shall be stockpiled for re-use in the restoration of temporary affected area, and
- ❖ Pay reasonable compensation for loss of farmlands, grazing areas, and trees and other properties according to the pertinent government laws (Proc. No. 455/2005 and Regulations No. 135/2007), which deal with compensation issues for expropriation of landholdings for public projects.
- ❖ Applying half-way construction method to avoid losses of land due to detour roads,
- ❖ Avoiding releasing of runoff water passing through culverts or side-drains onto agricultural lands, restoration of areas affected due to temporary activities, and payment of adequate compensation for immitigable losses.
- ❖ Reinstate all the borrow areas, quarry sites, plant and camp sites after the completion of intended uses by removing all the foreign materials and by refilling of borrows and quarry sites with construction spoil and stockpiled topsoil; and plant locally recommended trees and grasses to compensate the lost tree.

#### **6.3.3.2. Impact on Public Utilities**

There are some electric power transmission lines, telecommunication lines and water supply lines on the proposed Adama-Awash (Lot I) will be adversely affected. These utilities will need to be relocated in order to accommodate the road route. The proponent is expected to pay for the relocation cost so that the service providers could remove them prior to commencement of the construction. Unless the aforesaid relocation is completed before commencement of the work, it could cause enormous loss in public utilities and result in interruption in service delivery system.



### **Mitigation measures**

It is anticipated that the proposed road construction is likely to involve relocation of public utilities located within the ROW such as electric and telephone poles, and water supply pipelines.

Therefore, to overcome the adverse impacts the suggested mitigation measures are:

- ☞ Request the utility owners to relocate the utilities before the start of construction;
- ☞ Work in close coordination with utility offices.
- ☞ Pay compensation for the relocation before the commencement of the work.

#### **6.3.3.3. Impact on Historical, Archaeological, Cultural & Religious sites**

During field survey period, sites of historical, cultural etc. importance's that will be impacted, due to proposed project's implementation have been assessed. Accordingly , there are no Historical, Cultural and etc., Resources important sites along the project road that could be impacted by the project .

During construction period, where there are any accidental chance of findings that were not identified during the field assessment may become apparent during excavation and other principal and ancillary project works. Therefore, it is important that the Contractor should suspend the work and report to the nearby culture and tourism office. For practical enforcement, the contractor contract document should include provision of clauses, regards to the said issue.

### **Mitigation measures**

The suggested mitigation measures to overcome unforeseen adverse impacts are as follows.

- ❖ If archaeological, cultural and religious sites are encountered during the excavation, it has to be immediately reported to the zonal culture and tourism bureau, and at the same time report to the regional and federal conservation and preservation of cultural heritages authority and seek approval on how to continue the construction works.

#### **6.3.3.4. Impact on Residential Dwellings**

The adverse impacts due to Adama-Melkajilo (km-60) expressway project on houses will involve relocating/moving to vicinity in towns or villages in the rural settlements. Therefore, there is temporary or permanent inconvenience will be created due to shifting from their original premises rebuilding new house at new site, they are entitled to get appropriate compensation for the lost property.

It's assumed that compensation payments are fair enough to meet the actual costs of rebuilding new house and other expenses linked with relocation.

### **Mitigation measures**

The following mitigation measures suggested overcoming adverse impacts.

- ❖ Pay compensation to rebuild the demolished residential or business houses;

- ❖ Pay adequate compensation for the loss of economical trees and fences;
- ❖ Allocate transitional and transportation costs;
- ❖ Inform PAPs ahead of time and allow adequate time to take salvaged materials,
- ❖ Provide additional support if vulnerable people are affected by the project;
- ❖ Provide awareness creation to PAPs on how to use the compensation paid
- ❖ Prepare proper Resettlement action plan and implement it practically.

#### **6.3.3.5. Impacts due to influx of labour**

The influx of workers due to the availability of job opportunity created may lead to a number of adverse social and environmental impacts on local communities. Environmental and social risks associated with labour influx are usually amplified by local-level low capacity to manage and absorb the incoming labour force, and specifically when civil works are carried out in, or near, vulnerable communities and in other high-risk situations. Some of adverse impacts due to labour influx are increased risk of illicit behaviours and crime (including prostitution, theft and substance abuse), increased burden on public service Provision, Increased risk of communicable diseases (including STDs and HIV/AIDS), and Gender-based violence, including sexual harassment, child abuse and exploitation.

#### **Mitigation measures**

- ❖ Establishment and operation of an effective Grievance Redress Mechanism (GRM) accessible to community members involvement of respective Woreda administration through Woreda Grievance Redress Committee to facilitate early identification of problems/complaints and targeted mitigating interventions;
- ❖ Provision of information to communities on how to use the GRM to report issues;
- ❖ Workers' camp to include wastewater disposal and septic systems;
- ❖ Identification of authorized water supply source and prohibition of use from other community sources;
- ❖ Separate service providers for community and workers' camp/construction site;
- ❖ Worker Code of Conduct on water and electricity consumption
- ❖ Police monitoring to prevent drugs trafficking;
- ❖ Sensitization campaigns both for workers and local communities
- ❖ Provision of information regarding Worker Code of Conduct in local language(s);
- ❖ Provision of cultural sensitization training for workers regarding engagement with local community.
- ❖ Consultations with and involvement of local communities in project planning and implementation;
- ❖ Awareness-raising among local community and workers.

#### **6.3.3.6. Impact on community Health and safety**

Community health and safety issues during the construction of roads are common to those at most large construction sites. These impacts include, among others, dust, noise, and vibration from construction vehicle transit, and communicable disease associated with the influx of temporary construction labour. Significant community health and safety issues associated with road projects may also include:

##### **6.3.3.6.1. Impact on Pedestrian Accessibility and Traffic Safety**

Pedestrians' animals and none motorized access are at greatest risk of serious injury from collisions with high speed vehicles on the expressway. Children are generally the most vulnerable due to lack of experience and knowledge of traffic related hazards, their behaviour while at play, and their small size making them less visible to motorists. Being the road passes through rural setting where high cattle movement intended to cross the expressway from one side to the other side of the road to their grazing lands. Furthermore, being the proposed road is express way, it will be fenced to avoid traffic accidents, this further create defragmentation of wildlife in area, disrupts working conditions of the farmers, interrupts social cohesion as it bisects the community into two.

#### **Mitigation measures**

Traffic safety problems will be minimized by implementing the following mitigation measures.

- ❖ Develop and strictly following a well-designed work program and traffic management plan (TMP) that would consider local conditions like the normal traffic, terrain, weather and socio-economic conditions,
- ❖ Provide appropriate information on the location of risky areas to potentially affected local residents and prohibiting such areas for safety reasons, e.g. borrow pits and quarries, and stone crusher and asphalt mixing plant sites, and
- ❖ Provision of awareness education for the local population in traffic safety measures at public meetings, social gatherings, schools, etc.
- ❖ Construction of pedestrian, animal and vehicular over or under passes on the proposed sites where high density of animal movement to drink water and grassing lands;
- ❖ Assesses further accessibility problems and provide proper solution by constructing necessary stature (under or over pass).
- ❖ Awareness creation should be undertaken to the local communities to guide their animals to use the constructed animal pass until their animals adapted to use the pass.

### **6.3.3.7. Impact on Occupational Safety and Health**

There will be occupational safety and health issues for the construction workforce caused by accidents (operating machinery, falling in ditches, etc.) and poor hygiene in construction camps. During the construction works, accidental discharge or spillage caused by inflammable, toxic, explosive and chemical substances could create health risks on the work force.

Occupational health and safety issues associated with the road construction and operation of roads primarily include the following:

#### **Physical Hazards**

Road construction and maintenance personnel, as well as landscaping workers maintaining vegetation in the rights-of-way, can be exposed to a variety of physical hazards, principally from operating machinery and moving vehicles but also working at elevation on bridges and culverts. Other physical hazards (e.g. exposure to weather elements, noise, contact with overhead powerlines, falls from machinery or structures, and risk of falling objects) are the peculiar one.

#### **Chemical Hazards**

Chemical hazards in road construction, operations, and maintenance activities may be principally associated with exposures to dust during construction and paving activities; exhaust emissions from heavy equipment and motor vehicles during all construction and maintenance activities; potentially hazardous dust during earthworks, construction material excavation, dust blown to prepare the route for asphalt, dust from crusher site and asphalt fume during asphalt plant preparation and diesel fuel used as a release and cleaning agent for paving equipment.

#### **Noise**

Construction and maintenance personnel may be potentially exposed to extremely high levels of noise from heavy equipment operation and from working in proximity to vehicular traffic. As most of these noise sources cannot be prevented, control measures should include the use of personal hearing protection by exposed personnel and implementation of work rotation programs to reduce cumulative exposure.

#### **Communicable Diseases**

Communicable diseases pose a significant public health threat to construction workforce. Communicable diseases of most concern during the construction phase due to labour mobility are sexually-transmitted diseases (STDs), such as HIV/AIDS. As far as construction work forces are within sexually active age and far from their family within the construction camps, they are adversely impacted by communicable disease such as STD and/or HIV/AIDS during construction and maintenance phases.

#### **Mitigation measures**

The following mitigation and precaution measures are suggested to overcome the adverse impacts on the workforce.

- ❖ The contractor by all means take maximum care in applying the internationally accepted standards and recognized occupational health and safety guidelines.
- ❖ Consider appropriate care for storage of chemicals and explosives and provision of training to workers handling it to avoid inhalation of chemicals and easily be exposed to it.
- ❖ The contractor is also required to provide workers with protective clothing and equipment and create awareness on safety issues;
- ❖ At the same time the contractor is also responsible to create awareness among the local community on the hazardous nature of chemicals and explosives used during the construction works.
- ❖ Contractor shall provide clinic at construction camp and first aid kits at workshops, active construction sites and also inside vehicles.

Additionally, the recommended management practices to prevent and control physical hazards on the workforces include but not limited to the followings.

### **Moving Equipment and Traffic Safety**

Development of a traffic safety management plan for road construction and repairs that includes measures to:

- ❖ Ensure work zone safety for construction workers and the travelling public;
- ❖ Establishment of work zones to separate workers on foot from traffic and equipment by:
- ❖ Routing of traffic to alternative roads when possible;
- ❖ Closure of lanes and diversion of traffic to the remaining lanes as the road is wide enough (e.g. rerouting of all traffic to one side of a multi-lane highway);
- ❖ Where worker exposure to traffic cannot be completely eliminated, use of protective barriers to shield workers from traffic vehicles, or installation of channeling devices(e.g. Traffic cones and barrels) to delineate the work zone;
- ❖ Regulation of traffic flow by warning lights, avoiding the use of flaggers if possible;
- ❖ Design of the works pace to eliminate or decrease blind spots;
- ❖ Reduction of maximum vehicle speeds in work zones;
- ❖ Training of workers in safety issues related to their activities, such as the hazards of working on foot around equipment and vehicles; and
- ❖ Safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety clothing and proper illumination for the workspace (while controlling glare so as not to blind workers and passing motorists).

### **Elevated and Overhead Work Safety**

The area around which elevated work is taking place should be barricaded to prevent unauthorized access. Working under personnel on elevated structures should be avoided; hoisting and lifting equipment should be rated and properly maintained, and operators trained

in their use. Elevating platforms should be maintained and operated according to established safety procedures including use of fall protection measures; equipment movement protocols (e.g. movement only when the lift is in a retracted position); repair by qualified individuals; and installation of locks to avoid unauthorized use by un trained individuals; ladders should be used according to pre-established safety procedures for proper placement, climbing, standing, as well as the use of extensions.

