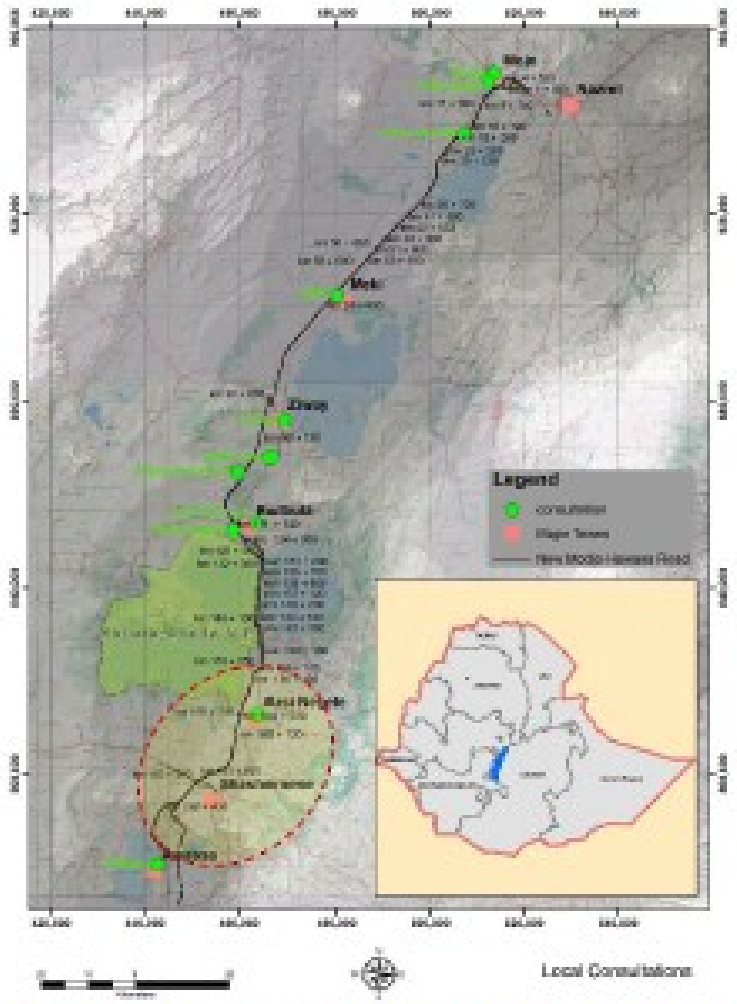
RP1734 V4

THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

ETHIOPIAN ROADS AUTHORITY



UPDATED ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

MODJO HAWASSA HIGHWAY PROJECT

LOT 4: Arsi Negele – Hawassa

Modjo-Hawassa Expressway Design-Build Road Project: SYNOPSIS

A. General

The Modjo-Hawassa expressway project is predominantly located in Oromia Regional National State (ORNS) and serves the Southern Nations, Nationalities and Peoples Regional State (SNNPRS) that is located just at the end of the project. The road generally traverses in a southward direction and it is a branch south from the Addis Ababa-Adama expressway. The project road will be a high speed, free flowing road that traverses through rural areas by-passing settlement areas and provides controlled access connections at reasonable distance to link the expressway with the existing road and urban centers.

The Modjo-Hawassa expressway project will improve the connectivity of high-potential farming and tourism areas, while forming part of the Addis Ababa-Moyale-Nairobi-Mombasa Corridor, which is of strategic importance to diversify Ethiopia's international links and sea port outlets. In this regard, it is worth-recalling that the project road will link to the just started project Lamu Port South Sudan Ethiopia Transport Corridor (LAPSSET) that will make highly competitive the southern route to alternative ports, thus increasing the function of the Addis Ababa-Modjo-Hawassa expressway.

The Addis Ababa-Modjo-Moyale Corridor, will serve as one of the gateway for the import/export of the country connecting the southern and central part of the country with Kenyan ports of Mombasa/Lamu, as a potential corridor alternative to Djibouti with enhanced road condition.

The Lamu-Southern Sudan-Ethiopia Transport Corridor Project (LAPSSET), an initiative included by the Kenyan Government in the “Vision 2030” multi-annual plan makes the Moyale corridor very vital for the regional trade between the neighboring countries. The LAPSSET corridor will link the port of Lamu, north of Mombasa, to Ethiopia and Sudan through Isiolo, Turkana and Moyale. The first phase of the project has been launched on 2010, and the feasibility study for the construction of 3 berths and other infrastructures at the Lamu port has been recently finalized. The development of Moyale corridor, intersecting this important new traffic route, will therefore offer a tremendous opportunity for the development of the trade between Kenya and Ethiopia, accelerating the regional integration among the two Countries and also to possible transit traffic from the Kenyan ports. The Hawassa-Moyale and Moyale – Mombasa roads are being upgrade by the respective Government through finance received from the African Development Bank. Therefore, the construction of the Modjo-Hawassa expressway will facilitate the traffic movement and increase the capacity of the Moyale corridor. Figure 0-1 shows the major road corridors of Ethiopia connecting the country with ports.

Figure 0-1: Ethiopia Road Corridors and connection with ports

The Figure 0-2 depicts the northeast and south freight corridors of Ethiopia, namely:

- the Djibouti Corridor: Djibouti port - Galafi border – Semera – Mille – Awash – Modjo – Addis Ababa for a total length of 920 km;
- the Addis – Moyale Corridor: Addis Ababa – Modjo – Hawassa – Yabelo – Moyale, for a total length of 770 km;
- the Kenyan Corridor to Mombasa: Moyale – Marsabit – Isiolo – Nairobi – Mombasa port, for a total length of 1,280 km.

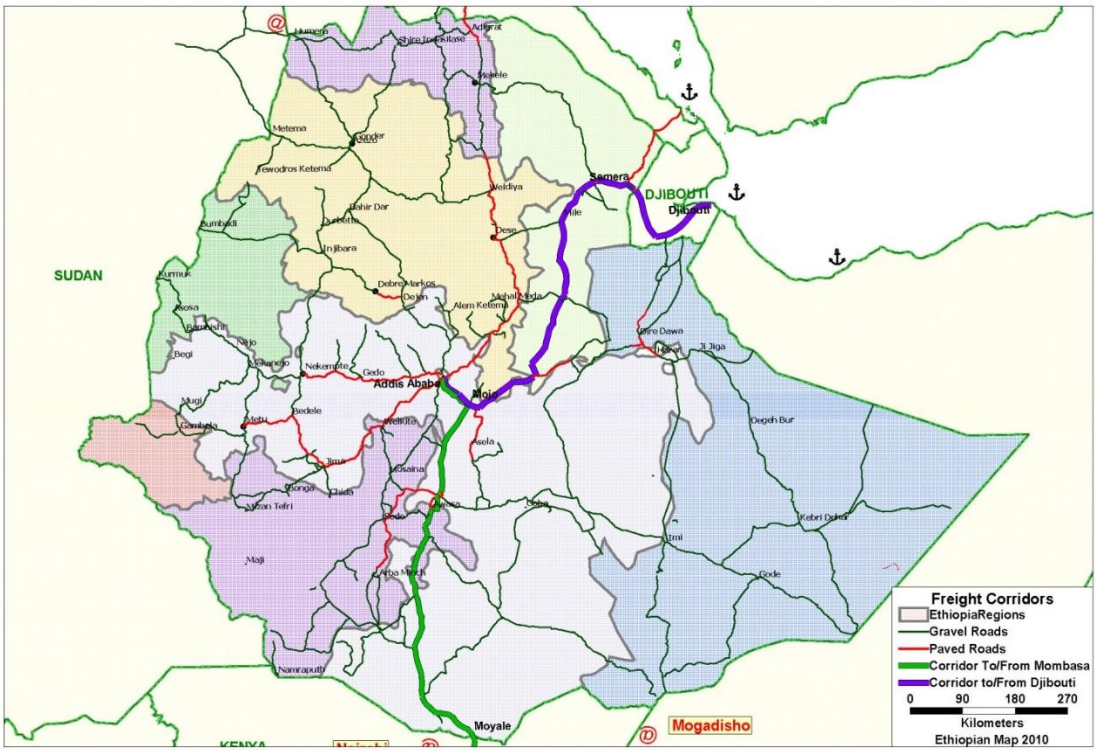


Figure 0-2: Ethiopian Freight Corridor

Analyzing the Average Annual Daily Traffic along Modjo-Hawassa (Moyale corridor), the traffic projection shows by year 2018 an average AADT of 4044 vehicles between Modjo and Hawassa. The following Table 0-1 show the project traffic for the new expressway.

Table 0-1: Projected Expressway Traffic

Year	AADT		
	Modjo - Zeway Section	**Zeway - Shashemene Section**	**Shashemene - Hawassa Section**
2010*	3,612	3,541	4048
2018**	4,587	3,125	4,420
2027	11,271	7,674	11,153
2037	27,990	19,047	28,413

*traffic on the existing road

**base traffic, when the expressway is open to traffic

The overall Modjo-Hawassa expressway will have a length of 202.48 km from the proposed new Modjo interchange at Addis Ababa – Adama expressway which is located east of the existing Modjo Dry Port and traverses southward while the towns along the route are accessed at Koka, Alemtena, Zeway, Bulbula, Langano, Arsi Negele, Shashemene and Hawassa.

The implementation of the project is formulated to be tendered in four lots. The first lot, Lot-1: Modjo-Meki (56.8km) will be financed by African Development Bank. The next lot, Lot-2: Meki-Zeway (36.896km) will be financed through a Loan from the Export-Import Bank of Korea from the resources of the Economic Development Cooperation Fund (EDCF) of the Republic of Korea, Lot-3: Zeway – Arsi Negele (57.1km) will be financed by the World Bank while the last lot, Lot-4: Arsi Negele-Hawassa (51.68km) will be financed through Export Import Bank of China.

The expressway project will have controlled access and grade-separated interchanges, with adequate link roads to connect the highway to the major urban centers, ordinary trunk roads network and other feeder roads. The location map of the Modjo-Hawassa road is appended herein below.

Environmental and Social Impact Assessment has been undertaken for each lots. This synopsis describes briefly the project scopes for Lot 1, 2, 3 and 4. Description of the detailed ESIA for **Lot-4** is appended following this section.

B. Introduction

The Modjo-Hawassa Road Project will be constructed on a green-field alignment to a 4 lane dual carriageway standard involving new construction of pavement layers and various other road components such as bridges, culverts, underpasses, over bridges and construction of ancillary works. To minimize the risks to pedestrians and animals from the high-speed traffic, fences will be provided along and edge of the road reserve: access to the road will be limited to vehicular traffic. The project therefore falls under Schedule I according to EPA environmental guideline; and hence requires full ESIA.. Environmental and Social impact assessment has been carried out for each Lot in line with Ethiopian legislation and financiers' guidelines. The following sections present brief descriptions and features for all lots.

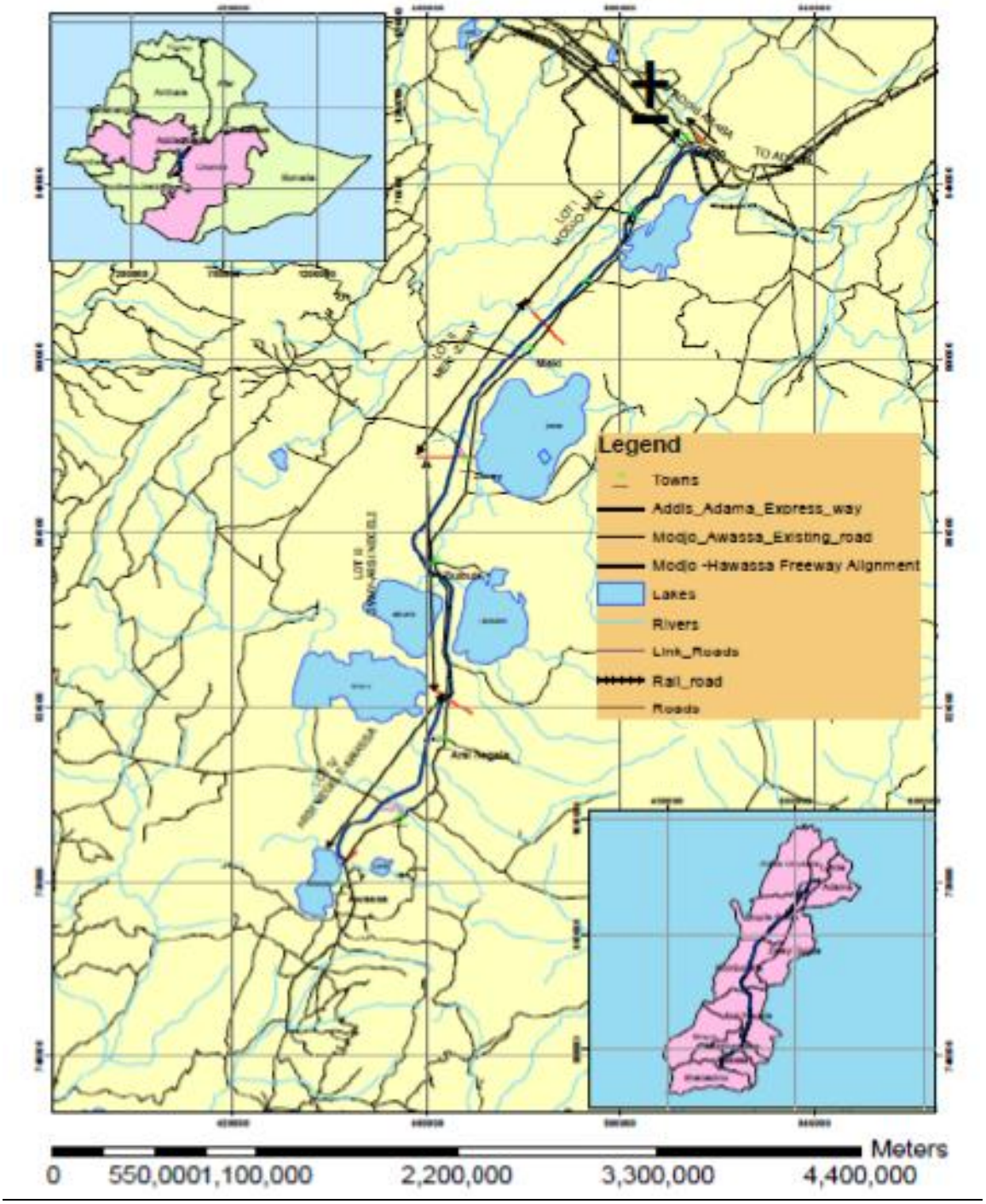


Figure 0-3: Project location

Lot 1: Modjo-Meki

The proposed Lot 1 Modjo – Meki Road Project starts at Modjo town in Oromia National Regional State (ONRS); and the road is connected with the Adama-Addis Ababa expressway and terminates before Meki town with a total length of 56.8 km.

Taking into consideration the urban environment at the beginning of the Project Road in Modjo town in general, and the possible increase in vehicle emissions and traffic/road safety in particular, it is designed in such a way that:

i. The expressway would commence on the east side of Modjo town avoiding the current built-up areas; and
ii. Traffic safety and easy access is ascertained taking into consideration the traffic to Modjo Dry Port

Therefore, by doing so, it is anticipated that:

a) There would be no adverse impact on private or public infrastructures notably houses/buildings (socio-economic impact);
b) The immediate adverse impact - due to vehicular emission- on the micro climate and the health of people along the road (if it traverses town section) would be decreased (environmental and health impact); and
c) The potential rate of occurrence of traffic/road accidents would be reduced due to low level of interaction between vehicles and pedestrians (road safety enhancement).

In addition, it would be possible that heavy trucks from the Dry Port would have easy and safe access to the Project Road in case of travelling to or towards Hawassa town.

As stated above, the Project Road (new dual carriageway route section) falls in ONRS which includes the Modjo, Lome and Bora weredas of East Shewa Zone. The location map for Modjo-Meki section is shown in the Figure 0-4 below.

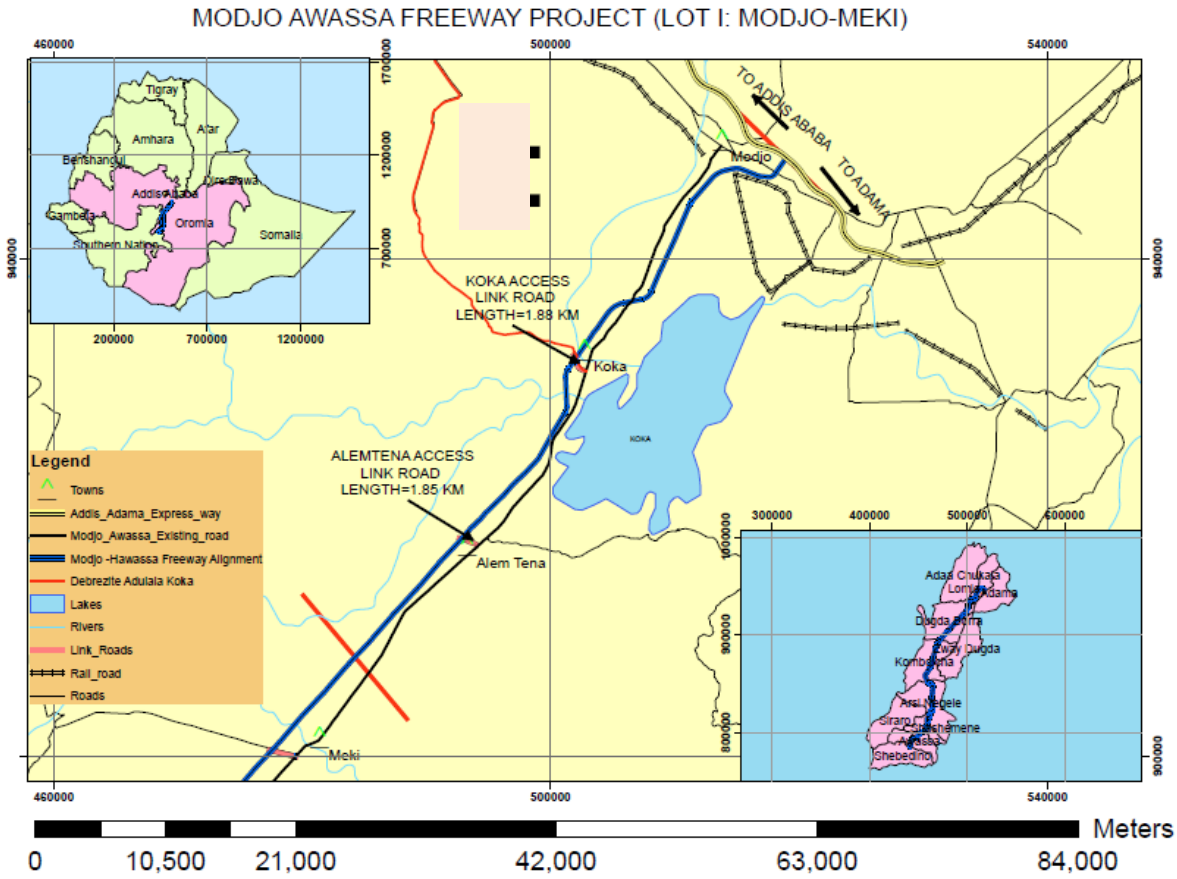


Figure 0-4: Lot-1 project location

The expressway, starting from Modjo, runs on the east side of the existing road for considerable stretch and crosses to the west side well before Koka town. The Project Road then crosses Awash River, upstream of Awash Bridge, and continues traversing on the same side for the remaining section of the Lot.

Lot 2: Meki-Zeway

The proposed Lot 2: Meki–Zeway Road Project starts before Meki town in Oromia National Regional State (ONRS) and terminates west Zeway town after crossing the old Zeway-Butajera road at km 92+896, with a total length of 36.896km. The location of the Project Road corridor is depicted in the Figure 0-5 below.

The route shown on the map is part of the Modjo-HawassaHawassa Road; and the proposed Lot lies entirely to the west side of the existing road (leaving Meki and Zeway to its east and connected to these towns with link road through grade-separated controlled access / intersection.

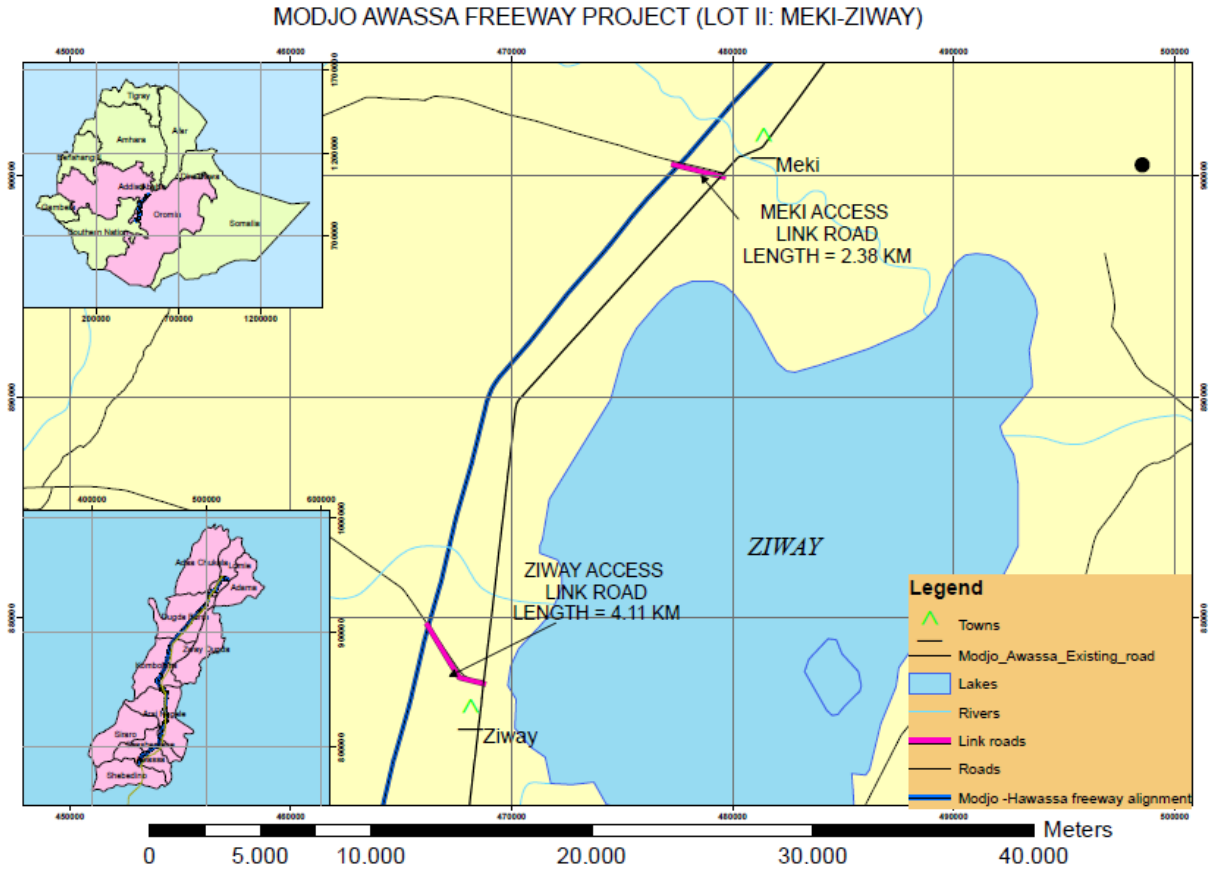


Figure 0-5: Lot-2 project location

LOT-3: Zeway-Arsi Negele

LOT-3 starts west of Zeway town and the alignment traverses the west side of the existing road until it crosses the existing road just after Bulbula village to avoid interference with the Abiyata Shala Lakes National Park (ASLNP) whose boundary lies entirely on the west side of the existing road. The alignment keeps the eastern side of the existing until it passes the Langano lake area and terminates few kilometers past the lake influence area. The location of the Project Road Corridor is shown in Figure 0-6 below.

The alignment is generally characterized by long tangents connected by large radii of curves. The terrain it traverses is predominantly flat. The project road will provide a high speed, free-flowing connection to improve the connectivity of high-potential farming and tourism areas.

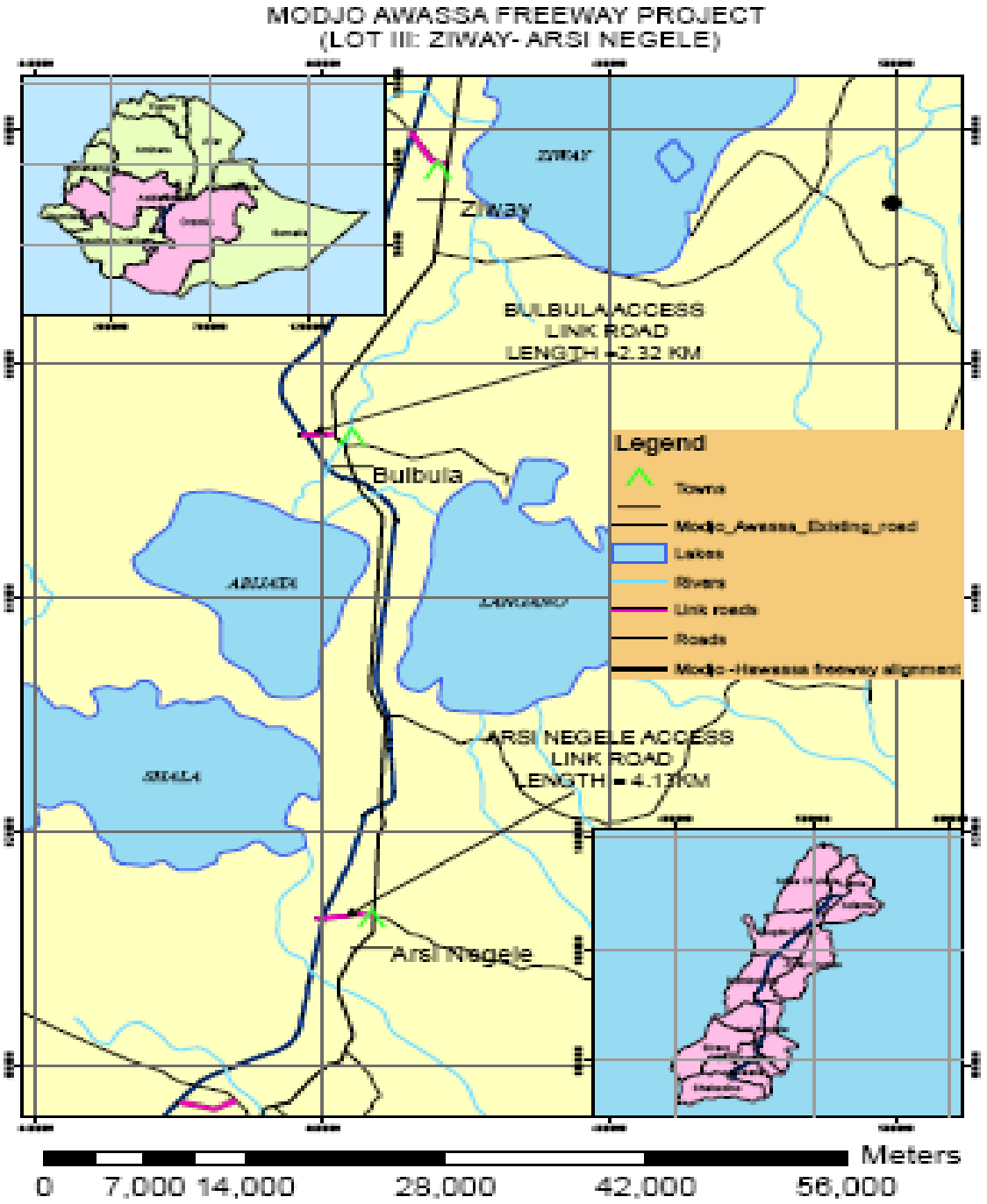


Figure 0-6: Lot-3 project location

Lot 4: Arsi Negelle-Hawassa

This Lot starts from a point located at km 150 (well before Arsi Negelle town) and the expressway terminates at km 201.68 (at the entrance of a small town of Tikur Wuha on the northern outskirts of Hawassa). The Project Road is connected with the existing alignment of the Hawassa-Hageremariam Road with at grade roundabout. The Hawassa-Hageremariam

road project is being upgraded with support from the African Development Bank. The Figure 0-7 below shows the location of the proposed Project Road.