- ♣ Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures;
- ♣ inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers, among others;
- ♣ Establishment of criteria for use of 100 percent fall protection (typically when working over 2 meters above the working surface, but sometimes extended to 7 meters, depending on the activity);
- ♣ The fall protection system should be appropriate for the structure and necessary movements, including ascent, descent, and moving from point to point; Installation of fixtures on bridge components to facilitate the use of fall protection systems;
- ♣ Safety belts should be not less than 16 millimeters (mm) (5/8 inch) two-in-one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibers become evident;
- ♣ When operating power tools at height, workers should use a second (backup) safety belt.
- ♣ The recommendations to overcome or minimize adverse impacts from chemical hazards specific to road projects include:
  - ❖ Use of millers and pavers with exhaust ventilation systems and proper maintenance of such systems to maintain worker exposure to crystalline silica (millers and grinders) and asphalt fumes (pavers) below applicable occupational exposure levels;
  - ❖ Use of the correct asphalt product for each specific application, and ensuring application at the correct temperature to reduce the fuming of bitumen during normal handling;
  - ❖ Maintenance of work vehicles and machinery to minimize air emissions;
  - ❖ Reduction of engine idling time in construction sites;
  - ❖ Use of extenders or other means to direct diesel exhaust away from the operator;
  - ❖ Ventilation of indoor areas where vehicles or engines are operated, or use of exhaust extractor hose attachments to divert exhaust outside;
  - ❖ Provision of adequate ventilation in tunnels or other areas with limited natural air circulation;
  - ❖ Installation of tollbooth ventilation and air filtration systems; Use of protective clothing when working with cutbacks (a mixture of asphalt and solvents for the repair of pavement), diesel fuel, or other solvents;



- ❖ Use of dustless sanding and blasting equipment and special containment measures for paint removal activities;
- ❖ Avoiding the use of lead-containing paint and using appropriate respiratory protection when removing paints (including those containing lead in older installations) or when cutting galvanized steel.

### **Vector-Borne Diseases**

To manage vector borne diseases the contractor, in close collaboration with community health authorities, can implement an integrated control strategy for mosquito and other arthropod-borne diseases that might involve:

- ❖ Prevention of larval and adult propagation through sanitary improvements and elimination of breeding habitats close to human settlements;
- ❖ Elimination of unusable impounded water;
- ❖ Increase in water velocity in natural and artificial channels considering the application of residual insecticide to dormitory walls;
- ❖ Implementation of integrated vector control programs promoting use of repellents, clothing, netting, and other barriers to prevent insect bites;
- ❖ Use of chemoprophylaxis drugs by non-immune workers and collaborating with public health officials to help eradicate disease reservoirs;
- ❖ Monitoring and treatment of circulating and migrating populations to prevent disease reservoir spread collaboration and exchange of in-kind services with other control programs in the project area to maximize beneficial effects;
- ❖ Educating project personnel and area residents on risks, prevention, and available treatment;
- ❖ Monitoring communities during high-risk seasons to detect and treat cases.

#### **6.3.3.8. Impact on Women and Vulnerable Groups**

In Ethiopia, there is high gender disparity and this is also believed to be one of the major bottlenecks for development. This high gender disparity between men and women negatively affects the development of a nation and its wealth distribution.

Among the negative social impacts, resettlement/relocation of PAPs may affect women more than men. Resettlement/relocation leads to the breakdown of community social networks and this has direct impact on women more than men, because women rely and depend on community and social networks for their emotional, family and practical supports.

In construction works, women always do not receive equal employment opportunities; and the contractors, in most cases, favour to employ men rather than women, and female workers do not obtain particular attention due to their biological and physical condition.

Hence, the discrimination against women will negatively affect those women who want to work in the Road construction work. Such discriminatory acts and lack of other employment opportunities may force women to carry out other marginal activities and to be engaged as sex workers for survival, which exposes them to increased risk of sexually transmitted diseases, HIV/AIDs and unwanted pregnancies.

The negative impacts of the project Road Construction on women include;

- ❖ Increased risk of exposure to sexually transmitted diseases and unwanted pregnancies;
- ❖ Price increase of consumer goods due to the coming of large number work force to the area in particular will make FHH vulnerable to economic crisis;
- ❖ Most construction companies prefer to employ only men, and this will lead to unequal treatment of women during employment of the construction work force;
- ❖ Sexual harassment and labor exploitation against women.

### **Mitigation Measures**

The following mitigation measures need to be addressed by the Contractor;

- ❖ Ensure women's participation and improve their employment opportunities by developing guidelines and regulations to ensure that women receive equal employment opportunities and to avoid discrimination against women;
- ❖ Provide education and awareness creation on reproductive health, STD and HIV/AIDS to women residing in the project influence area;
- ❖ Support FHH and other women interested or willing to provide catering services to contractors' work force. Such measure will encourage local women be able to generate income to support their families;
- ❖ Assign female workers to those works that are gender friendly; accepted to be appropriate for their biological and physical condition;
- ❖ Give special attention for female headed households in employment and delivery of other services;
- ❖ During field survey, existence of vulnerable groups like the aged, handicapped, households victimized by HIV/AIDS, socially and economically marginalized groups have been reported by community consultation. But it is well known that their actual type and number identification at this stage of study is very difficult. Hence, the detailed RAP should:
  - ☞ Identify the actual type and number of vulnerable groups, and
  - ☞ Design special assistances measures for the identified vulnerable groups in kind and in cash form through livelihood restoration plan.

### **6.3.3.9. Adverse impact due to camp sites and other workshop areas**

During construction phase, there are different adverse impacts emanate from construction of camp site such as induced soil erosion & sedimentation leading to subsequent deterioration of water quality, dust, and noise pollution, respiratory illnesses related to dust pollution, compaction of soil; traffic accident on local community and workforce, Solid waste (household wastes & spoil material), competition for electricity, land use change; disfiguring of landscape; spillage of oils, lubricants and other chemicals are adversely impacts the environment. Thus, there could be adverse impacts stemming from inappropriate management of waste disposal, air pollution, competition for water and electricity around these camp sites.

#### **Mitigation measures**

To minimize or overcome adverse impacts due to camp sites and workshop area the following mitigation measures were suggested.

- ❖ Select the location of camp sites in collaboration with local authorities, representatives of local community, the engineer/RE and ERA's representative(s) preferably from EMT & ROWMT;
- ❖ Prevent environmental pollution by hazardous substances such as oil, fuel, cement sludge and detergents through proper storage and handling of the substances due to spillages.
- ❖ Among the precautions to be taken is that the contractor shall install drip pans and fuel funnels at dispensing points of fuels and lubricants.
- ❖ Oil exchange should be taken place only at pre prepared workshop area. Washing of vehicles and machineries should only be conducted in workshop area and never done in rivers and open soils.
- ❖ Avoid leakages from construction equipment and vehicles through regular and effective maintenance, and
- ❖ Properly collect used oil and other chemicals and safely dispose through accredited oil reprocessing or disposal agency or in other manner approved by the engineer.
- ❖ The contractor has to record the types and number of trees removed due to the establishment of campsites in the presence of representatives from Zonal/Woreda LEPO;
- ❖ Establish construction campsites with appropriate and standard health care services, potable water supply, garbage disposal and sanitation facilities including imperviously lined septic tanks to reduce possible pollution impact on ground and surface water resources;
- ❖ Provide toilets and shower rooms for labor fitted with water flashing system.
- ❖ When the camps are no more required for the project and if they are not going to be used for other purposes by local authority or going to be abandoned, the contractor shall reinstate them to their original state as closely as possible.

- ❖ The reinstatement activities shall include stockpiling the topsoil during camp construction, removing all concretes/slabs and all scrap metals from the workshops, loosening the compacted soils, and spreading of the top soils;
- ❖ The contractor shall plant appropriate tree species in the camp yard for beautification purpose; the tree species selected for the planting shall be approved by the Environmentalist of the supervision consultant and forester of zonal/Woreda Forestry
- ❖ Construct lined septic tanks at all camp sites and discharge of all liquid wastes generated by camps into the septic tanks with regular inspection of the septic tanks in order to avoid overflow to the surrounding environment,
- ❖ Take photographs of the campsites before putting any structure at the site in order to compare the level of environmental alteration before and after the establishment of the campsites and to plan reinstatement measures.
- ❖ The contractor shall assign gardener to maintain the camp tree plantation;
- ❖ The contractor shall maintain proper management and discipline in the camps;
- ❖ The contractor's work force shall respect local culture and norms;
- ❖ The contractor shall dismantle all the site facilities (camps, workshops and storage sites) and rehabilitate the areas as per the surrounding nature once construction is completed.

#### **6.3.3.10. Negative Impacts Due To Operation of Asphalt Plant**

It is obvious that the operation of asphalt plant poses adverse impacts on the workforce, local community and ambient air quality.

##### **Mitigating Measures**

The contractor shall prepare and submit to the supervising consultant site specific environmental management and rehabilitation plan for the asphalt plant site that indicate existing situation of the area, identified site specific adverse impact and mitigation that avoid or reduce these impacts before the commencement of the asphalt plant operation.

#### **6.3.3.11. Negative impact due Risk of Spread of Malaria**

Since the proposed road upgrading project will be executed in the malaria prone area, there will be high risks of spread of malaria that can may affect the workforce as well as the local community.

##### **Mitigation Measures**

To avoid or minimize the spread of malaria along the road corridor, the following mitigation measures are important.

- ❖ avoid accumulation of stagnant water in quarry sites, barrow sites and drainage ditches;
- ❖ Provide ITN for camp residents;

- ❖ Put malaria treatment system in place;

#### **6.3.3.12. Negative impact from Explosives**

Blasting activities may cause accidental explosions and affect surrounding populated areas. Furthermore, it may damage or affect the security of the area in addition to the adversely impacting physical as well as psychologically the local community in which the blast will take place.

#### **Mitigation measures**

The contractor should prepare plans for explosives handling and blasting operation. Methodology has to be adopted both at road side slope cuts and at quarry development sites will highlight the safety measures and care to be exercised while operating at such sites. Occupational safety hazards may be related to blasting activities resulting in accidental explosions. Prevention and control measures for explosion hazards include the following activities:

- ❖ A consistent blasting schedule should be adopted, minimizing blast-time changes;
- ❖ Specific warning devices (e.g. horn signals and flashing lights) and procedures should be implemented before each blasting activity to alert all workers and local community in the surrounding areas;
- ❖ Warning procedures should include traffic limitation along local roadways and railways;
- ❖ Specific personnel training on explosives handling and safety management should be conducted;
- ❖ Blasting-permit procedures should be implemented for all personnel involved with explosives (e.g. handling, transport, storage, charging, blasting, and destruction of unused or surplus explosives);
- ❖ Blasting sites should be checked post-blast by qualified personnel for malfunctions and unexploded blasting agents, prior to resumption of work.
- ❖ Particular attention should be given to all explosives handling phases to prevent theft / improper use;
- ❖ Blasting should be conducted according to a consistent timetable;
- ❖ If changes to the blasting timetable occur, nearby communities should be immediately informed of those changes;
- ❖ Community awareness and emergency preparedness and response planning should be undertaken, including control of third-party access to blasting areas;
- ❖ Vibrations caused by blasting have adverse impacts on community properties unless managed properly. Monitoring (e.g. preconstruction surveys of buildings, infrastructure, and structures, including photographic and video image recording) should be implemented to ensure that potential household damages caused by the project activities can be adequately identified and managed.