As shown in the Figure 0-7, the proposed road starts on the east side of the existing road for a short 3 kms section and then it crosses the existing road and the remainder of the road alignment lies entirely on the east side of the existing Modjo-Hawassa Road. Grade-separated intersections for access to the existing roads has been introduced at Shashemene and Arsi Negele.

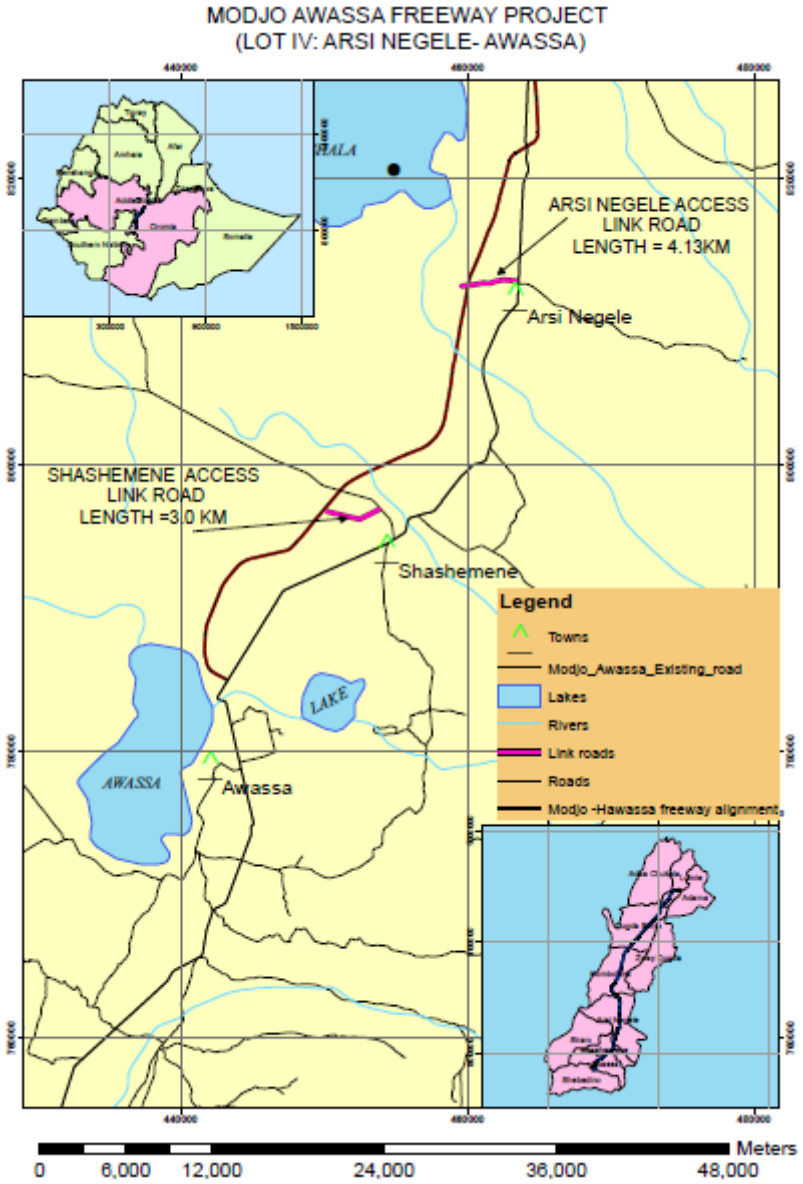


Figure 0-7: Lot-4 project location

C. Issues of Interest

This section highlights the generic impacts common to all Lots listed below (with varying degree depending on environmental settings of the Lot under consideration) and the specific impacts due to each Lot. The generic impacts include, but are not limited to:

- Removal of vegetation;
- Initiation of increased soil erosion;
- Expropriation of land, dwellings and other properties;
- Pollution of water resources;
- Soil contamination; and
- Noise and air pollution

The project will allow long distance through traffic to be diverted from the highly populated towns along the existing road to the new expressway, resulting in a safer and much improved environment for the people living along the existing road. The mitigation measures for the above identified generic impacts are detailed in chapter 7

Lot 1: Modjo-Meki

As stated earlier, the Project Road lies to the west of the existing road near the man-made Lake Koka. Therefore, adverse impact on the upstream [aquatic] ecosystem is expected due to earthwork operation, spillage of liquid [hazardous] waste and disposal of solid waste.

Thus, measures such as the following will be adopted to mitigate the impacts:

- Soil and other materials should not be pushed towards the river bank;
- Construction vehicles and machinery should be inspected regularly especially against leakage;
- Vehicle and machinery washing and servicing sites should be sufficiently far from the river and should be sealed to avoid percolation into the soil as the waste may eventually join the river water;
- Sound waste management should be practiced at all sites.

Lot 2: Meki-Zeway

Apart from the impacts stated above as common to all Lots and the impacts above specific to Lot 1, there are no additional issues in this section.

Lot 3: Zeway-Arsi Negele

This section of the project road is located parallel to and on the west side of the ASLNP boundary, with Abijata and Shala lakes on the west side and Langano lakes on the east side of the project road.

The major sensitive environment along the Lot-3 corridor is related to the ASLNP. The expressway is designed in such a way to avoid interference with the ASLNP. The ASLNP lies

on the western side of the expressway. The park engulfs Lakes Abijata, Shalla and Chitu covering a total area of about 887 sq. km. The park provides habitat for endemic bird and mammal species and protects the remaining acacia woodland forest.

Lot 4: Arsi Negelle-Hawassa

In the initial design case, this Lot was proposed to cross Tikur Wuha River and continue as the eastern Ring Road of Hawassa.

However, as a result of consultation it was later modified so that this section will terminate at the Tikur Wuha River at the northern boundary of Hawassa and be connected to the Hawassa-Hageremariam Road at the Tikur Wuha Bridge. Significant modification or change in alignment has been undertaken during the design review process to avoid impact on existing private development projects and to minimize the relocation of properties.

Therefore, due to the alignment modification, social impacts and environment related effects on aquatic ecosystem have been much reduced.

Lake Hawassa is source of fish and recreation for both the local community as well as tourists coming to the city.

In order to mitigate the possible adverse impacts resulting from the Project Road, the following measures should be taken:

- Earthwork operation should take into consideration that soil and other materials should not be pushed towards the river bank;
- Construction vehicles and machinery should be inspected regularly especially against leakage;
- Vehicle and machinery washing and servicing sites should be sufficiently far from the river and should be sealed to avoid percolation into the soil as the waste may eventually join the river water; and
- Sound waste management should be practiced at all sites.

D. Modjo-Hawassa vs Other Interventions

As the implementation of Modjo-Hawassa Road has impact on other interventions in its surroundings, other undertakings in the vicinity of the Project Area could also have impact on the Project Road. Such major undertakings include:

- Development of Addis- Adama Expressway,
- Implementation of the new rail line construction at the northern end of the road,
- the dry port establishment at Modjo;
- the Hawassa-Hageremariam Road; and
- other investment projects like horticultural development.

The impacts anticipated from the project are both positive and negative; and are mainly related to traffic flow. That is,

- the Expressway, rail line and dry port will increase traffic on the Project Road;
- traffic flow to and from the Hawassa-Hageremariam Road would be more efficient;
- the Project Road contributes to enhancement of mobility (especially in further facilitating access to market) at local and national level; and
- provides a door-to-door service as compared to the rail mode.

E. Modjo-Hawassa Resettlement Action Plan (RAP)

Resettlement Action Plan (RAP) is prepared for the entire Modjo-Hawassa road in lots. The RAP is intended to ensure that Project Affected Persons (PAP) receive appropriate compensation, or livelihood restoration or income restoration measures and/or rehabilitation measures. Table shows summary of the number of Project Affected Persons for each lots and details are provided with lot specific RAP documents.

Road Section	Total PAPs		People to be Displaced		Partially Affected[1] People	
	Number of House Hold	PAPs	Number of House Hold	PAPs	Number of House Hold	PAPs
Modjo- Meki (Lot 1)	1269	6879	218	1308	1051	5571
Meki – Zeway (Lot 2)	801	5767	84	504	717	5263
Zeway- Arsi Negele (Lot 3)	651	4,103	33	200	618	3,903
Arsi Negele - Hawassa	853	7281	117	700	112	6581
Total	3,574	24,030	452	2,712	2,498	21,318

[1] Partially affected people include those losing strip of farm land, but able to continue living with the remaining land holding after being compensated for loss of crops, trees, forgone benefit, etc.

Modjo-Hawassa Expressway Design-Build Road Project

Lot 4: Arsi Negele-Hawassa

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LIST OF ACRONYMS

%	Per cent
(O)BoLEP	(Oromia) Bureau of Land and Environmental Protection
^{0}C	Degree Celsius
ARCCH	Authority for Research and Conservation of Cultural Heritage
ARV	Anti-Retroviral
ASLNP	Abijata Shala Lakes National Park
BoA	Bureau of Agriculture
BoH	Bureau of Health
BoQ	Bill of Quantities
BP	Bank Policy
COMESA	Common Market for Eastern and Southern Africa
CRGE	Climate Resilient Green Economy
CSE	Conservation Strategy of Ethiopia
DS	Design Standard
EA	Environmental Assessment
EEPCo	Ethiopian Electric Power Corporation
EIA	Environmental Impact Assessment
EIE	Ethio-infra Engineering
EIS	Environmental Impact Statement
EMU	Environmental Monitoring Unit
EPA	Environmental Protection Authority
EPC	Environmental Protection Council
EPE	Environmental Policy of Ethiopia
ERA	Ethiopian Roads Authority
ESIA	Environmental and Social Impact Assessment
ESM	Environmental and Social Management
ESMP	Environmental and Social Management Plan
ESMT	Environmental and Social Management Team
ETB	Ethiopian Birr
Etc.	et cetera
ETP	Education and Training Policy
EWCA	Ethgiopian Wildlife Conservation Authority
EWRMP	Ethiopian Water Resources Management Plan
FDRE	Federal Democratic Republic of Ethiopia
GEF	Global Environment Fund
GHG	Greenhouse Gas
GPS	Global Positioning System
GTP	Growth and Transformation Plan
ha	hectare
HAPCO	HIV/AIDS Protection and Control Office
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HSDP	Health Sector Development Program
IBA	Important Bird Area
ICS	Interconnected System
IEC	Information, Education, Communication
IFC	International Finance Corporation
ITCZ	Inter Tropical Convergence Zone
IWRM	Integrated Water Resources Management

KAP	Knowledge, Attitude and Practice
Km	Kilometre
m	Meter
M&E	Monitoring and Evaluation
MARP	Most at Risk Population
masl	Meters above sea level
MDG	Millennium Development Goal
MoFED	Ministry of Finance and Economic Development
MoME	Ministry of Mines and Energy
MoWE	Ministry of Water and Energy
NAP-GE	National Action Plan for Gender Equality
NBP	National Biodiversity Policy
NGO	Non-government Organization
No.	Number
OI	Opportunistic Infection
ONRS	Oromia National Regional State
OP	Operational Policy
PAP	Project Affected People
Para.	Paragraph
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PLC	Private Limited Company
PMTCT	Prevention of Mother to Child Transmission
Proc.	Proclamation
Qt.	quintal
RAP	Resettlement Action Plan
RE	Resident Engineer
REA	Regional Environmental Agency
RoW	Right of Way
RPF	Resettlement Policy Framework
RRA	Rural Roads Authority
RRNDSP	Regional Road Network Development Study Project
RSDP	Road Sector Development Program
RVLB	Rift Valley Lakes Basin
RVLBIRMPS	Rift Valley Lakes Basin Integrated Resource Management Plan Study
SDPRP	Sustainable Development for Poverty Reduction Program
SEP	Site Environmental Plan
SNNPRS	Southern Nations Nationalities and Peoples Regional State
SRH	Sexual and Reproductive Health
STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infection
SWC	Soil and Water Conservation
TV	Television
VCT	Voluntary Counselling and Testing
VEC	Valued Environmental Components
WAO	Women's Affair Office
WB	World Bank

EXECUTIVE SUMMARY

INTRODUCTION

Background

Road infrastructures play a key prominent in the social and economic wellbeing of a society. The existing Modjo - Hawassa road is providing service for mixed traffic, motorized and non-motorized means of transport which significantly reduced its efficiency and also results in accidents that result in loss of human life and resources. The traffic flow on the project road has manifested a marked increase over the last eight years with average annual growth rates between 11 and 13%. Furthermore, the traffic trend and transport demand study foresees a significant increment of traffic in the coming years which cannot be accommodated by the existing road. The traffic volume projection for the year 2030-34 revealed that it will be over 10,000 as compared to the present average 3,000AADT. Congested traffic in urban sections also results in a high level of pollution from poorly controlled exhaust gases. The existing Modjo - Hawassa asphalt road failed to sustain the growing traffic flow rate and axle load volume, long haul and local transport demands as well as social and ecological safety rules. Most of all, the growth and transformation strategy which is formulated to bring about fast economic development in the country and the increasing economic development in the recent years requires an improved & modern road and transport system to carry agricultural inputs, products, raw materials and industrial products.

The other important aspect of the Mojo -Hawassa road is that it is part of the Trans-African Highway, the Cairo-Gaborone-Cape Town highway, the longest amongst the Trans-African highways covering a total of more than 10,000km and linking Addis Ababa with Kenya and the port of Mombasa. The Kenyan section from Moyale to Isilo and Nairobi is under rehabilitation and thus the rehabilitation of the Ethiopian part will complete the upgrading/rehabilitation of the link Addis-Mombasa. The Modjo –Hawassa road project is a continuation of Government efforts to improve the standard of Trans-East African Highway as a member of COMESA countries and its import-export corridors to minimize the cost of its transit traffic. The proposed Modjo-Meki which is part of the Moddjo-Hawassa road has also quite significant national and international tourist flows using the road to visit important tourist attraction sites in SNNPRS and ONRS; the known destination are ASLNP and generally the lakes strip that include Hawassa, Zeway, Shalla, Langano and Abyata. The proposed road project will give momentum to the already accelerating tourism industry.

Feasibility study and detailed design has been undertaken by Techniplan International Consulting firm. The Design Consultant identified and assessed three alternative options (Option 1 Expressway, Option 2 Dual carriage Highway and Option 3 Full Upgrading of existing road) that envisage different design standards and technical parameters.

The proposed Lot 4 Arsi Negele-Hawassa Road Project is part of the overall Modjo-Hawassa Road Project. The Project starts 3 kms south of Lanagno lakes east of the existing Modjo-Hawassa road and crosses the exsting road at nearly 4km from the start location and traverses west side of the existing road at 3-4km west of Arsi Negle and Shahemene towns and terminates before Tiku Wiha village connecting the expressway with the Hawassa Hageremariam road with at grade intersection (roundabout). The concept design for this section shows this Lot has a design length of 51.48km.

Depending on the level of intervention, the project falls under Schedule I according to EPA environmental guideline hence requires full ESIA. This document presents summary findings of

the ESIA study conducted for Lot 4 Arsi Negele-Hawassa Section so as to support and assist decision making.

Objective of the ESIA Study

Environmental consideration and study is part of the overall project study and design from the very start and the main objective of the ESIA study are:

- Establish baseline environmental data of the project road and surrounding environment, including physical, ecological, socio economic and any other relevant factor;
- Make a comparison among the alternative options and routes with regard to the environmental consequences and indicate the option with lesser adverse environmental impacts for the road project implementation;
- Alert project affected communities and residents as well as planners and decision-makers to the likely positive and negative impacts and ensure that human values and concerns are receiving proper attention and consideration during the design, construction and implementation of the project road;
- Undertake environmental and social impacts assessment and analysis to identify impacts (positive and negative) and propose mitigation and enhancement measures to be incorporated in the design and construction activities of the project road;
- Carry out public consultations to identify the stakeholders interests and concern, find alternative solutions for any potential social impacts and to discuss on the potential social benefits accruing from the construction of the project road;
- Prepare an environmental mitigation management plan and an environmental monitoring plan along with indication of the required implementation cost estimates and responsible implementing agencies; and
- Indicate environmental training and induction requirements for Ethiopian Roads Authority (ERA) personnel, Construction Contractor, sub-contractor and other stakeholders responsible

ESIA Study Methodology

The methods used for the ESIA study include collection and review of relevant documents including policy, previous study documents, use of satellite imagery, Google Earth, onsite environmental investigation, consultation with stakeholders and undertaking the environmental impact assessment. The methodology adopted for the study briefly described as follow:-

- Collect and review relevant policy and study documents: The most important policy documents include Environmental Policy of Ethiopia (1997) Environmental Impact Assessment Proclamation No 299/2002, Wildlife Development Conservation and Utilization Proclamation (Proc 541/2007). These documents provide national policy proclamation regulations that the proposed project has to integrate with or adjust accordingly. Environmental and 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 and requirements.. Relevant previous study documents were also collected and reviewed and among these are the RVLBIRMPS (MoME 2010) the Bird study by Hilman 1993 provides important

information to establish biophysical baseline environment in the road project area which are related to water resource, water quality, natural vegetation, wildlife, birds etc Appendix 1: reference shows a compressive list of reviewed documents.

- Onsite environmental assessment: Environmental assessment has been undertaken in both dry and wet season (February, March and August). During site visit data collection was done both from primary sources and secondary sources for base line environmental situation assessment. Site visits were conducted by travelling along the potential alternative routes proposed for evaluation.

- The site visit was supported by use of top map (1:50000 scale) and also taking pictures of environmental features falling in the project road influence area. GPS also used to locate/mark important crossing points for local people and animals.

- Consultations with the public and other stakeholders: Consultations with the public and relevant stakeholders were conducted at a number of towns along the road corridor sideways. Local administrations and relevant institutions were contacted and involved in data collection, during discussion sessions and for coordination of the various public consultations. Discussions and briefings on the project objective, the possible impacts of project implementation, cooperation needed from the municipalities, Wereda administrations and from the community were raised and discussed. Discussion and consultations were made with ERA which includes the Planning and Programming Management Directorate, Environment and Social Management Team and Design and Build Contract Management Directorate ROW Teams so as to understand environmental responsibilities of the various organs for implementation of the proposed EMP. The consultations were further extended Modjo town administration. The various consultation help to alert project affected communities and residents as well as planners and decision-makers on the likely positive impacts and negative consequences, and ensuring that sensitive environment and protected areas as well as human values and concerns receive proper attention and consideration during the design, construction and implementation of the project road.

- Liaison with study team professionals including the socio economist, the highway design engineers, the material engineer and surveyors so as to undertake discussion and exchange of data. The necessary environmental input was then forwarded to the design engineers such as consideration and location of underpasses for people and animals, avoidance of alignment and construction sites in Koka swamp area etc.

- Use of satellite imagery (2008) and use of Google Earth to support establishment of baseline environment along the various alternative route corridor.

- Environmental and social impact assessment: An environmental and social impact assessment (ESIA) continued following the establishment of the existing baseline environmental conditions and development of the road project options and associated components. Environmental scoping conducted for identification of major impacts for each road alternative and support comparison of alternative. The potential environmental impacts of the proposals during the construction and operation phases and the likely mitigation and monitoring measures were analyzed. The proposed options were overlain on the existing environmental features graphically and an impact checklist/matrix approach was used to identify the significance of any residual impacts following mitigation. Environmental Management and Monitoring Plans are also prepared including parameters to be monitored and managed, responsible implementing agency, and cost estimate.

POLICY LEGAL & ADMINISTARATIVE FRAMEWORK

Development programs and projects should comply with the Country's prevailing policies, legislative and institutional frameworks and standards for proper execution and implementation. Knowledge of the policy and legal frameworks within which the project is going to be implemented would facilitate the project performance and helps to ensure sustainable development. There are several policy and legal documents both at federal and regional level regarding environmental management and development projects. Therefore, as part of the ESIA study, relevant national policy and legal framework as well as financier funding procedure were collected and reviewed in context to the proposed road project implementation & sustainable service. In addition, this ESIA is consistent with international standards, including those of the IFIs.

Among the relevant policy strategy and programs are the Conservation Strategy of Ethiopia (CSE 1996), Environmental Policy of Ethiopia (EPE 1997), the Growth and Transformation Plan (GTP 2010), Water Management Policy (1999), Biodiversity Policy (1998), Wildlife Policy (2006), Health Policy (1993), Policy on HIV/AIDS (1998), Policy on Women (1993), Population Policy (1993), Education & Training Policy (1994), ERA's Policy on HIV/AIDS (2004), Road Sector Development Program (RSDP 1997) and Resettlement Rehabilitation Policy Framework (2006).

The Constitution of (FDRE 1995) is the umbrella that govern all laws in the country and among the most relevant legislative frameworks related to the proposed road project implementation include Proclamation on Establishment of Environmental Protection Organ (Pro No 295/2002), Proclamation on Environmental Impact Assessment (Pro No 299/2002), Proclamation on Pollution Control (Pro No 300/2002), Proclamation of Public Health (Proc 200/2000), Expropriation of Land Holding for Public Purposes and Payment of Compensation (Proc No 455/2005), National Rural Land Administration and Use Proclamation (Proc No 456/2005), Proclamation on Development Conservation and Utilization of Wildlife (Proc 541/2007), Regulation on Development Conservation and Utilization of wildlife (Regulation No 163/2009), National Proclamation on Water Resource Management (Proc No 197/2000), Regulation for Wildlife Development Conservation and Utilization (Reg. No 163/2009), Regulation on Compensation Procedure (Reg. No 136/2007), Proclamation for Conservation of Cultural Heritage (Proc. No 209/2000). Relevant procedural guideline and standards prepared by Environmental Protection Authority (EPA) and Ethiopian Road authority (ERA) were also collected and used during the ESIA study including Environmental and Social Management Manual (ERA 2008), Environmental Impact Assessment Procedural Guideline (EPA 2003).

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DESCRIPTION & ANALYSIS OF ROAD PROJECT ALTERNATIVE OPTIONS & ENVIRONMENTAL SCOPING

The proposed Lot 4 Arsi Negelle-Hawassa Road Project is part of the overall Modjo-Hawassa Road Project which is divided in to two Lots to facilitate implementation process. Three alternative route options have been considered for the project and this section provides description of these alternatives and associated major environmental impacts.

Summary description of alternative options

- ✓ **The Expressway (Option 1)**

The typical activities and component of the expressway option with regard to Lot 4 Arsi Negelle-Hawassa Road Project are:-

- Have dual carriageway 2 lanes each having 3.65m width, median of 9m (area separated) and paved/unpaved shoulders on inner and outer side.
- Construction of underpasses, overpass, grade separated access / interchange and link roads to connect with main urban centers
- Require construction of new bridges
- Development of ancillary works which include signage, safety facilities, landscaping, access, material sites (borrow/quarry), camp, material storage etc
- fencing
- Development of ancillary works which include access, material sites (borrow/quarry), camp, material storage etc

✓ **Dual Carriageway Highway (Option 2)**

This option follow the same route to that of the expressway option, the main difference with the expressway is related to the design standard, reduced structures and volume of earthwork as well as modification of route alignment in the three lakes region and the last section near Hawassa which avoids direct interference and impact on environmental sensitive and protected areas.

The main activities and component of the new Highway with regard to the Project are:-

- Dual carriageway two lane of 3.65m width on each carriageway, median of 9m (area separated), paved shoulder and unpaved shoulder on inner and outside.
- Development of ancillary works which include access, material sites (borrow/quarry), camp, material storage etc
- Unlike to the expressway, this option has no overpass, no separated grade interchanges and no fencing.

✓ **Full Upgrading (Option 3)**

The Full Upgrade Option starts at the outskirt of Arsi Negelle town, and follows the exiting asphalt road and terminates at Hawassa town. The main components and activities by this option are:

- DS-1 standard, two carriageway and the ROW expands from 30 to 50m
- The by-passes are the major deviation from the existing route and will be provided along the interurban sections of towns such as Shashemene.
- Upgrading of the existing crossing and construction of new crossing
- It traverses more or less similar biophysical features to that of the existing route since its alignment will be laid along the existing road route, except for the bypasses around towns.
- Development of ancillary works including detour, access and material sites (borrow/quarry), camp, material storage etc

ENVIRONMENTAL SCOPING OF THE PROJECT ALTERNATIVE OPTIONS

Environmental scoping has been carried out with the objectives of determining the Road Influence Area (RIA), identifying Valued Ecosystem Components (VEC) in the project area,

justifying the needs for the project and defining potential impacts expected from implementation of the different options. Method used for the purpose include site visit, discussion and consultation with stakeholders, review of previous study reports, liaison with specialist in the study team, use of Google Earth satellite imagery (2003) and GIS.

a) Valued Major environmental impacts with Option 1 Expressway

- **Perennial streams:** Traverse main perennial rivers like Awade, Dedeba, Dedeba, rivers and therefore require construction of new one way bridges that fit the standard.
- **Natural vegetation:** scattered indigenous Montana forest trees along the expressway corridor, especially the section between Arsi Negele and Shashemene.
- **Areas prone to erosion:** Slope gradient and land degradation condition is relatively higher as compared to the existing road route. Steep slope cultivation without Soil and Water Conservation (SWC) measures, as well as the proposed road construction related activities may increase soil erosion and land degradation in these area. The expressway option traverses through rugged topography and involves quite large excavation and movement of earth material hence it is likely to result in soil erosion and sedimentation.
- **Agricultural land:** agriculture (crop and livestock production) is the main economic activity rural people along the expressway road corridor. This option requires significant loss of productive agricultural land for opening of the new dual carriageway pavement ROW (90m) and also link roads with 50m ROW.
- **Rural villages and population:** The expressway is expected to result in more adverse impact to the rural population activities such as loss of temporary and permanent productive agricultural land taking, increased pollution and health risk from various construction activities, creation of barriers to human and animal movement and so on. The direct adverse impact would affect the rural administrations in the Oromia National Regional State.
- **Seasonal flood plain and wetland:** The expressway route revised to traverse west side of the existing road to avoid interference with Cheleleka swamp and surrounding flood plain at the Hawassa.

- **Rural villages and population:** The expressway is expected to result in more adverse impact to the rural population activities such as temporary and permanent productive agricultural land taking, increased pollution and health risk from various construction activities, creation of barriers to human and animal movement and so on. The majority of the direct adverse impact would affect the rural administrations in the Oromia National Regional State as over 95% of the road corridor falls in the region. The last section of the road which creates connection with the road network falls in Hawassa town, capital of the SNNPRS.
- **Urban centres & population:** The town population and the municipalities can be benefited and also dis-benefit from the expressway road option construction and operation. The road operation also contributes significantly to reduced accident rates, reduced atmospheric pollution vehicular emission and noise in these urban centres.

Overall, the expressway option will have major adverse impact on water resource including traversed rivers, swamp and nearby lakes, major clearing of the remnant acacia woodland and Monetna trees, major adverse impact on environmentally sensitive sites/protected area, major adverse impact on soil and erosion, major

adverse impact on agricultural land (crop cultivation & grazing), major adverse impact on rural settlements traversed by the expressway corridor

b) Valued Ecosystem Components & Major environmental impacts with Option 2 New Highway

The Environmental valued components & identified major impacts for the Dual Carriageway (Option 2) are similar to that of the Expressway (Option 1) since it follows the same route alignment corridor.