### **6.3.3.13. Negative impacts from Wastes generated**

Solid waste may be generated during construction material excavation, construction and maintenance of roads and associated structures. Significant quantities of rock and spoil materials may be generated from earth moving during construction activities. Solid waste generation during operation and maintenance activities may include road resurfacing waste (e.g. Removal of the old road surface material), road litter, illegally dumped waste, or general solid waste from rest areas, animal carcasses, vegetation waste from right-of-way maintenance; and sediment and sludge from storm water drainage system maintenance (including sediment traps and oil/ water separation systems). Paint waste may also be generated from road and bridge maintenance (e.g. due to removal of old paint from road stripping and bridges prior to re-painting).

#### **Mitigation measures**

The recommended solid waste management strategies may include the following measures. During construction phase waste management along of road construction site, camp sites and excavation materials should be conducted as scientific principles. When choosing between waste minimization options, the following hierarchy for waste management is preferred:

- ♣ waste avoidance and/or reduction
- ♣ reuse
- ♣ recycling

Diverting the waste stream in these ways means that waste treatment and waste disposal options can be reduced.

Construction sites should pursue this hierarchy and seek out waste reduction opportunities. To identify opportunities it is necessary to consider all aspects of the project and the wastes it generates.

Waste can be minimized by using improved technology, recycled or reused on-site, or by making purchasing decisions that favor recycled products.

Wherever possible, include performance measures and targets for reduction, reuse and recycling options in the environmental management plan.

Waste minimization opportunities include:

- ❖ obtaining construction materials, paints, lubricants and other liquids in reusable packaging or containers
- ❖ using noise barriers made from recycled materials
- ❖ Using over burden to construct temporary noise barriers.
- ❖ using contaminated water out of sediment dams for dust suppression and irrigating adjacent vegetated land
- ❖ sending waste concrete from demolition activities to a concrete recycler instead of landfill



- ❖ segregating and recycling solid wastes generated by construction activities, offices and mess-rooms
- ❖ Collecting lubricating oil from the construction vehicle fleet and sending it to a recycler during road resurfacing maximizing the rate of recycling of road resurfacing waste either in the aggregate(e.g. Reclaimed asphalt pavement or reclaimed concrete material) or as a base;
- ❖ Incorporating recyclable materials (e.g. glass, scrap tires, certain types of slag and ashes) to reduce the volume and cost of new asphalt and concrete mixes.
- ❖ Collecting Various Wastes road litter or illegally dumped waste and managing it according to the waste management principles recommended such as avoid waste, reduce, reuse, recycle and dispose.
- ❖ Further the following activities also recommended:
- ❖ Provision of bottle and can recycling and trash disposal receptacles at parking lots to avoid littering along the road;
- ❖ Manage herbicide and paint inventories to avoid having to dispose of large quantities of unused product. Obsolete product should be managed as a hazardous waste;
- ❖ Collecting animal carcasses in a timely manner and disposing through prompt burial or other environmentally safe methods;
- ❖ Composting of vegetation waste for reuse as a landscaping fertilizer;
- ❖ Managing sediment and sludge removed from storm drainage systems maintenance activities as a hazardous or non-hazardous waste.

#### **6.3.3.14. Negative impacts from Borrow pits and quarry sites**

Rock waste and removed overburden are the main inert wastes produced by quarrying activities. Hazardous wastes may be generated from impurities and trace components included in the exploited (waste) rocks (e.g. asbestos or heavy metals or minerals that could result in acidic runoff).

##### **Mitigation measures**

The recommended prevention and control methods to reduce wastes include the following:

- ❖ Operational design and planning should include procedures for the reduction of waste production (e.g. blending high-quality rock with poor rock);
- ❖ Topsoil, overburden, and low-quality materials should be properly removed, stockpiled near the site, and preserved for rehabilitation;
- ❖ Hazardous and non- hazardous waste management plans should be developed and adopted during the planning phase. Impacts associated with specific chemical and / or physical properties of extracted materials should be considered during the environmental

and social management plan preparation, and impacts from waste rock impurities should be adequately controlled and mitigated by covering waste disposals with none contaminated soil.

- ❖ Stockpiles and batters are a potential source of dust and sediment run-off. Additional recommended controlling measures to those covered previously are outlined as below:
- ❖ Locate stockpiles away from drainage lines to where they are protected from wind;
- ❖ Minimize the number and size of stockpiles. Keep topsoil separate from under burden when stockpiling soil;
- ❖ Construct the stockpile with no slope greater than 2:1 (horizontal to vertical). A less steep slope may be required where the erosion risk is high;
- ❖ Mulch, roughen and seed with grasses any batter or topsoil stockpile which is to be maintained for longer than 28 days;
- ❖ Treat under burden stockpiles in the same way, but check whether they need a layer of topsoil to provide a media for grass seeds before seeding;
- ❖ Circle all unsterilized stockpiles and batters with silt fences or a drainage system that will collect and correctly dispose of contaminated water;
- ❖ Locate stockpiles within ten meters of a water way only if no other alternatives exist. This situation should be identified in the risk assessment;
- ❖ Hand water or install temporary sprinklers to suppress dust from unsterilized stockpiles and batters;
- ❖ Finish and contour any stockpiles located on a floodplain so as to minimize loss of material in a flood or rainfall event.

#### **6.4. Enhancement measures and Complementary Initiatives**

Complementary community initiatives are planned to enhance project benefits, improve socio-economic conditions of the local communities, and ensure project sustainability. The proposed interventions are tree planting; establish water supply schemes in the camp, Road safety campaign, HIV/AIDS prevention and Control. The complementary interventions are proposed based on the general understanding of the road project area & constraints grasped during the ESIA study and consultations, and hence require further onsite assessment & consultation with concerned stakeholders.

**Tree Planting Initiative:** The project plans to prepare 250,000 tree seedlings to be planted on median of the road and the roadside and also in selected degraded land in the Adama-Melkajilo (km-60) road corridor and micro catchment. The main purpose of this enhancement measure is to:



- ☞ improve stability of road structure;
- ☞ prevent soil erosion in the micro-catchment, whilst enhancing local communities soil and water conservation initiatives;
- ☞ provide shade and stabilize micro climate in the area;
- ☞ replace lost vegetation in the new road corridor;
- ☞ Contribute to climate change adaptation and mitigation initiatives.

The project plans to use indigenous tree species like *Gravelia robusta*, *Jakaranda mimisipholia*, *Acacia melanox* and selected multipurpose local flora species. Selection of species and location of targeted degraded area for planting will be determined based on consultation with local community, woreda agriculture & environment office and research institution like Adama University. This complementary initiative is expected to contribute to the regional & national effort of combating global warming & climate change as the planted trees can serve as CO<sub>2</sub> sink, following maturity & full vegetative growth.

**Road Safety Awareness Campaigns:** The project will include an item of road safety campaign and education programs for the road users during construction and operation. The existing road is one of the roads identified as high risk roads in the country being import and export corridor through Djibouti.

During operation, educational campaigns will have to target all users including operators of animal driven carts. The service provider for this activity will have to collaborate with Police and Traffic Controllers of Oromia Transport Authority. Part of inputs to be procured during the road safety educational campaigns would be distribution of reflectors to all carts in the area an intervention which is already showing significant results in Oromia and Amhara Regions.

**HIV/AIDS/STI Awareness Campaign:** The project has incorporated in its design awareness and prevention programs against the spread of HIV/AIDS and STI. The HIV/AIDS Coordination office at ERA has developed TORs for recruitment of sub-contractor who will provide the services, and the bidding documents ensure that special clauses are included in the Contractor's contract. To ensure sustainability of programs and activities, when the road gets operational phase, ERA will impresses it upon the service provider to engage the various networks both at woreda and kebele levels. These include NGOs, CBOs, Ministry of Health, Oromia HAPCO office and others who will be expected to continue with the awareness and prevention activities. The specialized service providing firm for implementation of HIV/AIDS and STD program will combine the delivery of Gender Mainstreaming Plan of Action with HIV/AIDS, STI awareness and prevention program. To this end the firm will prepare Gender Mainstreaming Plan of Action.

**Gender Mainstreaming Plan of Action:** In line with the Bank's policy on Gender, the project plans to mainstream gender and ensure equal opportunities between men and women in project planning, implementation and benefits. Women together with men have fully participated in the consultation process and views of both genders have been incorporated in the project design. As



part of women's economic empowerment, the project shall apply the national practice of allocating a quota of at least 30% of semi-skilled and non-skilled jobs to women at the construction site.

Further recommendations have been made in the ESIA for a Project Specific Gender Plan of Action, inclusion in the bidding documents, as part of the health and safety measures, the requirement for providing adequate facilities for female workers just as those for the male. These should include, but not limited to, provision of ablution corners, adequate and secure accommodation for women, resting space dedicated for women, code of conduct to prevent abusive language and unwanted approaches at the work place.

Once the project is completed, both women and men will benefit from its use in various forms one of which will be dedication of produce stores at the planned roadside services to be constructed as part of the project. The service providers for the HIV/AIDS, STI campaigns will ensure appropriate focus is given to adolescent girls and boys in program delivery.

## **CHAPTER SEVEN**

### **7. ANALYSIS OF ALTERNATIVES**

#### **7.1. General**

The objective of alternative assessment is to identify the best option of the road project based on low environmental degradation and a social cost benefit analysis. The alternatives considered in this proposed expressway road project construction are “ No action scenario” project implementation, best alternative route, and best construction technical approach during construction options are considered based on the assessments made by a team consists of multidisciplinary experts who conducted field visit along the proposed road project corridor for the preparation of the concept engineering design, ESIA and RAP preparation on which the build contractor will relays on.

Prior to arriving at a decision regarding best route alternative for Adama-Melkajilo (km-60) expressway road construction the following options were considered:

- ❖ No Project Scenario
- ❖ project implementation
- ❖ Best alternative route which is environmental, social and economically sustainable with no or very minimum negative impacts which can be mitigated using different mitigation measures.

#### **7.2. Project implementation vs No Project scenario**

##### **7.2.1. No Project Scenario**

The ‘No project action option’ implies that the proposed Adama-Melkajilo (km-60) expressway road construction will not occur at the proposed road corridor and the site would continue to remain abandoned. However, the existing Addis-Adama-Djibouti asphalt road, has failed to support the growing traffic flow rate and axle load volume, long haul from export import and local transport demands as well as social and ecological safety rules. Therefore, the no-project alternative does not support the growth & transformation strategy which is formulated to bring about fast economic development in the country. Therefore the no-project option was not evaluated as a feasible option.

##### **7.2.2. Project Implementation**

Thus, excluding the “No action scenario” option, and arrived at project implementation, then three alternative options have been identified and considered for the proposed Adama-Melkajilo (km-60) Road Project. These are:

Alternative 1: Expressway of 6 lanes

Alternative 2: Expressway of 4 lanes

### Alternative 3: Upgrading the existing

During the feasibility study; three project Alternatives have been assessed for the selected project implementation using multi criteria analysis (based on Engineering/Design, Environmental, Social, Economic and financial Criterion).

From the analysis of the results of the pre-feasibility and feasibility studies, alternative 1 require higher environmental and social mitigation and construction cost as construction of 6 lane demand more land acquisition, degrade more environment and more construction material than Alternative 2. Alternative 3 will displace very large number of residential house, commercial centres as it passes through towns and village along the road. Furthermore, it never improve the existing traffic congestion and accident even though the width of the existing road will increase as it will serve both motorized and none motorized movements. Therefore, depending on the analysis made expressway with 4 Lanes (Alternative 2) as the best feasible for Adama-Melkajilo (km-60) expressway project.

#### 7.2.3. Alternative Routes

After thorough analysis of project alternatives, further three route option selection was conducted for the selected project Alternative 2 (Separate Expressway Project with 4-Lanes) for the Adama-Melkajilo (km-60) Expressway Project. Accordingly, the following three route options were considered and compered depending on the multi criteria analysis for route selection.