Valued Ecosystem Components (VEC) and major environmental impacts by the new highway Option 2 are:

- **Perennial streams:** Traverse main perennial rivers and therefore require construction of new one way bridge
- **Natural vegetation:** indigenous Montana forest trees along the dual carriageway route corridor especially the section between Arsi Negele and Shashemene.
- **Areas prone to erosion:** Slope gradient and land degradation condition is relatively higher as compared to the existing road route. Steep slope cultivation without SWC measures, as well as the proposed road construction related activities may increase soil erosion and land degradation in these area.
- **Seasonal flood plain:** The dual carriageway route is modified in the last section and aligned outside of the potential swamp and hence no major direct adverse impact anticipated on the sensitive environment of Cheleleka swamp.
- **Agricultural land:** agriculture (rain fed crop and livestock production) is the main stay to the rural people along the road route corridor. This option requires significant loss of productive agricultural land for opening of the new dual carriageway pavement ROW (90m) and also link roads with 50m ROW.
- **Rural villages and population:** the whole of the new dual carriageway route is to be laid in sparsely populated rural villages whose livelihood is exclusively dependant on agricultural production. This option has significant effect on rural houses, and majority of them are located rural administrations of the Oromia National Regional State.
- **Urban centers & population:** The road construction may not result in displacement disturbance of the town population from land take, increased dust level etc since it depart from the existing road route. The road operation also contributes significantly to reduced accident rates, reduced atmospheric pollution vehicular emission and noise in these urban centres. The dual carriageway may take significant traffic volume that used to stop in the various urban centers for food, shopping etc; this could be considered to have an adverse impact to the local economy existing towns.

Overall, the new highway option will have major adverse impact on water resource including traversed rivers, swamp and nearby lakes, major clearing of the remnant acacia woodland and monetna forest remnant trees, major adverse impact on soil and erosion, major adverse impact on agricultural land (crop cultivation & grazing), and major adverse impacts on rural settlements traversed by the new highway corridor.

c) Valued Ecosystem Components & Major environmental impacts with Option 3 Upgrading of exiting road

Valued Ecosystem Components and major environmental impacts identified by the Upgrading Option 3 are:-

- **Perennial streams:** Traverse main perennial rivers and therefore require construction of new one way bridge
- **Urban greenery and road side trees:** Urban greenery and roadside trees in the main urban centers like Arusi Negele, Shashemene etc are not in the project influence area since the Full Upgrading option envisages construction bypasses to these main urban centres.
- **Acacia woodland and remnant forests:** Presence of dense acacia woodland was reported in most of the central Rift Valley some 30-40 years back however, the majority of the natural vegetation is already deforested and the land is diverted to crop cultivation. Widening of the exiting road route will affect the dense acacia woodland located along the exiting road route due to widening of the exiting alignment.
- **Agricultural land:** agriculture (rain fed crop and livestock production) is the main stay to the rural people and major adverse impact on agricultural land can be encountered due to the road widening, town bypasses and other main and ancillary works.
- **Rural villages and population:** The rural population lies east and west of the existing road. The adverse impact is land take (agricultural land) due to road widening; the significant benefit goes to reduction in accidents rate, transport facilitation and contribution to rural economy improvement.
- **Urban centres & population:** during the upgrading construction phase, impact both negative and positive can be resulted in the main urban centers like Arsi Negeleand Shashemene etc in relation to the construction activities and workforce. The by-passes will also have both positive and negative impacts; specifically related to reduced accidents, reduced atmospheric pollution due to vehicular emission and noise in the urban centres. The by-passes may divert a significant traffic volume that used to stop in the various urban centres for food, shopping etc; so they could be considered to have adverse impacts to the local economy.

Overall, the upgrading option will have major adverse impact on environmentally sensitive sites/protected., major adverse impact on soil erosion, major adverse impact on scattered rural settlements traversed by existing road corridor.

Table E.2 Summary of environmental impacts & comparison between alternative Options

Impacts	Option 1 Expressway	Option 2 Dual Carriageway	Option 3 Full Upgrading	Option 4 Do Nothing (base scenario)
Permanent loss of land for establishing link roads, ROW etc.	1,825ha	1,825 ha	755ha	0
Temporary loss of land for quarry, camp, detour etc.	125ha	125 ha	50ha	0
Benefit to the local economy	+	+++	+++	++
Benefit to the national economy benefit	+++	+++	+++	+
Change in fuel consumption and level of vehicular	+++	++	++	---

Impacts	Option 1 Expressway	Option 2 Dual Carriageway	Option 3 Full Upgrading	Option 4 Do Nothing (base scenario)
emission				
Loss of protected conservation area, ASLNP	Nil	Nil	Nil	Nil
Important habitats as seasonal food plain, lakes and wetlands	- -	-	-	-
Clearing of vegetation, acacia woodland and savanna for ROW and other construction activities	187ha	187ha	50ha	0
Impact on fauna, wild animals and birds due to direct and secondary effect on the other lakes	- - -	-	-	--
Loss of esthetic value	-	-	Nil	Nil
Change of storm water runoff due to road embankment, gradient	- -	- -	-	-
Soil erosion and sedimentation	- -	- -	-	-
Air pollution from dust and gas emission to the atmosphere during construction	---	--	--	---
Air pollution from dust and gas emission to the atmosphere during operation	+++	++	++	---
Increased noise level during construction and operation	-	-	- -	Nil
Water pollution from project construction and operation	-	-	-	-
Loss of agricultural land, mainly cropland	1983ha	1983 ha	878ha	0
Damage to cash crop irrigation fields	Nil	Nil	-	-
Impact from influx of labor force	- -	- -	- -	Nil
Disturbance to urban centers and loss of public service and facilities, private investments	-	- -	- -	0
Local employment benefit during construction and operation	+++	+++	+++	0

DESCRIPTION OF THE NEW DUAL CARRIAGE HIGHWAY (LOT 4)

Location

The proposed road project starts at a point located at km 150 (3 km south of Langano lake) and terminates at km 201.48 at the southern exit of Hawassa city, capital of SNNPRS before Tikur Wuha village. The road corridor entirely traverses two administrative weredas in the ONRS (Arisi Negele and Shashemene).

Project standard components & structures

The proposed Lot 4 Arsi Negelle – Hawassa Road Project has DS-1 standard construction of 4lane dual carriageway, a length of 51.48kmand 90m ROW.

The project road also requires new construction of drainage structures, underpasses, overpass bridges, support structures such as retaining walls, terracing in potential sliding degraded and rugged terrains and road ancillary works. Link roads will be constructed at locations where access to existing towns is required.

Environmental considerations have been taken into account while establishing the new road route in protected area or environmental sensitive area that are located in the project influence area.

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 over 95% 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.

There is no protected area like national park or wildlife reserve in this section, hence no adverse impact expected or consideration required by the project.

BASELINE ENVIRONMENT FEATURES

The baseline environmental features in the project area are briefly presented under three parts, namely physical, biological and socio economic environment.

Physical Environment

Topography

The road project is located in the central Rift Valley which is characterized by flat land and depressions that formed the lakes, run off from the highlands drains through stream channels. Generally, the elevation in the road project area ranges from 1600masl to 2000masl. The topography along the project road route is dominantly flat plain, about 66% of the route is characterized by a slope gradient <3%, whereas 32% displays a slope gradient between 3 and 5%. The streams crossing the road corridor originate from hilly and mountainous areas in the road project surroundings. The new dual carriageway route differs from the existing route and most of the road corridor will be aligned west of the existing road route where the land is relatively elevated and with high slope gradient.

Climate

The project is located in a warm temperate zone and the mean daily temperature ranges from 12.5°C to 31.5°C area-wide, with 6.6-21°C excursion in Modjo and 8-31°C in Hawassa. Annual rainfall varies from 750mm to 1250mm area-wide increasing from 875mm at Modjo to 1,100mm in Hawassa. Two rainy seasons are experienced annually, the main rainy season lasts from the end of June to the end of September, the lesser rainy season from the end of February to the middle of May, the rest of the year being generally dry.

Soil and geology

The subgrades of the soils in the project area are largely alluvial and lacustrine in origin and are often underlain by thick deposits of volcanic ash and pumice. There are also soils derived from the in situ weathering of mainly acid volcanic parent rocks and are therefore residual to a very large extent. Dark expansive soils (vertisol) are observed covering less than 10% of the road route and are located mainly around Tikur Wuha River. The soils in most part of the road corridor are light reddish and light gray soils with varying proportions of sand gravel silt and clay, and they are dominantly used for crop cultivation.

The project road crosses mainly Quaternary Deposits and Rocks of Volcanic Origins. The geology in the project road route corridor is made of two litho-stratigraphic units, the first is made of Alluvial and Lacustrine Deposits with Volcanic which consist mainly of sand, silt and clay with thick deposits of Volcanic Ashes and Tuff. The geology in the remaining road segment consists in Ignmbrite with ash flows, Pumiceous Tuff and unwelded Tuff.

Water resource and quality

The road project road traverses through exclusively in the Rift Valley Lakes Basin (RVLB). Generally, rivers with perennial flow are scarce and the main rivers traversed north to south by the road project include Werkelo, Awda, Tiliku Dedeba and Tinish Dedeba. The expressway requires construction of new bridges along the above rivers to be located few kms upstream or downstream of the existing bridges along the existing Modjo-Hawassa road.

Land use and vegetation cover

The land use and land cover along the project corridor is established through use of Google Earth, satellite imagery, onsite observation and checking, supported by information obtained from previous studies. Prevailing land uses include crop cultivation, acacia woodland, and scattered remnant trees of Montana forest. The majority of the proposed road route corridor (85.8%) traverses in smallholder mixed crop cultivations (main crops being Maize, Sorghum, Wheat, Pulses, Pepper etc) in sparsely populated rural settlements. The road corridor in the final section (102-109km) falls in the private agricultural investment of Shalow Cattle Farm. The proposed dual carriageway road route corridor section falling in between the three lakes (Langano, Abijata & Shalla Lakes), from 30- 50km, traverse in relatively dense acacia woodland which is found in the ASLNP surrounding area. The route corridor between km70 – 90km traverse in Montana Forest vegetation with scattered rare trees species left in farm land.

The new dual carriageway road passes through sparsely populated rural village settlement with very limited service and infrastructure. The new dual carriageway will cross main roads, people and livestock paths and community roads (mud), regional roads (gravel), and also the existing Modjo – Hawassa asphalt road (at one location).

Soil erosion gullies and land degradation

Soil erosion and land degradation features are related with land use and slope gradient, inherent soil characteristics and other human interference. The proposed road project corridor mainly follows a flat plain topography and hence soil erosion and land degradation may not be considered as a problem. However, soil erosion is observed at some locations along the route as between Shashemene and Hawassa, and also stream channels used as cattle path for watering and grazing, especially to the lakes and surrounding floodplains. On the other hand erosion and silitation can be caused by construction activities or improper land use in the upper catchments, leading to blocking of drainage and pipes followed by flooding. Spread silt from the surrounding highland contributes to maintain land productivity in the plains.

Small portion of the proposed dual carriageway route corridor traverses degraded and erosion hazard area and hence require rehabilitation measure and promote proper land use and SWC measures in the micro catchments area.

Biological environment

Flora

Terrestrial habitat in the road project area is associated with the type of vegetation available and human interference. The vegetation types encountered in the project road influence area include Acacia woodland in combination with savanna, Dry evergreen Montana forest and Riverine vegetation. The acacia woodland is typical of the central Rift Valley and is the dominant vegetation cover along the project area. The Dry evergreen Montane forest mainly occurs between Arsi-Negelle and Shashemene. People usually leave some of the indigenous tree in their farm. Road route ROW for the dual carriageway will result disruption of trees falling in the Montna forest. The Riverine vegetation is more pronounced along Bulbula and other streams with noticeable perennial flow.

Fauna

The natural vegetation used to be an important habitat for wildlife, but the numbers of species and individuals have declined with the extensive change of land use to crop production. The wildlife population and diversity in the project area is very limited. According to the relevant wereda agriculture offices the main wildlife species that can be observed sporadically are Snakes, Monitored Lizard, Hippopotamus, Warthog, Greater Kudu, Baboon, Porcupine, Wartoug, Pig, Hayna, Common Bushbuck and Hare. Various bird species were observed during the site visit around the lakes Zeway Abijata & Hawassa, and the swamp near Tikure Wuha River. Encroachment of the National Park by farmers and conversion of Acacia woodland to farmland has also significantly reduced terrestrial habitats.

Socio economic environment

Project affected weredas

Lot 4 is 51.48 km in length affecting the following two weredas and a city found in two zones and two regions. The Project Road is located in Oromia Region, West Arsi Zone, Arsi Negele and Shahsemene Zuria woredas.

Demographic Characteristics

The total population in the project affected weredas is 1,028,237 out of which the dominant majority (63.5%) lives in the rural areas. Arsi Negele wereda is the most populous wereda followed by Shashmene Zuria is the least populous wereda.

The sex ratio of the affected weredas is 101 which indicate a higher proportion of male population. The distribution of sex ratio among the weredas is uneven.

Economic activities

The area of influence is characterized by intensive cultivation with low productivity. The shortage of arable land is a key factor, leading to average household landholdings as low as 1.2 ha. In most of the weredas, a large proportion of the households cultivate less than 1 ha of land which is greater than 0.5 ha of land that represents the minimum requirement to fulfil the food needs of an average household for a year.

The total cultivated area in the project affected weredas was 105,946 hectare and the total volume of crop production was around 3 million quintals in the year 2009 (refer Table 4.17). In the year indicated about 16,601 ql of chemical fertilizer and 2,776 quintals of improved seeds were distributed to the farmers in the area.

Arsi Nagele is considered a food self-sufficient area yet there are households that experience food insecurity problems. The severity of the problem varies from year to year depending on rainfall conditions. It also varies from village to village as a result, villages are not equally vulnerable to drought.