**Option 1:** All parts of the Expressway stretched on the left side of the Existing Addis-Adama-Djibouti asphalt Road;

**Option 2:** All parts of the Expressway stretched on the right side of the Existing Addis-Adama-Djibouti asphalt Road; and

**Option 3:** Partly on the right, partly on the left of the Existing Addis-Adama-Djibouti asphalt Road.

#### 7.2.4. Description of Alternative Routes

The three options fall within the same ecological zone and have Woinadega and Kola type climatic conditions. Options 1, 2, and 3 corridors have more or less similar climatic conditions and traverse parallel to each other. Most of the environmental settings are commonly shared by the proposed Options. Option 1 displaces many urban and rural settlements from the very binging of the project to the end and demands higher cost of compensation; while option 2 highly affect sugar can plantation ,large scale of farm lands. Furthermore, it poses large scale of displacement that entails the highest compensation cost. Comparatively, option 3 will reduce number of house to be displaced and farm land expropriation compared to option 1&2.

### 7.3. Comparison of alternative routes

Further comparison of the proposed were considered depending on the severity and significance of environmental and social impacts that may be occur if a rout option selected for the proposed



road project. This was done by considering environmental and social parameters as well as cost implication of each route option if selected for the proposed road alignment.

### 7.3.1. Environmental parameters for the comparison of alternative routs

The major environmental indicators used to describe the environmental settings of the route corridor are:

- ❖ Possible synergies and/or conflicts between the road project and the valued environmental components in the area;
- ❖ Conflicts/synergies with other development projects within the route corridor
- ❖ Impacts on the National Park
- ❖ Impacts on productive lands under various uses
- ❖ Soil erosion and slope stability
- ❖ Impacts on drainage systems and water resources
- ❖ Impacts on air quality (air and noise pollution)
- ❖ Impacts on flora and fauna resources
- ❖ Impacts on wildlife habitats
- ❖ Susceptibility to seismic hazards and/or
- ❖ Susceptibility to over flooding/inundation of the road infrastructure

The environmental criteria for selection of Options focus on the maintenance of the ecological balance, sustainable development and implementation of the road project with minimum environmental costs. Furthermore, the following table indicates comparative evaluation of the proposed alternative routes from environmental issue point of views.

Table 7-1: Route alternatives and anticipated severity of environmental impacts

No.	Description of Environmental Indicator	Weight	Options					
			Option-I		Option-II		Option-III	
			Quantity	points	Quantity	Points	Quantity	Points
1	Impacts on land resources(ha)	1.7	712.92	1.58	798.85	1.41	718.2	1.57
2	Impacts on National Park (ha)	2.5	49	0.01	49	0.01	49	0.01
3	Susceptibility of the route corridor for seismic effects, land slide/slip hazards(qualitative)	0.6	Medium	0.40	medium	0.40	low	0.6
4	Risk of flooding (qualitative)	0.7	Low	0.70	High	0.20	low	0.70
5	Damage to Vegetation cover and soil erosion impacts (ha)	1.3	592.31	1.30	612.64	1.26	596.69	1.29
6	Impacts on Water resources(no)	1.2	15	0.72	12	0.90	9	1.20



No.	Description of Environmental Indicator	Weight	Options					
			Option-I		Option-II		Option-III	
		10	Quantity	points	Quantity	Points	Quantity	Points
7	Noise and air pollution impacts (degree of impacts)	0.6	Medium	0.40	medium	0.40	medium	0.40
8	Availability of construction material and water for construction(no)	0.7	Medium	0.50	medium	0.50	medium	0.50
9	Cost for implementation of mitigation measures (Eth Birr)	0.7	14,995,000	0.69	15,164,500	0.68	13,000,000	0.7
10	Net value			6.30		5.76		6.97
	Rank			2nd		3rd		1st

Based on the above indicators and criterion the result of environmental evaluation of alternative road routes made it indicates that in the above table, option 3 considered as best route option of the Adama-Awash (Lot I ) expressway road construction.

### 7.3.2. Social indicators and parameters for the comparison of alternative routs

Analysis of project route options has been carried out also by using social parameters. Accordingly, evaluation of the route options were based on the following social indicators and criterion:

- ❖ Population Size Served: in view of maximizing the number of beneficiary community and encouraging trade and urban Centre developments; accessing population settlement site is a major indicator criteria;
- ❖ Connectivity of kebeles: Possibility of connecting regional and woreda level administrative locations to the lower administrative units
- ❖ Resources Potentials of the route; and
- ❖ Opinion of local administrators and the kebeles, and
- ❖ Resettlement Cost,
- ❖ The land cover/ land use characteristics; this can reflect effect of land acquisition and socio-economic characteristics of the route corridor.

Therefore, based on the above stated indicators and criterion the summary of the result of social evaluation of alternative road routes is presented in the table 7-2 below.

Table 7-2: Social parameters considered for route selection

No.	Parameters	Options			
		Option-I	Option-II	Option-III	Remark
1	Population and Connectivity of Kebeles	Marginal	Marginal	Marginal	
		3	3	3	



No.	Parameters	Options			
		Option-I	Option-II	Option-III	Remark
2	The impact of land acquisition on Settlement	Marginal	Very high	Marginal	
		3	1	3	
3	Impact of Land Acquisition on Farm Grazing land and trees	Marginal	Very high	Marginal	
		3	1	-	
	Impact on Public properties and resources falling in the ROW of the road alignment(Water Supply, electric, Tele, Irrigation canal)	Low	Moderate	Very low	Option-II Cross more Abadir farm and a number of camps
		3	2	3	
5	Opinion of Local Stakeholders; Social Acceptability of the alternatives.	Positive	Negative	Positive	
		4	3	4	
6	Cost of Compensation	611,756328.55	723,645,632.99	502,264,599.33	
		2	1	3	
Overall Result		14	8	15	
Rank		2 <sup>nd</sup>	3 <sup>rd</sup>	1 <sup>st</sup>	

#### 7.4. Alternative construction methods

Different construction techniques were proposed to be considered to avoid or minimise adverse environmental and social impacts during construction phase of the road project such as site specific detour selection, half width and temporary road closure methods of construction were analysed and appropriate method for the specific sites were proposed to be implemented during practical construction time.

##### 7.4.1. Alternative of Using Half Width, Temporary Road Closure And Detour

###### 7.4.1.1. Half Width Versus Use Of Detour

After considering the existing baseline environmental condition of the road corridor regarding using detour against half width construction method, it was arrived on the conclusion of using only half width construction methods to avoid additional land acquisition, degrading existing trees and vegetation due to detour throughout the road stretch. Furthermore, the RoW of the road is very wide (90m) and the road is not open for other road users except for the construction contractor's car and machines. Therefore, it was strongly recommended the prohibition of development of detour for the Adama-Melkajilo (km-60) expressway project during construction and seriously follow up shall be made by supervising consultant and client environmental and social supervisors.

#### **7.4.1.2. Half width versus temporary road closure**

The other alternative options considered are half width versus temporary road closure construction method. The road is no access for other traffic movement other than contractor's as there is existing road r that can be used by traffic movement from Addis-Adama-Mille. Therefore, it is the contractor's choice to use both alternatively as appropriate for its actives.

Therefore, neither considering temporary road closure nor half width for the proposed road project will adversely affect the movement and traffic flow of the area.

### **7.5. Summary of Recommended alternatives**

The summary of evaluation of the alternatives considered for the proposed Adama-Melkajilo (km-60) expressway construction project such as No project scenario versus project implementation, upgrading the existing road or constructing separate expressway of 6 and 4 lanes respectively, alternatives of route and alternative construction methods were made and finally arrived at the following conclusion.

1. From the considered alternatives "No project scenario" versus project implementation, "No project scenario" was rejected as it never support growth and transformation strategy of Ethiopia;
2. Out of the three considered project implementation alternatives such as construction of separate expressway that has 6 lanes, expressway that has 4 lanes and upgrading the existing Addis-Adama-Mille road, constructing separate expressway that has 4 lanes was selected as best project for implementation;
3. From the considered three route options for the proposed Adama-Melkajilo (km-60) expressway option 3 was selected as best alternative route option for the proposed road project;
4. Finally, from the considered alternative construction methods such as half width versus detour, half width versus temporary road closure, half width and temporary road closure were selected as the road width is very enough for half width construction and temporary road closure also possible as the proposed road never accessed by other road users except contractor.

## CHAPTER EIGHT

### 8. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

#### 8.1. Environmental and Social Management Plan

##### 8.1.1. General

This chapter of the ESIA report provides an indicative outline of environmental and social management plan (ESMP) that comprises set of recommended mitigation and monitoring measures that should be adopted by the design and build contractor to avoid, reduce or mitigate the main potential adverse environmental and social impacts identified in this study report. In addition, it provides the responsible bodies for the implementation and time framework as well as cost estimate where required. The proposed environmental and social management plan, mitigation and monitoring actions will be applied during the subsequent stages of the project, and these include:

- ♣ During detailed Engineering Design Stage,
- ♣ During Pre-construction phase,
- ♣ During actual road Project Construction phase,
- ♣ During Project Decommissioning phase, and
- ♣ During Project Operation and Maintenance phases.

Therefore, the ESMP indicates what actions shall be taken by the design and build contractor and other stakeholders during each phases of the road project.

Details of the proposed ESMP are provided in Table 8-2 below that consists of the following:

- ♣ Adverse environmental and social impacts likely to occur due to the proposed road project activities,
- ♣ Important mitigation measures that should be taken to avoid, reduce or mitigate for each adverse potential impact,
- ♣ Recommended time boundary for implementation of the mitigation measures,
- ♣ Responsible bodies for implementation of proposed mitigation measures,
- ♣ Responsible bodies for monitoring of the proper implementation of the proposed mitigation measures,
- ♣ Finally, capacity building and cost estimate required for practical implementation of the proposed mitigation measures and monitoring activities.
- ♣ Implementation schedule of the environmental and social management plan that indicates timeframe and activities

##### 8.1.2. Institutional Responsibilities for Implementing ESMP

The institutional involved and responsible bodies for practical implementation of the proposed ESMP are briefly described in Table 8-2.

#### **8.1.2.1. Ministry of Environment, Forestry and Climate Change (MoEFCC)**

As a competent organization at the federal level, MoEFCC is fully responsible for ensuring that the ESIA process is carried out in accordance with the relevant laws and guidelines. Nevertheless, since May 2009, the environmental units of sector ministries and agencies are designated to ensure that ESIA is carried out for development projects under their mandate, and to evaluate and take decisions on ESIA Reports and ensure the implementation of ESIA recommendations or the ESMP. Therefore, MoEFCC's involvement in the implementation of the ESMP of the proposed road project is expected to be very limited.

Since the project road is not affecting environmentally sensitive areas like national parks, important wetlands, cultural and historical heritage and ethnic minorities, the involvement of other stakeholders besides ERA, the contractor and woreda administration offices along the road corridor is very minor if any.

#### **8.1.2.2. Environmental Protection Office at Woreda and/or Municipality Level**

Environment, Forest and Climate Change Authority office at Adama, Boset and Minjar Shankora Weredas' will be responsible for follow up and implementing the environmental mitigation and monitoring measures specified in table 8-2. Besides the responsibilities indicated in the table, the Environment, Forest and Climate Change Authority offices at Weredas levels will conduct awareness creation for the implementers of the ESMP and coordinate their activities.

#### **8.1.2.3. ERA's Environmental and Social Management Team (EMST)**

Environmental and Social Management Team of the ERA will carry out the environmental and social monitoring and management activities, which include:

- ☞ Ensure inclusion of environmental protection features in the detail engineering design,
- ☞ Ensuring assignment of a qualified environmental and social inspector in the construction supervision consultant team and environmental supervisor on the contractor's side,
- ☞ Involving in site selection and approval for material sources (quarries & borrow sites), access roads and contractor's site facilities so that environmentally sensitive areas are considered and avoided to the extent possible,
- ☞ Reviewing environmental monitoring reports to be submitted by the supervision consultant and take necessary actions,
- ☞ Conducting periodic project site supervision to oversee environmental performance of the project or status of environmental protection measures and if required provide guidance for the consultant and contractor particularly to resident engineer and environmental inspector on matters that would require improvement or particular attention,
- ☞ Conducting environmental supervision or auditing after completion of the construction, but before the contractor handover the project and approve the handing over of the project with respect to implementation of the ESMP, and



- ☞ Carrying out environmental monitoring during the operation phase and ensuring failures are sufficiently repaired in time.

#### **8.1.2.4. Construction Supervision Consultant (CSC)**

The main responsibilities of the CSC will be reviewing the contractor's environmental and social management plan, work plans, method of implementation, their approval, and making sure that these and other environmental protection requirements that are included in the contract document and fully complied accordingly. In addition, the CSC is responsible for a day-to-day observation of all site activities and occurrence of any unforeseen issues. If unforeseen adverse impacts are observed, the CSC will recommend appropriate actions to be taken for the contractor or other implementing body to overcome or mitigate the problems in time; if necessary the CSC will seek the advice from ERA's environmental and social monitoring team for necessary actions.

#### **8.1.2.5. Construction Contractor**

The contractor will be responsible for constructing the road considering the environmental and social condition of the proposed road project area and he/she is responsible for implementing appropriate mitigation measures to avoid or reduce negative impacts associated with the road construction activities such as extraction of construction materials, haulage and processing of construction materials, establishment and operation of campsites and other site facilities, operation of construction traffic, and other project activities.

The environmental management and mitigation measures to be implemented by the contractor are specified in the ESMP. The contractor shall avail a **full time qualified and experienced environmentalist** at site to implement the ESMP. Moreover, based on new emerging environmental and social issues at the time of construction including the nature, magnitude and significance of the issues observed, the contractor required to continually updating the ESMP. The supervision consultant will determine this requirement and enforce the contractor to update his/her ESMP as deemed necessary. Finally, the contractor will prepare and submit to the client and supervising consultant monthly, quarterly and annual environmental and social performance and progress report

#### **8.1.3. Stakeholders and Other Interested Parties**

There are several other institutions or parties that will be involved in the implementation of the proposed ESMP. These include agencies responsible for public utilities such as EEPKO, ETELCO, and drinking water supply offices, kebele administration offices, woreda and health offices, and other interested parties etc. These parts will have to cooperate for the successes of the road construction project.

#### **8.1.4. Updating of the ESMP**

The construction contract should include obligations for the contractor to prepare a detailed site environmental and social management plan (ESMP) during the preparation for construction, i.e. prior to the commencement of the road works.

The ESMP should reflect the environmental and social issues and their mitigation measures identified in the ESIA study. It should also consider the environmental and social issues that were uncertain during the ESIA study. For example, site specific issues related exploitation of quarries and borrow sites, access roads, detours, construction materials processing plants sites, camp sites etc.

In addition, the ESMP should consider any changes in the project features as well as changes in the baseline environmental conditions since the ESIA was conducted. As indicated above, the ESMP might need to be updated at the time of construction based on new developments. Furthermore, the contractor shall prepare environmental management and rehabilitation plan for the crusher sites, asphalt plant site as well as quarry and borrow pits before the commencement of activities of these works.

The supervision consultant will instruct the contractor to prepare and submit a standard ESMP, and upon submission, review and comment for improvement. When the ESMP is to the satisfaction of the consultant, he will submit it to ERA/ERA's ESMT for further review and approval. In addition, the consultant will monitor and ensure the proper implementation of the ESMP. Furthermore, she/he may instruct the contractor for updating it based on new emerging situations.

#### **8.1.5. Consequences to Contractor upon Failure to Implement ESMP**

In order to make sure that the environmental clauses included in the contractual agreement are binding and effectively implemented, it is strongly recommended that the contractor provides a security in form of a (bank) guarantee of sufficient amount, e.g. 20% of the contract price, which may be forfeited in part or in total in case of contractor's failure/non-compliance and the money shall be used to repair/mitigate environmental/social damages/impacts.

#### **8.1.6. Grievance Redress Mechanism**

Sometimes disputes will arise between the RAP implementation committee and project affected persons the preferred way of dispute settlement should have to be through amicable problem solving approach. This will save time and resources as opposed to taking the matter to court.

To ensure that the PAP have avenues for redressing grievances related to any aspect of land acquisition and resettlement, procedures for the redress of grievances should be established for the project. The objective is to respond to the complaints of the PAP speedily and in a transparent manner. The mechanism is designed to be easily accessible, transparent and fair.



As far as possible, the objective will be to avoid the need to resort to complicated formal channels to redress grievances. It is considered that by resolving grievances within the projects administrative structures, not only will the process be more effective and efficient but also the progress of the project implementation is less likely to be affected.

Arbitral tribunals will be formed at each woreda and town level and is expected to settle disputes arising in the respective kebeles. The arbitral tribunals will be established from the outset of the project road construction instead of leaving it to the disputants to appoint the arbitrators. This is the preferable option since it might take a lot of time to appoint arbitrators if left to the disputing parties.

The following table presents the proposed grievance redress committees for the rural and urban areas in each towns and Weredas. In each of the committees, PAPs will elect their representatives to avoid any dissatisfaction and in each there will be two representatives of PAPs.

Table 8-1: proposed members of grievance redressing committee

For Urban areas (towns)	For Rural Areas
One member from the town administration - Chairperson	One member from the Woreda Administration - Chairperson
One member from the Kebele Administration	One member from the Woreda Agricultural Office
Two members selected by PAPs	One member from the Kebele administration
	Two members selected by PAPs

In case the dispute is not resolved by the Implementation Committee, then the Committee will revolve to the arbitral tribunal. If any of the Parties disagree, the aggrieved party has the right to appeal to the ordinary courts of law in the region. What should be underlined here is that the preferred option of dispute settlement ought to be finding amicable solution because recourse to courts may take a very long time and even years before a final decision is made and therefore, it should not be the preferred option for both parties concerned.

### Stage One

PAPs can complain orally or in writing to the Woreda Resettlement Committee (WRC). If it is an oral complaint, the WRC must record the complaint in writing and must respond to the complaint within one week. If the complaint is very difficult to deal with by the WRC for approval, respondent of the WRC to the complaint must be provided within one week.



## **Stage Two**

If the respondent to the complaint at Stage One cannot satisfy the PAPs, PAPs can appeal to Grievance Redress Committee (GRC) within two weeks after the receipt of the respondent to the complaint, and GRC at Woreda level must respond to the appeal within two weeks.

## **Stage Three**

Figure 8-1 shows simplified flowchart for grievance appealing and addressing. If PAPs are still not satisfied with the respondent at the Stage two, PAPs can appeal to the court within 15 days after receipt of the respondent for final decision.

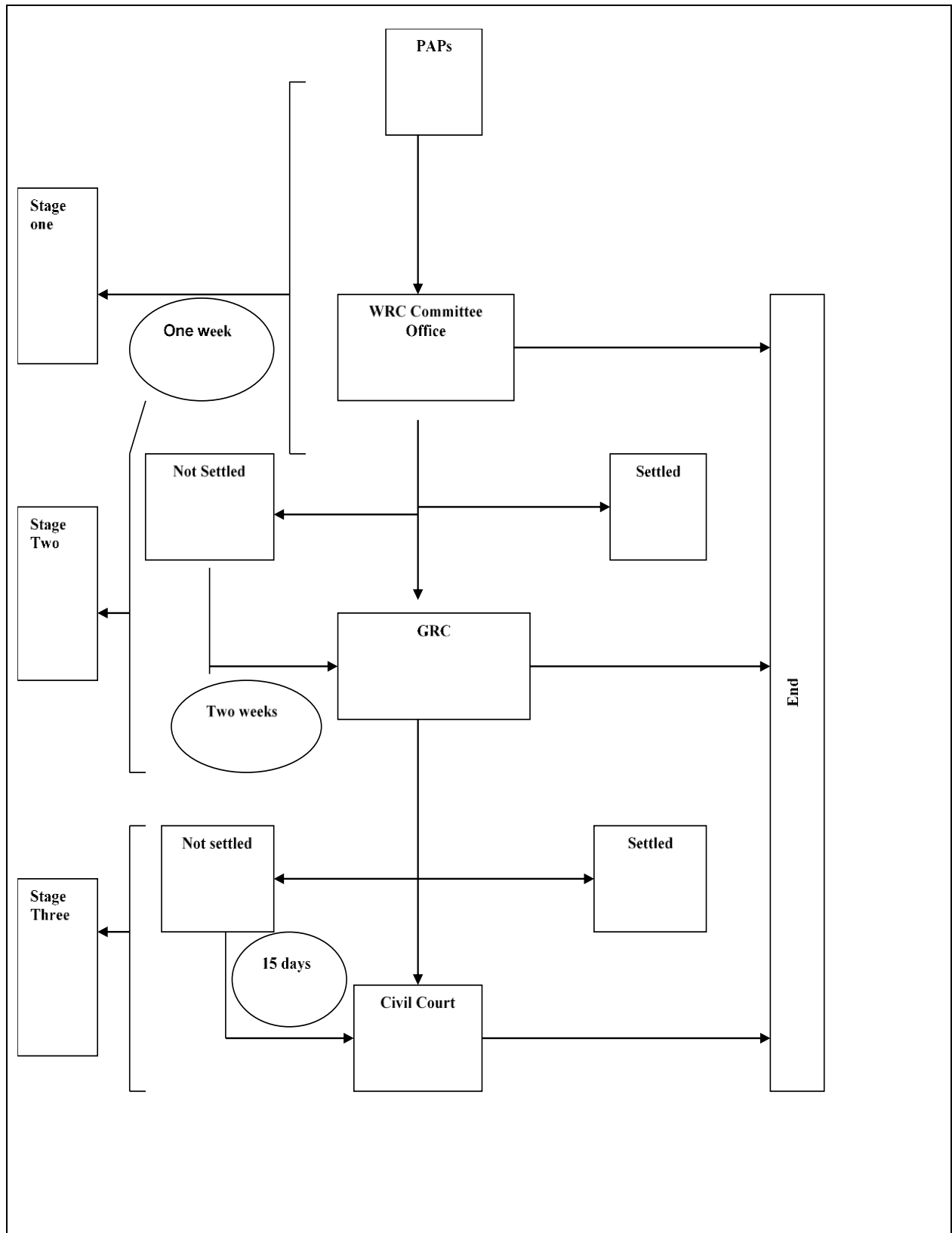


Figure 8-1: Project Affected Persons (PAPs) grievance redressing flowchart



Table 8-2: Outline environmental and social management plan for Adama-Melkajilo (km-60) expressway project

Environmental/ Social Issue/ Impact	Significance	Key Mitigation Measures	Period	Responsibility	Cost (Birr)
<b>Designing phase</b>					
Compliance of the ESIA study with Government and financier's safeguard policies and guidelines	High	Ensure that the Government and funding agency environmental protection/ safeguard policies are fully complied with in the ESIA.	During engineering design	contractor, ERA's ESMT	Part of the design and build cost
Consideration of environmental and social issues in engineering design	High	Thoroughly understand the environmental mitigation measures recommended in the ESIA study and incorporate them in the detailed engineering design.	Detail engineering design	Design and build contractor	As above
Consideration of pedestrian access and animal crossing in the engineering design	High	Thoroughly understand access hindering and high animal crossing area that recommended in the ESIA study and incorporate them in the detailed engineering design.	Detail engineering design	Design and build contractor	As above
Impacts on vegetation and trees found on roadsides	Very high	As far as the road construction area is, semi-arid, vegetation are very important for the stabilisation of micro climate in the area therefore, avoid or minimize vegetation and trees from clearing. In case it is impossible to do so, replace the trees removed during construction in the Row;	As above	As above	As above