Livestock is an integral part of the farming system in the project area and are economically complementary to crop production. It provides fertilizer for crops and to a lesser degree, it supplies milk, meat, cash income and serve as an investment against risk for rural households. In times of famine, livestock is sold to purchase food.

Tourism

Lake Hawassa and the town of Hawassa itself are the potential tourist destinations in the Project Area.

PUBLIC & STAKEHOLDER CONSULATION

Consultations with project influence area residents in general and project affected people in particular have a paramount importance in having smooth field level activities related to the road project task.

On this basis, consultations with PAPs and local Authorities were conducted at different locations and level

The majority of the affected population was aware of the project and about the need for resettlement and the consultation revealed a high degree of support for the project.

During the discussions, the consultant's team gave briefings on safeguarding measures that ensure that PAPs receive fair compensation.

POTENTIAL ENVIRONMENTAL IMPACTS

Beneficial impacts

The main beneficial impacts with implementation of the project road are the following:

- Economy: The project road will result in significant positive contribution to regional and national economy following adequate, safe, cost effective and reliable transport service by the project. A considerable reduction in vehicle operating costs is anticipated once the project has been implemented. Businesses and communication between regions and most importantly import and export from the central part of the country to Djibouti through Hawassa will be facilitated and strengthened.
- Agriculture: Construction of the road will enhance agricultural development as the local people will be encouraged to produce more because of the opportunity to have easy access to markets;
- Reduced air pollution/emission: The proposed new dual carriageway highway will contribute to reduction of air pollution from vehicular emission since it diverts traffic from densely populated urban road sections (like Arsi Negele and Shashemene) where it causes adverse effects like pollution, accident risk and inefficient transportation.
- Create employment opportunity to local communities: The youth and women residing in the project area will benefit from the employment opportunities created due to the construction of the road which may extends for three years.
- Creation of income generating activities: It will increase non- agricultural employment opportunities for local communities Businesses such as shops, catering services (or small bars and restaurants) located along the project road and near construction camps could earn additional income due to the presence of large numbers of construction workers. The opportunity for generation of income may continue during the project operation phase as long as availability and provision of other services like water supply, electricity etc prevails along the new route.
- The road will solve administrative and security problems as government officials will have easy access to the areas;
- It will reduce travel time to woreda towns;
- It will improve access to market, health and school facilities.

Adverse impacts

The adverse impacts anticipated with implementation of the project are:-

- Effect on soil: the effect of construction on soil can be related to soil erosion, compaction and soil contamination due to the various construction activities including construction machinery operation.
- Effect on air quality: adverse effect on atmospheric air quality expected due to increase in air particulate matter (dust) and gaseous emission expected due to construction activities and operation of machineries
- Noise and vibration: Noise and vibration result from construction activities in general but particularly from operation of heavy machinery, especially in densely populated rural settlement and while passing through/crossing urban centres.
- Climate change impact: increased atmospheric temperature, high rainfall and floods expected due to effect from the global climate change and mitigation measure to be included in the road structures design.
- Deterioration and pollution of water source: induced/increased soil erosion by construction activities, chemical/oil spillage, waste from camp and garage sites can result in pollution of water source located in the road construction influence area.
- Clearing of vegetation: Opening of new pavement and other construction activities require clearing of vegetation/tree in the sparse to dense acacia woodland (especially in the road route section around Arsi Negele) and clearing of remnant trees of Montana forest (especially in the road route section between Arsi Negele to Shahemene).
- Effect on important habitat and wildlife: The project road traverse area of important wildlife habitat and inhibit various wildlife species including birds. Construction activities in and around these area will affect the wildlife habitat flora and fauna.
- Expropriation of property and land: Loss of farmland on temporary and permanent basis because of possible realignment, detour, quarry sites, access roads and campsites. Demolishing of housing units including permanent property in residential areas. Therefore, expropriation of land and property will be required for establishment of the new dual carriageway and the main land uses to be affected are smallholders cropland and rural settlement tukules.
- Effect on existing town and local economy: The main purpose of the project is to support the fast economic growth of the country by providing efficient transport service and at the same time improve efficient transport on the existing road by diverting the traffic.
- Competition for water by the project: Requirement for safe water supply and sanitation for construction employees may compete with the limited available water supply sources of the rural community.
- Health effect including HIV/AIDS: The various construction activities including operation of heavy machineries result in deterioration of air quality (dust/emission, noise), affect local water sources which ultimately affect health of the local people in and around construction sites. Malaria problem can be increased due to creation of conducive habitat through development of borrow sites and other construction activities. Influx of construction labour force during the project construction phase may result in the spread of commercial sex, HIV/AIDS and other communicable diseases in the project areas.
- Road safety issue: road safety issue during the project road construction can be related to high construction traffic resulting in damage of existing roads and accident, development construction site (borrow pit, high cut and embankments, excavated land etc) can result in accident to livestock, people, and hence the need for

awareness sign and fences are put in place. Road safety during the project operation is mainly related to measures traffic operation and management along the route and most importantly to roads interfered by the dual carriageway route.

The adverse impacts can be avoided or minimized through implementation of the proposed mitigation management and monitoring measures.

ENVIRONMENTAL AND SOCIAL MANAGEMENT & MONITORING PLAN

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 purpose of an Environmental and Social Management Plan (ESMP) is to set out how the adverse environmental and social impacts identified in the environmental 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 management responsibilities are to be shared between several governmental and non-governmental organizationseach with specific executive responsibilities for particular aspects, which are exercised during the various stages of project preparation, implementation and subsequent operation and maintenance. The principal agency concerned with the environmental management is the project owner, Ethiopia Road Authority (ERA) and specifically the ESMT of ERA. 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 and maintenance division. ERA may hire contractor depending on the type and 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 Environmental and Social Management Team (ESMT) within ERA 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 management during the project construction phase lies with the project construction contractor and supervision consultant. For this purpose, the supervision consultant shall establish Environmental Management Unit (EMU) responsible for undertaking an independent monitoring and supervision of proposed environmental mitigation measures and other environmental issues during the project construction phase. The EMU should consist of environmentalist and social expert who will be actively engaged to integrate environmental supervision work with the overall project construction supervision activity and the Resident Engineer (RE). Once the construction is completed, the ESMT of ERA 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 on duty, Environmental Management Unit (EMU) as part of the overall construction supervision consultant, and the ESMT of ERA. The Resident Engineer (RE) and the environmental supervisor will prepare monthly progress reports which also highlight environmental performances of the project work and submit it to ERA. The Environmental

reports will be transmitted through ERA to the Regional and Federal EPAs, who are the overall supervising environmental institutions.

An overall supervision and monitoring of the environmental conditions and performances of the project will be made by the Environmental Protection Authorities both at federal and regional level. External monitoring can be conducted with government financing institutions like the Ministry of Finance and Economic Development (MOFED), as well as the international financing institution (WB) that will check the project performances against their funding policy and environmental guidelines.

Resettlement Action Plan (RAP)-Lot 4

Summary of impacts

A Resettlement Action Plan (RAP) has been prepared to avoid and minimize the impoverishment of Project Affected Persons (PAP) and ensure that they receive appropriate compensation and rehabilitation measures. During the preparation of the RAP, the potential positive and negative social impacts created by the construction of the project road are identified through field surveys, consultation meetings and discussions held with Project Affected Persons (PAPs), Government officials and experts. A socio economic study is carried out to identify potential impacts, identification of affected households and properties located along the route has been carried out; and also measurement of affected properties and assets was conducted.

In the Lot-4 project road corridor, there will be 853 household heads to be dispossessed from their farmland and house. Most of the affected households (98.8%) are farmers that will lose strip of their land and despite of that these farmers could continue to farm their land since what they lost is not much. This is to say that what is left could be sufficient and will allow them to continue their livelihood in the remaining plot of land; however they will be compensated for losing their crops, trees, and some other crops as per the law and the replacement cost. To compensate PAPs who have lost strip of their farmland and for the forgone benefits from farmland cash compensation is the preferred option. For those PAPs who may have lost their businesses and income sources, establishing livelihood restoration measure is required. Table below shows the list of PAPs partially and fully displaced.

Road Section	Total PAPs		People to be Displaced		Partially Affected[i] People	
	Number of House Hold	PAPs	Number of House Hold	PAPs	Number of House Hold	PAPs
Arsi Negele - Hawassa	853	7281	117	700	112	6581

Among the identified PAPs the majority (83%) are male headed households while 15%are women headed households, and 1% are institutions (public and government). The total family members of the project affected households are 7281 out of which, 5875 (80%) are male and the remaining 1406 (20%) are female. Appendix 1 provides the names of the household and institutions identified during the field survey. The name for each household head and list of affected properties, and those who may lose their businesses and income sources requiring establishing livelihood restoration measure are provided in Appendix 1 and 6 respectively.

The socio-economic survey has also identified 273 vulnerable PAPs. Vulnerable PAPs constitute of elderly men, women heads of households without labor, severely ill person, HIV/AIDs positive persons, Child headed families, the disabled, landless, etc. The names of project affected vulnerable households heads are given in Appendix 5. This project will improve their living condition through provision of access to services and facilities and livelihood restoration measures.

The construction of the project road will improve the livelihood of the local populations and will contribute to the growth and development of trade and urban centers, improvement of crop and livestock production and its marketing network. The natural resource and human resource potentials are also highly important in contributing to the development of the project area.

The review process also included checking the previous RAP for its completeness and conformity with the policies, procedures and guidelines of the Federal Democratic Republic of Ethiopia (FDRE), Korean EXIM Bank, AfDB and that of World Bank.

This RAP builds on ERA's Resettlement/Rehabilitation Policy Framework and China EXIM Bank, policy on involuntary resettlement. It is also consistent with international standards, including those of the IFIs. The preparation and content of this RAP is within Ethiopia's existing legal and administrative framework and China EXIM Bank, policy on involuntary resettlement In case of conflicts or gaps between the Federal Democratic Republic of Ethiopia (FDRE) law will prevail as the final and this RAP will be an international credit agreement between the Government of Ethiopia and China EXIM Bank.

MITIGATION MANAGEMENT & MONITORING COST

The social mitigation, management, and monitoring costs are estimated to be around ETB 95,541,181 to be financed from the Government Treasury. Resettlement and compensation for loss of private and public properties absorbs the major proportion of the total cost (95%). The remaining 5% of the budget will cover costs related to awareness creation programs on traffic safety and public health issues for the local community as well as project workforce, and social monitoring activities and training.

On the other hand, most of the physical mitigation measures will be considered in the engineering design and will be implemented as part of the construction items; thus, these will not require separate costs as they are considered as part of the engineering item and good engineering practices.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

(i) The existing Modjo-Hawassa road is providing service for mixed motorized and 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 requires an efficient road network and implementation of the proposed Arsi Negelle – Hawassa new dual carriageway project is essential in this regard.

(ii) 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.

(iii) The major adverse impacts with the project result from land take for new dual carriageway road pavement and material sites development. This will result in loss of productive agriculture land, loss of settlement house, loss of scattered trees in the acacia woodland and remnant Montana forest. Other adverse impact by the project includes erosion and sedimentation, water pollution risk, public health, HIV/AIDS. With implementation of the proposed mitigation measures and proper compensation the adverse impact can be controlled to acceptable level.

Requirements

(i) Implement the proposed environmental mitigation management and monitoring plan, and based on site specific condition update the plan.

(ii) Include the necessary environmental clauses in the project tender and construction contract document so as to ensure the implementation of the proposed mitigation measures to minimize/avoid adverse impacts;

(iii) Insure an independent environmental supervision through establishment of Environmental Management Unit (EMU) as part of the supervision consulting service. The EMU shall be staffed with qualified professionals (environmentalist and sociologist) to the effective implementation of proposed mitigation management and monitoring measures;

(iv) Integrate the project road with all concerned regional and national government development plan, among others are municipality and weredas in the project road;

(v) Undertake RAP through detail investigation of adverse impacts on the socio economic and human environment;

(vi) Strengthen the capacity of ERA ESMT to inspect proper implementation of ESMP during construction and to carry out routine inspections during the road service period;

(vii) Support the new road route micro catchment treatment and management through promoting and implementing conservation measures.

(viii) Lot 4 Arsi Negelle-Hawassa Road Project should be implemented in parallel with the other Lots of the Modjo– Hawassa Expressway Project for the overall improvement of road transport and efficiency of Modjo – Hawassa road and possibly integrate environmental management and monitoring activities.

1. INTRODUCTION

1.1 Background and Purpose

The Ethiopian Roads Authority (ERA) in association with the World Bank (WB) has allocated funds through the Road Sector Development Program (RSDP) for the *D*esign of Modjo-Hawassa Road Project which was originally awarded to Techniplan International Consulting firm. However, due to the requirement for review, ETHIO Infra Engineering (EIE) PLC was awarded the Service of which review of Environmental and Social Impact Assessment (ESIA) is one.

On this basis, the Report presents Review[2] of the ESIA conducted with the purpose to provide:

1. All the necessary information for ERA, Regulatory bodies, and Financiers to assess the proposed project in environmental and social terms; and
2. Details of environmental and social impacts, mitigation measures and costs required for the feasibility, design and construction phases.

The Design Consultant identified and undertaken analysis of three alternative options that envisage different design standards and technical parameters. Environmental and social consideration and study was one of the principal components of the overall project study and design from the very start; and environmental assessment and scoping was carried out on each of the alternatives to identify major environmental impact and concerns. The alternatives have distinct environmental and social impacts as presented in detail in this Report with consideration and analysis of the alternatives. Detail assessment & analysis have been conducted in order to prepare comparative analysis for the evaluation and decision by the client. Based on this assessment, the preferred standard for the proposed road was found to be Alternative (Option) 2– "the Dual Carriageway Highway" option– which was eventually approved by ERA. The full ESIA is therefore conducted on the selected Dual Carriageway Highway alternative[3].