Environmental/ Social Issue/ Impact	Significance	Key Mitigation Measures	Period	Responsibility	Cost (Birr)
<b>Pre-construction phases</b>					
Loss of properties such as residential housing units, crops and trees, etc.	Moderate	Payment of cash compensation for the affected properties based on the current market value or according to the pertinent government laws (Proc. No. 455/2005 & Regulations No. 135/2007).	Before commencement of construction	ERA's ROWMT	To be included in RAP





Relocation of public utilities such as electric & telephone poles & lines, water supply pipelines	Minimum	Relocating electric and telephone poles and transmission lines located in the impact zone. Relocating the affected water pipelines and distribution points.	As above	EEPCO, ETLCO, MWSO	As above
Impacts on water supply systems	High	Relocation of the affected water pipelines before the start of the road works to avoid interruption of drinking water supply for the residents, Avoid using construction water from public water supply without getting permission from local authorities as well as communities.	Before the start of construction work	Woreda & Municipality Water supply Offices & ERA	Part of RAP
Air and noise pollution	High	Use of modern and well-maintained equipment, & regular maintenance of machinery and vehicles, Restriction of traffic speeds and applying water sprinkling regularly on access roads, gravel roads & other dusty roads	Throughout construction period	Contractor	900,000 for regular spray of water to suppress dust release

Environmental/ Social Issue/ Impact	Significance	Key Mitigation Measures	Period	Responsibility	Cost (Birr)
Air and noise pollution from construction plants (Stone crushers, asphalt plant, etc.)	High	Regular maintenance of emission intensive plants like stone crusher & bitumen mixer & application of dust suppressant mechanisms; Locating the aggregate production and bitumen mixing plants at a minimum distance of 1.5km from noise or dust sensitive areas; Complying with relevant health and safety standards pertaining to noise and emissions, such as wearing	Through construction period	Design & build contractor	Part of the Contractor's obligations



		<p>ear protection when operating plants or heavy machinery;</p> <p>Implementing well-designed traffic management plan that considers traffic safety and working hours for materials transport;</p> <p>Carrying out noisy construction activities during normal working hours;</p> <p>Avoiding burning of materials such as tires, plastic, rubber products or other materials that creates heavy smog, hazardous smoke or nuisance odour and disposing of any volatile chemicals to the air.</p>			
Land degradation (soil erosion, soil compaction & soil pollution)	Moderate	<p>Carrying out earthworks during the dry season to reduce soil exposure to erosion and alteration of drainage systems,</p> <p>Using 'half-width' construction method to reduce soil compaction and pollution due to use of detours,</p> <p>Cover cut slopes with locally recommended grass species</p>	Through construction period	Design & build contractor	500,000 for grassing cut slopes & tree planting fill sections

Environmental/ Social Issue/ Impact	Significance	Key Mitigation Measures	Period	Responsibility	Cost (Birr)
Construction phase					



landscape disfiguring & slope instability	High	Use of existing material sources adjacent to the road in the cut section; Avoiding indiscriminate disposal of surplus or unsuitable excavation materials by depositing it only at approved disposal sites; Use of open lands for contractor's site facilities to minimize the impacts caused by exploitation of new material sources and establishment of campsites; Building appropriate slope stabilizing structures like retaining walls or gabions at sections vulnerable to slope instability problem; Reserving spoil materials and utilizing it in back-filling of quarries or borrow pits when exploitation of those sites is over; Planting appropriate grass species on cut slopes and Trees on fill slopes; Controlling surface water infiltration to reduce seepage forces by providing adequate side ditches, interceptor drains, & diversion drains.	During construction & following completion of works	Design & build contractor	Part of the Construction Contractor's
Impact on irrigation scheme	Low	Irrigation canal/PIPES should be relocated through guided construction method after the road side ditch; Hence, at these two points the pipes should be constructed to direct the irrigation water to irrigation field;	During construction	Design & Build Contractor	Part of the Construction Contractor's
<b>Environmental/ Social Issue/ Impact</b>	<b>Significance</b>	<b>Key Mitigation Measures</b>	<b>Period</b>	<b>Responsibility</b>	<b>Cost (Birr)</b>
Construction phase					



Impacts on landscape quality from borrow and quarry exploitation	High	Stockpile the topsoil before extraction of materials; Restoration of borrow sites and areas of contractors' site facilities through back-filling; Levelling to acceptable level for the other use by the local community; spread the stockpiled topsoil to restore the fertility of the soil; re-establishing vegetation cover; Landscaping and planting spoil disposal sites with appropriate tree, shrub or grass species to improve the aesthetic quality of the sites.	When use of those sites is ceased	Design and Build Contractor	1,000,000 for reinstatement of material extraction site
Impacts on drainage systems and water resources including changes in surface and subsurface water flows, increased sedimentation and water pollution	High	Execution of earthworks/excavation works during dry seasons to reduce interference in river flows& reduce erosion, sedimentation and water pollution risks; Avoidance of dumping excess excavation materials on riverbanks or in river courses; Avoiding locating nearby streams and rivers, wetlands, drainage lines or slopes where the materials could be exposed to runoff or flood water and transported to water bodies; Proper handling of hazardous substances such as oil, fuel, detergents and cement to avoid water pollution risks due to spillages; Avoidance of leakages from vehicles and equipment through regular and effective maintenance; Proper disposal of solid and liquid wastes generated by camps and workshops by providing proper sanitary facilities and maintaining them in good condition until the camps are closed.	Through construction phase	Design and Build Contractor	Part of the Construction Contractor's

Environmental/ Social Issue/ Impact	Significance	Key Mitigation Measures	Period	Responsibility	Cost (Birr)
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Impacts on water supply systems and competition for water	Moderate	Arranging separate water supply sources for campsites requirements and other purposes without affecting the quality and quantity of water sources of existing users, Avoiding using water from existing water supply sources used by the local communities unless its adequacy is proved and permitted by water supply offices.	construction time	Design & build contractor	Part of the design and Contraction cost
Impacts on road side trees- loss of indigenous trees, plantation trees and other vegetation resources	High	For sections of protected forest that containing important indigenous trees on roadsides, try to be limited to absolute road width during clearing and for the section outside the forest implementing widening/improving the road to one side only to save trees, Limiting earthworks and earthmoving activities to the imperative area necessary for the road works to avoid any unnecessary loss of trees or vegetation; Conduct compensation tree plantation on the road sides and at locations to be recommended by the local Natural Resources Conservation or Environmental Protection Offices to compensate for trees/vegetation lost.	during construction	Design and Build Contractor	5,000,000 tree plantation(250,000 tree seedlings) sides of the road , fence and watering them

Environmental/ Social Issue/ Impact	Significance	Key Mitigation Measures	Period	Responsibility	Cost (Birr)
Construction phase					



Road and traffic safety issues - safety hazards to road side communities, animals, road users and project workers	High	<p>Developing and implementing a well-designed work program and TMP that would consider local conditions like the normal traffic, terrain, weather and socio-economic conditions,</p> <p>Provide animal passes &amp; pedestrian accesses in the cut and fill sections according to the proposed mitigation measures in this report and others,</p> <p>Provision of necessary information such as speed limits, direction, hazard locations, sensitive sites by putting appropriate signals and hazard markings, speed brake in the protected forest to save wildlife from traffic accident while crossing the road,</p> <p>Assigning traffic regulators, flag men, or traffic police to control traffic flows at critical sections or periods where/when traffic safety is a serious issue;</p> <p>Awareness training of operators of equipment and construction vehicles in traffic safety measures;</p> <p>Establishment of speed limits (30 km in town section) and controls for construction vehicles and discipline for the drivers;</p> <p>Providing appropriate information on the location of risky areas to potentially affected local residents and prohibiting such areas for safety reasons;</p> <p>Regularly assign safety officer at site</p>	During construction & operation	Design and build Contractor	900,000 salary for safety officer throughout the construction phase
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Environmental/ Social Issue/ Impact	Significance	Key Mitigation Measures	Period	Responsibility	Cost (Birr)
Construction phase					



Solid and liquid waste generation camps and materials processing sites	High	<p>Careful selection of camps &amp; materials processing sites if the proposed ones are not convenient, in such a way to avoid environmentally sensitive areas.</p> <p>Taking photographs of the campsites before the construction of any structures in order to compare the level of environmental degradation before and after the establishment of the campsites and to plan rehabilitation work.</p> <p>Establishing campsites with appropriate and standard sanitation facilities including imperviously lined septic tanks and toilets with flashing water.</p> <p>Proper treatment of all wastes and disposal in a priory designated place under the control of the Engineer and local Health Offices.</p> <p>The camp should not be Dismantled if the local authorities are interested to use it for other purposes but if they are not interested, dismantling the camps and rehabilitation of the areas as per the surrounding nature once construction is completed.</p> <p>Provision of health care services, potable water supply, and garbage disposal and sanitation facilities for the camps.</p> <p>Maintaining proper management and discipline in the camps.</p>	Construction	Design Build contractor, ERA(ROWMT), local Administration & local community	Part of the Contractor's obligations
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Environmental/ Social Issue/ Impact	Significance	Key Mitigation Measures	Period	Responsibility	Cost (Birr)
construction phases					





Spread of HIV/AIDS and other STDs	High	Provision of health education focusing on HIV transmission and prevention methods, Avoidance of discrimination in work places due to HIV/AIDS and provision of counselling services; Provision of free counselling and distribution of condoms & leaflets to workforce	Throughout construction period	contractor, higher Sub-contractor, Woreda health offices	2,000,000 for hiring HIV/AIDS prevention sub consultant
Occupational health and safety issues	High	Storing any explosives and chemicals in a safe place and making notification during blasting activities; Provision of protective equipment such as goggles, helmets, gloves and other masks for the workers who directly involved in physical works such as welding, steel bending, stone crushing, masonry, concrete, carpentry works and other similar activities, Minimizing dust emission by watering the road during construction; Provision of first-aid in the work places and clinics at the campsites; Posting appropriate and clearly visible signs and hazard markings that provide information on speed limits, direction, hazard locations, active construction sites, and other sensitive sites, and Provision of education to personnel of the contractor about safety procedures and emergency response plans associated with tasks.	Throughout construction period	contractor	Contractor's obligations

Environmental/ Social Issue/ Impact	Significance	Key Mitigation Measures	Period	Responsibility	Cost (Birr)
Construction phases					
Impact on productive agricultural land	Minimum	Pay compensation for the lost agricultural land	Before commencement	ERA(ROWM)	2,000,000 Compensation for the lost agricultural



					land due to spoil dump area
Soil Erosion from structure's outlets and downstream areas	Moderate	Constructing paved channelization, check dams and biological mechanisms and other protective structures at the outlets of the drainage structures to dissipate the energy of the concentrated runoff and associated downstream erosion	Construction	contractor	700,000 for the protection of structures outlet
Unforeseen impacts		Identification of unforeseen environmental & social issues/impacts and proposing corresponding mitigation measures, Advising the construction contractor regarding unforeseen environmental & social issues on how to minimize such impacts and mitigate the unavoidable impacts	Throughout construction time	Supervision consultant	Part of the supervision cost