The Modjo-Hawassa Road Project is divided and to be implemented in four Lots; and Lot 4 (the subject of this study) is Arsi Negelle – Hawassa Road Project (see Figure 1-1 for project location map) which starts near 3 km south of Langano Lake and traverses west of Arsi Negelle and Shashemene towns and terminates at Tikur Whia village lining with the existing trunk road (Hawassa – Hageremariam Road).

Lot 4 has a length of 51.48km and requires opening of new pavement of 4 lane dual carriageway and construction of various other road components such as bridges, culverts, and development of ancillary works. The project is therefore fall under Schedule I according to EPA environmental guideline hence require full EIA. Likewise, the project fall under Category I according to the World Bank guideline and therefore requires undertaking a full EIA.

This document presents findings of the Full EIA study conducted for Lot 4: Arsi Negelle-Hawassa Expressway Project.

[2] This Review mainly focuses on updating the previous ESIA through providing supplementing or complementing information, description, etc. to further enrich or enhance the relevance and quality of the latter.

[3]The first Option is an Expressway, Option 2 is a New Dual Carriageway and Option 3 is Upgrading of the Existing Road. They are fully described later in this Report.

1.2 Rationale for the Project[4]

It is apparent that road infrastructures play a key role in the social and economic well being of a society. The existing Modjo-Hawassa road is providing service for various slow and fast moving vehicles, mixed motorized –non motorized means of transport which significantly reduced its efficiency and also results in accidents that take away human life and in a considerable loss of resources. The traffic flow on the project road has manifested a marked increase over the last eight years with average annual growth rates between 11 and 13%. Furthermore, the traffic trend and transport demand study foresees a significant increment of traffic in the coming years, which cannot be accommodated by the existing road. The traffic volume projection for the year 2030-34 showed to be over 10,000– more than three-fold as compared to the current average of 3,000 AADT. Congested traffic in urban sections also results in high level of pollution especially due to very low efficient exhaust systems as significant proportion of the vehicle fleet is old.

The existing Modjo-Hawassa asphalt road is on the verge of being no more capable to withstand the growing traffic volume and axle load, long haul and local transport demands as well as social and ecological safety rules. Most of all, the growth and transformation strategy which is formulated to bring about fast economic development in the country and the present and ever increasing economic development in the recent years requires an improved and modern road and transport system to carry agricultural input and products, raw materials and industrial products.

The other important aspect of the proposed Modjo-Hawassa road is that it is part of the Trans-African Highway, the Cairo-Gaborone-Cape Town highway the longest amongst the Trans-African highways covering a total of more than 10,000km and linking, within its central part, Addis Ababa with Kenya and the port of Mombasa. The Kenyan section, from Moyale to Isilo and Nairobi, is under rehabilitation and thus the rehabilitation of the Ethiopian part, will complete the upgrading/rehabilitation of the link Addis-Mombasa. The Modjo –Hawassa road project is a continuation of Government efforts to improve the standard of Trans-East African Highway as a member of COMESA countries and its import-export corridors to minimize the cost of its transit traffic. The Modjo-Hawassa highway road has also quite significant national and international tourist flows using the road to visit important tourist attraction sites in SNNPRS and ONRS; the known destination are ASLNP and generally the lakes strip that include Hawassa, Zeway, Shalla, Langano and Abyata. The proposed road project will give momentum to the already accelerating tourism industry.

1.3 Scope & Objectives of the EIA study

This EIA study focus on Lot 4 Arsi Negelle – Hawassa Road Project including assessment of the baseline environment in the project road area; environmental scoping to identify major environmental impacts; consideration and analysis of alternatives; identification of impacts; development of mitigation and compensation measures and preparing an environmental management and monitoring plan for the selected road alternative option .i.e for the New Dual Carriageway Road Project. Environmental assessment and valuation will be conducted in the direct project road influence area, the project route ROW and ancillary work development sites.

The objectives of the ESIA study are:

- Establish baseline environmental data of the project road and surrounding environment, including physical, ecological, socio economic and any other relevant factor;

[4] Due to the fact that Arsi Negelle-Hawassa Project is part of the entire Modjo-Hawassa Road, descriptions on the latter that may hold true for the individual Lots are directly used; and may be encountered in different sections of this Report.

- Make a comparison among the alternative options and routes with regard to the environmental consequences, and indicate the option with lesser adverse environmental impacts for the road project implementation;
- Alert project affected communities and residents, as well as planners and decision-makers to the likely positive impacts and negative consequences, and ensure that human values and concerns are receiving proper attention and consideration during the design, construction and implementation of the project road;
- Undertake environmental and social impacts assessment and analyses to identify impacts (positive and negative) and propose mitigation and enhancement measures to be incorporated in the design and construction activities of the project road;
- Carry out public consultations regarding the potential social benefits accruing from the construction of the project road;
- Prepare an environmental mitigation management plan and an environmental monitoring plan along with indication of the required implementation cost estimates and responsible implementing agencies; and
- Indicate environmental training and induction requirements for ERA personnel, Construction Contractor, sub-contractor, and other stakeholders responsible for implementation of proposed Environmental & Social Management activities;

1.4 Methodology

The methods used for the ESIA study include collection and review of relevant documents including policy and previous study documents, use of satellite imagery and Google Earth, onsite environmental investigation, consultation with public and stakeholders and undertaking the environmental impact assessment. The methodology adopted for the study briefly described as follows:

- **Collect & review relevant policy & study documents:** The most important policy documents include Environmental Policy of Ethiopia (1997), Environmental Impact Assessment Proclamation No 299/2002, Wildlife Development Conservation and Utilization Proclamation (Proc 541/2007). These documents provide national policy proclamation regulations that the proposed project has to integrate with or adjust accordingly. Environmental and Social Management Manual (ERA 2008), Environmental Impact Assessment Procedural guideline (EPA 2003) were reviewed so as to untaken the study according to the national guidelines and requirements. Review the World Bank Safeguard Policy & guideline including the funding procedure and OP's that will be triggered by the project road implementation. Relevant previous study documents were also collected and reviewed, and among these are the RVLBIRMPS (MoME 2010), the Bird study by Hilman 1993 provide important information to establish biophysical baseline environment in the road project area which are related to water resource, water quality, natural vegetation, wildlife, birds etc Appendix 1: reference shows a compressive list of reviewed documents.
- **On-site observations:** A multi-disciplinary environment study team that include environmentalist, sociologist undertook site visit both during the dry (February. March) and wet season (August, September). During site visit, data collection was done both from primary sources and secondary sources for base line environmental situation assessment. Site visits were conducted by travelling along the potential alternative routes proposed for evaluation. For the Full upgrading option the existing Modjo-Hawassa asphalt road has been used, stopping at important environmental features like

rivers, seasonal flood plain, forest and other features. The Expressway (Option 1) and the New Dual Carriageway (Option 2) have the same route corridor which is located in few km (may vary from 2-3km) from the existing Modjo-Hawassa road. During these site visits, physical observation of the environmental settings of the alternative route corridor was done and inventory of the observations were noted. Parallel to the physical observations, consultations and interviews were also made at village centers and townships falling in the ROW of the routes. The Upgrading (Option 3) road widening will not result in major adverse impact on major towns on the existing road route which include Ejere, Alemtena, Koka and Meki since it's provided with town bypass roads around the town's outskirt. The site visit also used for identification of sensitive Valued Environmental Components (VEC) as well as the existing socio-economic situation along the expressway route corridor and influence area;

- The site visit is supported by use of top map (1:50000 scale) and also taking pictures of environmental features falling in the project road influence area. Handheld GPS also used to locate/mark important crossing points for local people and animals.
- **Consultations with the public and other stakeholders:** Consultations with the public and relevant stakeholders were conducted at a number of towns along the road corridor sideways. Local administrations and relevant institutions were contacted and involved in data collection, during discussion sessions and for coordination of the various public consultations. Discussions and briefings on the project objective, the possible impacts that can result during the project implementation, cooperation needed from the municipalities, Weredaadministrations and from the community were raised and discussed. Discussion and consultations were made with ERA which include the Planning and Programming Management Directorate, Environment and Social Management Team and Design and Build Contract Management Directorate ROW Management Teams so as to understand environmental responsibilities of the various organ for implementation of the proposed EMP. The consultations were further extended to Modjo municipality. Minutes of public consultation meetings were recorded and signed and are presented in Appendix 2. The various consultation help to alert project affected communities and residents as well as planners and decision-makers on the likely positive impacts and negative consequences, and ensuring that sensitive environment and protected areas as well as human values and concerns receive proper attention and consideration during the design, construction and implementation of the project road;
- Liaison with study team professionals including the socio economist, the highway design engineers, the material engineer and surveyors so as to undertake discussion and exchange of data. The necessary environmental input was then forwarded to the design engineers such as consideration and location of underpasses for people and animals, avoidance of alignment and construction sites in sensitive areas and avoidance of direct interference etc.
- Use of satellite imagery (2008) and browse the internet and use of Google Earth to support establishment of baseline environment along the various alternative route corridor.
- **Environmental and social impact assessment**: An environmental and social impact assessment (ESIA) continued following the establishment of the existing baseline environmental conditions and development of the road project options and associated components. Environmental scoping conducted for identification of major impacts for each road alternative and support comparison of alternative. The potential environmental impacts of the proposals during the construction and operation phases and the likely mitigation and monitoring measures were analyzed. The proposed options were overlain

on the existing environmental features graphically and an impact checklist/matrix approach was used to identify the significance of any residual impacts following mitigation. Environmental Management and Monitoring Plans are also prepared including parameters to be monitored and managed, responsible implementing agency and cost estimate.

1.5 Structure of the Report

This ESIA study report is prepared for Lot 4 Arsi Negele – Hawassa Road Project and the report is structured as follows:

Chapter 1 presents background information on the project, scope and objectives of the ESIA study, methodology adopted for the ESIA study;

Chapter 2 discusses relevant policy and legislative standards and the administrative framework including the World Bank Environmental Policy and Guideline;

Chapter 3 presents a description of the selected and proposed Dual Carriageway Highway Project (Option 2) that includes description of location, the road project components and characteristics;

Chapter 4 presents a the baseline environment under three categories; namely physical environment, biological/ecological environment and socio economic environment;

Chapter 5 presents summary findings of public and other stakeholders consultations that include municipalities, Wereda administration, concerned sector offices, local communities consulted along the road project towns and also consultations in Addis Ababa;

Chapter 6 presents a description and analysis of the alternative project options that include the Expressway (Option1), New Dual Carriage Highway (Option2) and Full Upgrading (Option 3);

Chapter 7 presents discussion identification impacts and proposed mitigation measures to minimize adverse environmental impacts by the proposed road project;

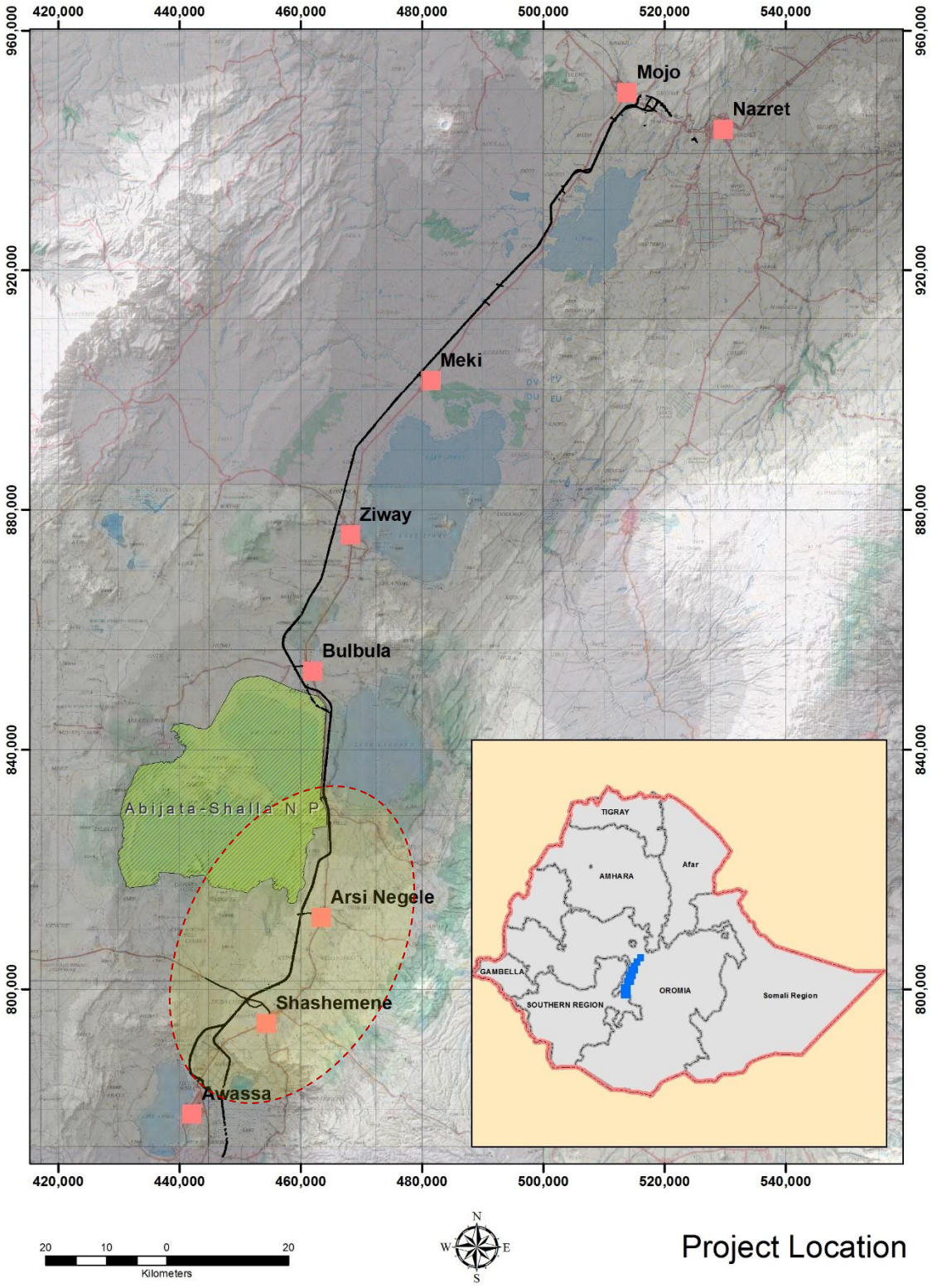
Chapter 8 presents environmental management and monitoring plans along with responsible implementing agencies and cost estimates;

Chapter 9 presents ESIA Disclosure;

Chapter 10 presents key environmental clauses to be included in the construction contract document to minimize adverse impacts and enhance positive impacts; and

Chapter 11 presents the conclusions and recommendations

Figure 1-1 :Arsi Negelle-Hawassa Road Project Location Map



2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 General

Development programs and projects should comply with available policies, legislative and institutional frameworks and standards for proper execution and implementation. Knowledge of the policy and legal frameworks within which the project is going to be implemented would facilitate the project performance and helps to ensure sustainable development. There are several policy and legal documents both at federal and regional level as regards to environmental management and development projects. This chapter review and discuss on relevant national policy, strategy, legislative and institutional framework as well as the World Bank's policy and funding procedure in context to the proposed road project implementation and sustainable service.