Environmental/ Social Issue/ Impact	Significance	Key Mitigation Measures	Location	Period	Responsibility	Cost (Birr)
Decommissioning phases						
Impact from un-cleaned salvages, wastes, unused construction materials, un-reinstated quarries and borrow areas, access and detour roads	High	Reinstate quarry and borrow areas, detours and access roads, and draining if any water is impounded at those sites and any other places modified by project activities; Cleaning all the salvages and waste materials from campsites, materials processing sites etc. and damping in appropriate and authorized places, Removal of all the temporary camps and loosening the compacted soils in such a way that the land would continue giving services which were discontinued due to the project, and Verifying that the work as		Following the completion of the road works	contractor	Part of the Contractor's contract



		built meets all significant environmental requirements before the project was officially accepted.				
Operation phase						
Road and traffic safety issues	High	Monitoring the safety/effectiveness condition of traffic safety signals and hazard markings on the road; Monitoring accident risks/rates, Provision of awareness education about traffic safety issues for local communities' esp. at schools; road safety auditing,		operation & maintenance	contractor, ERA, Traffic Police, Road Transport Office	Part of the road maintenance cost

Environmental/ Social Issue/ Impact	Significance	Key Mitigation Measures	Period	Responsibility	Cost (Birr)
Operation phase					
Erosion, siltation problems, failure of drainage structures	Moderate	Conducting periodic monitoring of the road condition, and proper functioning of the installed erosion protection and drainage structures,	As above	ERA's District, contractor	Part of the road maintenance cost
Siltation of drainage structures	High	Follow up of the risk/rate of siltation in culverts, roadside drains, diversion drains etc. and implementing de-silting program.	As above	ERA's District, contractor	As above
Soil and water pollution	Minimum	Monitoring any contamination of soil and water	As above	ERA's District, contractor	As above
	<b>Subtotal cost</b>				<b>13,000,000</b>

## 8.2. Environmental Monitoring Plan

Environmental monitoring of the road construction project is a very essential part of the project implementation. It helps to follow up the practical implementation of the proposed mitigation measures, as they are required and to anticipate possible environmental hazards and/or to detect unpredicted impacts over time. Such monitoring has to be carried out by an environmental inspector or environmental consultant assigned to the project.

The responsibility of the environmentalist will be to ensure the implementation of all the proposed mitigation measures. The inspector should focus on the following indicators but not limited to:

- ☞ Site selection of quarry and borrow material sources and their operation and hauling condition,
- ☞ Acquisition of land for the project requirements and rehabilitation measures after completion of works,
- ☞ Site selection, establishment and operation of contractor's site facilities (like workers campsites, stone crusher & asphalt mixing plants, workshops, materials casting places),
- ☞ Handling of soils exposed to erosion and rate of soil erosion and siltation,
- ☞ Drainage and water resources like modification of drainage systems/alteration of surface or subsurface water flows, water pollution,
- ☞ Impacts on water supply systems such as pipelines, protected springs & hand pumps, and competition for water,
- ☞ Spoil disposal condition like location of disposal sites, impacts on land use, landscape quality, water resources etc.,
- ☞ Waste management system or disposal of wastes generated from campsites, workshops/garages, used oils etc.,
- ☞ Water impoundments, marshy areas and water holding structures to ensure the presence or absence of mosquito, the vector of malaria.
- ☞ Proper storage of toxic substance, explosives and chemicals, which are involved in the process of road construction?
- ☞ Appropriate watering of road surface during the road construction to minimize dust born health problems.
- ☞ Status of the contractor on providing educational service for the work force to create awareness regarding the sexually transmitted diseases, mainly HIV/AIDS.
- ☞ Conducting periodic health surveys of the project area together with the designated staff from health centres along the road.
- ☞ Impacts on protected forest and indigenous trees as well as plantation trees and wildlife conditions,
- ☞ Road and traffic safety issues.



### 8.3. Monitoring and Reporting Procedure

Regular monitoring of important and crucial environmental parameters is of immense importance to assess the status of environment during operational phase. With the knowledge of baseline environmental and social conditions, the monitoring program can serve as an indicator for any deterioration in environmental and social conditions due to construction phase and suitable mitigation steps could be taken in time to safeguard the environment and social welfare of people along the road corridor. Monitoring is as important as that of control of pollution since the efficiency of control measures can only be determined by monitoring. Therefore, ERA, supervision consultant, AfDB and environment, forest and climate change authority of each woredas traversed have responsibility to conduction monitoring the proposed Adama-Awash expressway Lot I, month, quarterly, biannual and annually without informing the contractor of the road.

Additionally, during the construction phase, the results of monitoring should be reported, clearly addressing any none conformity or compliance on specific issues quarterly to the ERA's ESMT and/or Its representative. The environmental inspector (EI) shall work very closely with the resident engineer (RE) in order to ensure that the construction works are being done according to the contractual agreement, including environmental protection measures. The RE oversees that the technical specifications are met during construction while the EI monitors internally that the implementation of the EMP on site. It is recommended that the EI shall compile the monitoring results concerning environmental mitigation and management activities. The quarterly report may comprise the following issues, but not limited to:

- ☞ status on practical implementation of the environmental management action plans by the contractor in the specific period against the site environmental and social management plan submitted by the contractor,
- ☞ accident/incidents occurred that could potentially adversely affected natural environment or social welfare due to a non-conformity of the contractor,
- ☞ A description of exceptional conditions on site whether they be weather condition, personnel related, machinery related, or otherwise stipulated,
- ☞ Minutes of meetings, if any, with stakeholders on any outstanding issues related to the road construction works, and
- ☞ Suggested solutions for any outstanding/unforeseen issues/impacts detected during the monitoring.

After evaluating the monitoring results and the proposed solutions for unforeseen issues, the ERA's ESMT may approve the proposed solutions or come up with other appropriate solutions. Similarly, external monitoring can be carried out by woreda level and environmental protection offices, health offices and municipality offices.

During the operation phase of the project, the institutions or bodies responsible for monitoring should report the results to ERA/ERA's district office as per the monitoring requirements together



with proposed solutions for any outstanding issues. Then, ERA's district office reports to ERA's ESMT, if necessary, together with any other concerned parties approves the solutions proposed by the monitoring organizations or propose other suitable solutions. Detailed explanation and responsibilities were elaborated in the table 8-3 below.

The responsibility of the environmentalist will be to ensure the implementation of all the proposed mitigation measures. The inspector should focus on the following indicators but not limited to:

#### **8.3.1. Monitoring of Soil erosion**

Usually road construction processes accelerate soil erosion. Moreover, the negligence of road contractors and absence of effective monitoring further exacerbates erosion problems. Therefore, it should be the responsibility of the environmental inspector to ensure the implementation and effectiveness of erosion control measures. He should monitor the road side drainage works, gully reclamation works, re-grassing of road side cuts, slopes stabilizing works etc.

#### **8.3.2. Monitoring of Road side plantation/trees**

From the field assessment it was found that, there are valuable roadside trees such as income generating Eucalyptus trees and Chat plantation. Wherever these trees are in a significant amount, they should be protected. Therefore; the environmental inspector has to ensure that the recommended mitigation measures for roadside trees are implemented. Also, he has to monitor whether the recommended mitigation measures are effective or not.

#### **8.3.3. Land use**

Though the overall impact of this road on the land use is minimal, some specific impacts should be reduced as much as possible. The inspector should ensure that after the completion of the road construction, all the disturbed land use as a result of borrow pits, quarry areas, campsites are returned to its original state. Upon the completion of backfilling the area should be graded and compacted to allow the topsoil to be replaced uniformly over the original area.

#### **8.3.4. Health and safety**

Health situation of the project area has to be monitored to see the impact of road construction processes on the human health and also it has to be checked whether the proposed mitigation measures to overcome the health impact are carried effectively or not. The environmental inspector has to inspect the overall environmental situation in relation to health. His task should include:

- Monitoring water impoundments, marshy areas and water holding structures to ensure the presence or absence of mosquito, the vector of malaria.
- Inspecting the proper storage of toxic substance, explosives and chemicals, which are involved in the process of road construction.



- Monitoring the appropriate watering of road surface during the road construction to minimize dust born health problems.
- Providing educational service for the work force to create awareness regarding the sexually transmitted diseases, mainly HIV/AIDS.
- Conducting periodic health surveys of the project area together with the designated staff from health centres along the road.

#### **8.3.5. Noise and Dust**

There will be noise and dust impacts associated with road construction in the vicinity of the towns and settlements located near the road. Therefore, the environmental supervisor has to monitor the implementation of proposed mitigation measures to cover noise and dust impact such as locating of rock crushing plants, watering of road surface during construction, siting of construction crew camps, etc.

#### **8.3.6. Monitoring spoil disposal sites**

There will be improper disposal of spoils on the farm lands or grazing lands through agreement between contractor and farmers without the consent of supervising environmental undermining or ignoring the impacts the spoil on downstream natural environment. Therefore, the environmental supervisor shall strictly monitor and follow spoil disposal sites under use are those sites selected with supervising consultant or ERA's environmentalist in collaboration with consultant.

#### **8.3.7. Clean Up**

Before the handover of the road, the client or the environmental inspector has to monitor to ensure whether the proposed environmental requirements were implemented by the construction contractors as it is proposed in this EIA report. He should also monitor all works necessary to rehabilitate borrow areas, the removal of waste materials generated during the construction process, surplus materials from right of ways, construction camps, etc. as part of the construction demobilization process.

#### **8.3.8. Monitoring during the operation period**

Monitoring should be in place during the operational period to check the operating conditions of the road along the project route on a regular basis. A program for the controlling and removal of roadside litter, cleaning of drainage ditches, culverts, spills etc. should be in place in order to attain the best use of the constructed road and to improve the overall environment. Also proper signage and speed restrictions have to be monitored.





Table 8-3: Proposed Environmental and Social Monitoring Plan

S. No	Environmental & Social Issues	Project phase	Indicators/Parameters to be Monitored	Location/ Project Component	Frequency	Responsible body	Estimated Cost (Birr)
1	Inclusion of appropriate environmental clauses in the contract document	pre-construction Phase	Environmental clauses included in the contract document	At ERA Head Office	Once during document evaluation	ERA's representative	Part of the routine work
	Physical or economical displacement of people and loss of properties		Compliant from the affected people	In settlement areas along the road project RoW	Before the commencement of the construction work, during the construction phase, and at the end of the construction work	Municipalities and woreda administration offices and ERA(ROWMT)	Part of their routine work
2	Utilities and water supply systems	pre-construction Phase	Pre-construction relocation of utilities and water supply pipeline in the ROW	ROW	Before the commencement of construction	Woreda and Municipality, ROWMT	Part of their routine work
1	water pollution	Construction Phase	Water quality parameters such as EC, pH, TDS, & Turbidity,	Rivers, streams, springs and wells	Once before construction, once during construction and once after the completion of construction	Water quality expert from Zone Water Department along the project road, ERA's representative	48,000 (for analysing 6 water samples at a time & 2 times per year, 4000 Birr per sample
	Loss of land due to land expropriation for the RoW, access road, quarry and borrow sites and camp sites, etc.		Affected area of land in hectare	Along the project road, access roads, and at campsites, borrow & quarry sites.	Once per year	ERA,RE & each Woreda EFCCA	10,000 (daily allowance experts& transport cost



S. No	Environmental & Social Issues	Project phase	Indicators/Parameters to be Monitored	Location/ Project Component	Frequency	Responsible body	Estimated Cost (Birr)
	Soil erosion		Area exposed to erosion, gullies formation	Along the road and quarries, borrow areas and detour	Quarterly	ERA,RE & each Woreda EFCCA	20,000 (daily allowance experts& transport cost
	Impacts on roadside plantation trees		Number of indigenous trees removed, Species type & number of tree seedlings raised, planted and number survived or well established	Along the project road & access roads, at quarry & borrow sites, campsites, materials processing sites	Twice per year	As above	30,000 (daily allowance experts& transport cost
2	Disposal of construction spoils		Number of unauthorized spoil disposal sites & impacts caused; Number of spoil disposal sites properly managed and landscaping measures taken.	Spoil disposed sites along the project road	Quarterly	ERA,RE & Woreda EFCCA	Could be done at the same time with the above activities without additional cost
	Spread of STD and/or HIV/AIDS		Overall health and safety situation of the project area including construction camps and HIV/ADIS prevalence.	Construction campsites, working areas and nearby towns and villages	Quarterly	ERA,RE & each Woreda Health Office	15,000 (daily allowance experts& transport cost



S. No	Environmental & Social Issues	Project phase	Indicators/Parameters to be Monitored	Location/ Project Component	Frequency	Responsible body	Estimated Cost (Birr)
1	Aesthetic value and landscape	Decommissioning phase	Un-rehabilitated areas and leftovers Number of areas properly reinstated such as quarry sites, borrow pits and spoil disposal sites	Throughout the project route, contractor's site facilities and quarries and borrow pits	Once before officially terminating construction contract	ERA, RE & each Woreda EFCCA	20,000 (daily allowance for experts and transport cost)
1	Erosion, sedimentation of drainage structures, traffic signals, sight distance issues and roadside weeds	Operation	Surface area, length or number of sites affected by erosion, number of blocked drainage structures, number of traffic signals damaged, etc.	Along the project road	Biannual	Operation and maintenance Department of ERA or ERA's District Office	Part of routine work
						<b>Sub-Total Cost</b>	<b>143,000</b>

## 8.4. Capacity Building

Capacity building is essential to properly implement the proposed environmental and social management and monitoring plan. The environmental protection, land administration and utilization office of each woreda and municipalities along the road is the principal stakeholder for managing and implementing the environmental issues within the project area. Therefore, it is pertinent to increase the capacity of experts in these offices by providing necessary training on ESMP. The recommended level of training in relation to the proposed road construction is on job training. The potential participants, in addition to experts from Zone, woreda and Municipality offices could include representatives from the construction contractor workforce and key professionals of the construction-supervising consultants.

On job training can be arranged by the construction supervision consultant in collaboration with ESMT of ERA for two (2) days before the start of actual road construction work and for another two (2) days after the midway of construction work. The content of training should focus on environmental conservation and awareness creation in general and HIV/AIDS prevention in particular.

The first session of on job training could incorporate the following modules:

- ☞ An introduction to the concepts, terminology, aims and objectives of ESIA, environmental and social management and monitoring, with specific reference to road development projects;
- ☞ HIV/AIDS prevention and awareness creation;
- ☞ On-site review of existing environmental and social conditions in the project area, potential impacts and mitigation and benefit enhancement measures;
- ☞ A review of approaches which have been and are being adopted towards environmental and social management in the case of the present project, and their applicability in general to road projects, with particular reference to how uncertainties are handled; and
- ☞ A review of the role of environmental and social monitoring as a management tool.

The second session could cover the following aspects:

- ☞ on-site comparison of impact predictions in the ESIA with what has happened in practice, with particular emphasis on analysing the reasons for any significant differences;
- ☞ on-site review and analysis of the success or otherwise of the proposed mitigation measures, environmental and social management and monitoring approaches, including contributions from the contractor, the site supervision team, and representatives of the local authorities and the people who live along the road; and
- ☞ Summary of lessons to be learned which could usefully be applied to similar, future projects.

Generally informal approach may be adapted to the training sessions, in order to promote interaction between trainees and trainers, and in particular to facilitate the free and open exchange and discussion of ideas.

Numbers of trainees will be decided through discussion with both ERA and construction supervision consultant, but, it is suggested that the number should be limited to about 30 persons. The cost estimated for the proposed on job training (capacity building) is listed in Table 8-4 below.

Table 8- 4: Cost Estimate for Capacity Building

No.	Item	Quantity	Unit rate	Days	Amount( Birr)
1	Fee for Environmental & Social Specialist	2	5,000	4	40,000
	Per diem for the trainers	2	600	6	7200
2	Transport cost	Lump sum			20,000
3	Per diem for trainees	30	300	4	36,000
4	Course materials	Lump sum			7,000
	<b>Sub-Total</b>				<b>110,200</b>

### 8.5. Environmental Mitigation, Management and Monitoring Cost Estimate

In this section environmental and social impact management, mitigation and monitoring cost is estimated. The estimation is based on the unit costs according to the local prices.

The total cost of environmental and social management, mitigation, capacity building and monitoring cost to be covered by the project amounts is about **14,578,520 Birr** (see Table 8-5 below). The cost of the mitigation measures and management plan should be considered as a component of the financial requirements of the project. The cost estimations are depending on the assumptions that:

- ☞ Items of an engineering nature that are in any case required under the construction contract and do not involve additional costs have been excluded from this cost estimate. Examples are drainage structures, retaining walls and lined drains that are designed to control or prevent soil erosion and slope instability.
- ☞ The costs of mitigation measures to be implemented by the Contractor during construction are considered as included in his obligations under the construction contract. This applies to such measures as good management of the construction equipment and vehicles, workforce/camp management, good construction works, provision of necessary facilities for the workforce and proper waste management or disposal, restoration of campsites, traffic safety measures at construction sites, etc.
- ☞ Similar to that of the construction contractor, the costs of supervision activities to be carried out by the team members of the construction supervision consultant (CSC) is assumed to be included in the contract for the CSC.



Table 8- 5: Cost Estimate for the implementation of ESMP and monitoring Plan

No.	Reference	Cost Items	Cost Estimate
1	Table 8-2	Environmental Mitigation and Management Costs	13,000,000
2	Table 8-3	Environmental and social monitoring costs	143,000
3	Table 8-4	Capacity building cost	110,200
		<b>Total</b>	<b>13,253,200</b>
		<b>Contingency (10%)</b>	<b>1325320</b>
		<b>Grand Total</b>	<b>14,578,520</b>

## CHAPTER NINE

### 9. CONCLUSION AND RECOMMENDATION

#### 9.1. Conclusion

Based on the findings of this environmental and social impact assessment, the construction and operation of Adama-Melkajilo (km-60) expressway project will have several beneficial as well as adverse impacts on the human and natural environment within the area of influence of the road. Constructing the proposed expressway will improve access and transport efficiency that will boost economic growth and development of basic infrastructures along the road corridor.

The construction of the proposed road will not cause such severe environmental effects that can be irreversible and cannot be avoided or minimised with normal good engineering practices and with practical implementation of environmental and social mitigation measures in the planning and execution of the project.

The most anticipated significant adverse environmental & social impacts during the construction phase would be vegetation clearance in the ROW, dust pollution, water pollution, and land degradation from construction material excavation, traffic accident and safety risk, the spread of communicable diseases, HIV/AIDS and other sexually transmitted diseases. Moreover, construction of the road will also disturb the existing utility lines such as electric poles, telephone lines and water pipes and create inconvenience among users.

Therefore, from detailed study, it was concluded that there are no serious environmental and social issues that can be irreversible and prevent the proposed road construction project from proceeding to the implementation stage as long as the recommended mitigation and monitoring measures proposed in this ESIA are properly considered and timely implemented.

Finally, it was estimated that about **14,578,520 Birr** will be required for the implementation of the environmental and social management, mitigation measures to avoid or minimise adverse impacts due to construction of the proposed Adama-Melkajilo (km-60) expressway project.

#### 9.2. Recommendation

In terms of technical and economic feasibility, socio-economic benefits and environmental effects, following the selected route alignment under route selection section was found to be the most sound route option & recommended to be the first priority among the alternatives considered and studied in detail. Based on the environmental and social impact study of the selected route the following recommendations are given from both environmental & socio-economic aspects.

Most of the environmental effects will be of temporary and reversible nature, but some will be permanent impacts. They stem from vegetation clearing in the ROW, land acquisition and ground disturbance for the road construction and for obtaining construction materials, as well as operation of construction equipment and camps or housing of the labour force. The negative effects can be



reduced to acceptable levels with good engineering practices and implementation of restoration and other mitigation measures in the planning and implementation of the project. Therefore, to have minimal and acceptable residual environmental impacts, it is recommended that the proposed mitigation measures should be strictly and properly implemented by the contractor and through environmental management plan enforcement. A close follow up of the effectiveness of the implemented mitigation measures through a well-planned monitoring programme is also critically important. Among the issues that should be given maximum attention are:

- ☞ ERA should appoint senior environmentalist to supervise environmental monitoring and management activities of the road, and to ensure that contractors utilize methods that protect the environment.
- ☞ The contractor shall employ environmentalist with relevant experience on the road construction project who can practically implement the proposed mitigation measures.
- ☞ Implementation of erosion control measures by designing and constructing appropriate physical/engineering structures, and by implementing biological (re-vegetation) measures, as well as by instituting follow up procedures to repair defects.
- ☞ Application of good practices during the road construction and collection and hauling of water and selected materials to minimize unwanted impacts on the environment.
- ☞ Maximum care must be taken for sections protected forest and steep slopes that involve cut-and-fill.
- ☞ Effective storm water management systems and structures must be put in place throughout the project area.
- ☞ Impacts on water supply sources of the local communities and their animals must be kept to a minimum.
- ☞ Restricting land acquisition to what is absolutely necessary to reduce loss of land and forest.
- ☞ Proper setting of construction camps and management of workforce, and restoration of the sites to blend with the surrounding environment as soon as the construction work is completed.
- ☞ Proper management of construction machinery and control of traffic management.
- ☞ In locating the alignment, besides the technical issues, environmental considerations have been given due attention in order to minimise adverse environmental effects.

Similarly, with regards to social issues, there will also be a negative impact due to increases in STDs, especially HIV/AIDS. This can be mitigated by awareness creation and sensitising the local population.

Furthermore, with regard to adverse consequences of the project, the most important impact on socio-economic life is the loss of property, in particular the loss of housing units. However, these will be small in number and the negative impact can be mitigated by the payment of suitable compensation.

Because of the benefits of the project, it is considered that project area communities will be keen to ensure that the project road will be completed successfully.

Based on the socio-cultural assessment, the following recommendation should be implemented to ensure the sustainability of the road project:

- ☞ Project area communities should be actively encouraged to participate in the construction and implementation of the project. This participation should start from provision of necessary data and information pertaining to the project activities. Such participation should take account of the contributions that can be made by women at every level.
- ☞ Project area communities and stakeholders should be consulted from time to time, particularly before and during the construction period, to find appropriate mitigation measures for adverse impacts, and to implement them accordingly.
- ☞ Before the start of construction, an inventory of affected property and/or households should be compiled.
- ☞ The involvement of stakeholders is essential. The local administration, namely Woreda and Kebele administrations will be very helpful in facilitating the project activities through solving problems related to land acquisition, settlement of disputes and security.
- ☞ The schedule of construction needs should be communicated to the concerned bodies at the earliest possible opportunity, to allow affected households time to prepare themselves physically and mentally to participate and co-operate with the project activities.



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## **ANNEXES**

### **Annex 1: Minute of meeting during public and stakeholders Consulted**

## **Annex 2: Environmental and social Clauses to be Included in Bidding Document**

### **Annex 3.1: Matrix of Comments and Responses on Final ESIA**

## **Annex 3.2: Matrix of Comments and Responses on Draft ESIA**





#### **Annex 4: List of participants of administration officials Consulted in Adama, Boset and Mijar Shenkora woredas**