2.2 Relevant Policies and Strategies

2.2.1 Conservation Strategy of Ethiopia (CSE 1996)

Since the early 1990s, the Federal Government has undertaken a number of initiatives to develop regional, national and sectoral strategies for environmental conservation and protection. Paramount amongst these was CSE, approved by the Council of Ministers, which provided a strategic framework for integrating environmental planning into new and existing policies, programs and projects. The CSE is an important policy document which views environmental management from several perspectives. The CSE itself provides a comprehensive and rational approach to environmental management in a very broad sense, covering national and regional strategies, sectoral and cross-sectoral policies, action plans and programs, as well as providing the basis for development of appropriate institutional and legal frameworks for implementation.

The plan comprehensively presents the exiting situation in the country and provides a prioritized action plan for 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.

Regional States are responsible for elaboration of regional conservation strategies, detailing with the specific conditions and environmental issues prevalent in their territories, and outlining the ways in which problems are to be addressed. Following CSE the Oromiya National Regional State & SNNPRS have prepared Conservation Strategy documents for their respective Regional States.

The construction of Lot-4 will involve clearing and grubbing for construction of the road and the drainage construction will have impact on the watershed management and hence this conservation policy becomes necessary in tandem with other environmental regulations.

2.2.2 Environmental Policy of Ethiopia (EPE 1997)

The Environmental Policy of Ethiopia (EPE) was approved by the Council of Ministers in April 1997 (EPA/MEDAC 1997). It is based on the CSE which was developed through a consultative process over the period 1989-1995. The EPE's overall goal may be summarized in terms of improvement and enhancement of the health and quality of life of all 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 goal of the policy is to "…improve and enhance the health and quality of all Ethiopians and to promote

sustainable social and economic development through the sound management and use of natural, man-made and cultural resources and the environment as a whole so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs." The policy contains sectoral and cross-sectoral policies and also includes provisions required for the appropriate implementation of the policy itself.

The sectoral environmental policies are:-

- Soil husbandry and sustainable agriculture,
- Forest woodland and tree resources,
- Genetic species and ecosystem bio-diversity,
- Water, energy and mineral resources,
- Human settlement, urban environment and environmental health,
- Pollution from industrial waste and hazardous materials,
- Atmospheric pollution and climatic change,
- Cultural and natural heritage.

The cross-sectoral environmental policies cover the following:

- Population and the environment,
- Community participation and the environment,
- Tenure and access rights to land and natural resources,
- Land use plans,
- Social and gender issues,
- Environmental economics, information systems and research,
- Environmental impact assessment,
- Environmental education and awareness.

The section of the EPE concerning ESIA sets out a number of policies, the key elements of which may be summarized as follows:

- Recognition of the need for ESIA to address social, socio-economic, political and cultural impacts, in addition to physical and biological impacts and for public consultation to be integrated within ESIA procedures,
- Incorporation of impact containment measures within the design process for both public and private sector development projects and inclusion of mitigation measures and accident contingency plans within environmental impact statements (EISs),
- Creation of a legal framework for the ESIA process, together with a suitable and coordinated institutional framework for the execution and approval of ESIAs and environmental audits,
- Development of detailed technical sectoral guidelines for ESIA and environmental auditing,
- Development of ESIA and environmental auditing capacity and capabilities within the Environmental Protection Authority, sectoral ministries and agencies, as well as in the regions.

The thorough and holistic approach taken to development of the policy and, in particular, the recognition of the importance of addressing cross-sectoral environmental issues, has led to a national approach to environmental management, which is not only comprehensive, but also

provides a sound and rational basis for addressing the environmental problems faced by the country now and those which are anticipated over the next decade.

In accordance with the EPE principles the proposed Zeway-Hawassa New Highway Road Project considers environmental and social impact assessment study, and this ESIA report incorporate impact containment measures to be implemented at different phases of the project road development.

The EPE sectoral and cross-sectoral environmental policies have been followed by preparation of detailed policy and legislative framework, and the most relevant and available policies that can be triggered by the proposed project implementation are briefly presented in the following section.

2.2.3 Water Resource Policy (1999) and Proclamation No. 197/2000

The then Ministry of Water Resources has formulated the Federal Water Resource Policy for a 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 policies are meant to establish and institutionalize environmental conservation and protection requirements as integral parts of water resources planning and project development.

The proposed Lot 1 Modjo-Meki Road Project is located in Rift Valley and traverses upstream of Awash River at narrow location of the Koka dam backwater and terminates before Meki town. The project road traverse streams and rivers big rivers like Modo and Awash. The project construction activities may result in increased soil erosion and sediment, pollution from lubricant chemicals affecting quality of water resources in the project area.

2.2.4 Biodiversity Policy (NBP 1998)

The National Biodiversity Policy (NBP) was established in 1998 based on a holistic ecosystem approach to conserve, develop and utilize the country's biodiversity resources. Integration of the biodiversity conservation and development into federal and regional sectoral development initiatives and mobilization of international cooperation and assistance have been identified as the principal strategies for implementing the policy.

2.2.5 Wildlife Policy (2006)

The wildlife policy was developed by the Ministry of Agriculture in 2006 whose prime objective is the preservation, development and sustainable utilization of Ethiopia's wildlife resources for social and economic development and for the integrity of the biosphere. This is at present in draft form, and covers a wide range of policies and strategies relating, amongst others, to wildlife conservation and protected areas.

Based on international criteria, the protected areas of Ethiopia have been divided in four categories, each having its own laws and regulations. These areas are classified according to their management objectives and are designed to serve their own respective categories. The highest ranked are the national parks, where strict legislation is applicable. These are followed by game reserves, sanctuaries and finally, controlled hunting areas. In Ethiopia there are a total of 10 national parks, 11 game reserves and 3 sanctuaries. In addition 18 areas have been designated as controlled hunting areas.

2.2.6 Forest Policies and Strategies

The Proclamation on Conservation, Development and Utilization of Forests was issued in 1994 (Proclamation No. 94/1994) to provide for the Conservation, Development and Utilization of

Forests. The objective of this Proclamation is to provide the basis for sustainable utilization of the country's forest resources. The Proclamation categorizes types of forest ownership (State, Regional and Private Forests). It provides the power for designation, demarcation and registration of forests to the Ministry of Agriculture and Regional Governments. According to this proclamation, state and regional forests shall be utilized in accordance with approved management plans. The Proclamation then goes on to give some specific direction for the utilization of State and Regional Forests and lists prohibited activities within protected forests.

The construction of Lot-4 will involve removal of scattered trees and during construction the alignment development will take utmost care to minimize impacts in accordance with this policy.

2.2.7 The Growth & Transformation Program (GTP 2010)

The Growth and Transformation Plan (GTP) is the third development strategy document in series since 2002/03 to date. The development policies and strategies pursued during the three-year Sustainable Development and Poverty Reduction Program (SDPRP) (2002/03-2004/05), together with the vision expressed in and achievements realized by the SDPRP were the foundation for the design of the next document; namely: Plan for Accelerated and Sustained Development to End Poverty (PASDEP). The PASDEP was implemented during the five-year period of 2005/06-2009/10 based on achieving the Millennium Development Goal (MDGs) targets and the Government vision for development. Based on the foundation laid for achieving the MDGs through the strategic pillars of the PASDEP and with an ambition of a target of higher rate of economic development than that of the PASDEP (shown in Table 2.1) the current GTP has been framed for the period 2010/11-2014/15.

During the plan period, the GTP encompasses qualitative and quantitative targets set in the areas of macro-economic performance, performance of economic and social sectors (including: agriculture, trade and industry, mining, transport, telecommunication, energy, water and irrigation, construction and urban development, education and health) and cross-cutting sectors (including: gender and children affairs, youth and sports development, HIV/AIDS prevention and control, social welfare, population development, labor affairs, culture and tourism, science and technology development and environment and climate change).

The GTP particularly emphasizes the fact that consideration of the environment plays a pivotal role in sustainable development. The Plan aims at building a 'Green Economy' and implementing the existing environmental laws as part of the key strategic directions to be pursued during the plan period. In the process of building a 'green' and climate change-resilient economy the Plan identifies two key issues; namely: adaptation to climate change impacts and mitigation of greenhouse gases (GHGs).

The GTP sets out a strategic direction of building a 'green economy' and strengthening the implementation of existing environmental laws. It has also the objectives of formulating and effectively implementing policies, strategies, laws and standards which will foster social and green economy development so as to enhance the welfare of citizens and ensure good environment.

The construction of Lot-4 is part of the Modjo-Hawassa road and it will facilitate the government objectives in ascertain the GTP.

2.2.8 Ethiopia's Green Development Initiatives

Building on the positive development of recent years, Ethiopia aims to achieve middle-income status by 2025 while developing a green economy. To this end, boosting agricultural productivity and strengthening the industrial base will be essential to reach this goal.

Following the conventional development path would, among other adverse effects, result in a sharp increase in greenhouse gas (GHG) emissions and unsustainable use of natural resources. To avoid such negative effects, the government has developed a strategy to build a climate-resilient green economy (CRGE).

The CRGE initiative follows a sectoral approach and aims at overcoming the challenges of developing a green economy. This strategy focuses on four pillars (including renewable and clean sources of power) that will support Ethiopia's developing green economy:

- Adoption of agricultural and land use efficiency measures;
- Increased GHG sequestration in forestry, i.e., protecting and re-establishing forests for their economic and ecosystem services including as carbon stocks;
- Deployment of renewable and clean power generation; and
- Use of appropriate advanced technologies in industry, transport, and buildings.

It is believed that establishing these pillars within the relevant parts of the economic development plan will prevent the economy from being locked into an unsustainable pathway and can help to attract the investment required for their development.

The construction of Lot-4 which is part of the Modjo-Hawassa road is required to comply with this initiative as the road traverses agricultural land predominantly and emissions like GHG shall be addressed properly.

2.2.9 Road Sector Development Programme (RSDP)

The Road Sector Development Programme (RSDP) was launched in 1997 E.C. with significant support from the donor community. Under RSDP, four criteria inspire the choice of priorities, namely:

(i) Economic viability, to enhance mobility and reduce vehicle operating costs.
(ii) Completion of works underway in RSDP II, or addition of new sections to them.
(iii) Access to high-potential areas to alleviate poverty, and
(iv) Filling of network gaps with links that are vital for national economic interests and regional equity.

Table 2.1 shows the performance of the first three RSDP phases and the objectives of ongoing RSDP IV.

Table 2-1 ***: RSDP 13 years' performance and RSDP IV targets***

Indicator		1997	2002	2007	2010	2015
		baseline	***RSDP I***	***RSDP II***	***RSDP III***	***RSDP IV***
1	Proportion of Total Road network in Good Condition	22%	30%	49%	56%	87%
2	Road density/1000 sq. km (excluding community roads)	24.0km	30.3km	38.6km	44.4km	123.7km
3	Road density/1000 pop (excluding community roads)	0.46km	0.49km	0.55km	0.58km	---
4	Proportion of area more than 5 km from weather roads	79%	72%	68%	64.2%	29.0%
5	Average distance to all weather roads	21.4km	---	13km	11.3km	---

Source: ERA, RSDP 13 year's performance and Phase IV

The construction of Lot-2 will facilitate the road connectivity and the use of alternative ports like Lamu and Mombasa will be facilitated and hence it is in line with the RSDP.

2.2.10 Health Policy

Ethiopia's health 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 behavioral change of the society towards health issues, emphasis on the control of communicable diseases, epidemics, and on diseases that are related to malnutrition and poor living condition, promotion of occupational health and safety, 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.

Construction of Lot-4 will have direct and indirect impacts on health during construction and operation. The mitigation measures and awareness of the impacts shall be carried out in line with this policy

2.2.11 Education and Training Policy

Ethiopia's Education and Training Policy (ETP) aims at achieving universal education by the year 2015. The general objective of the policy is to develop physical and mental potential of individuals who can take care of and utilize their resources and to bring up citizens who respect human rights.

2.2.12 National Policy on Population

Ethiopia developed its Population Policy in 1993. The rationale behind the policy is that with increased human numbers, the population carrying capacity of the land decreases. Forest cover is estimated to have declined from 40 to 3 percent. Large expanses of land with large herds of livestock are said "to play havoc with the environment". The policy has as its major goal:

"*The harmonization of the rate of population and the capacity of the country for development and rationale utilization of natural resources to the end that level of welfare of the population is maximized over time".*

One of the general objectives of the population policy is Maintaining/improving the carrying capacity of the environment by taking appropriate environmental protection/conservation measures.

2.2.13 National Policy on Women

The Constitution of the FDRE recognizes equal rights for women and men; however, the traditional societal structure keeps women in a very low position and vulnerable situation. Women occupy a very small percentage of key political and government decision making positions.

Harmful traditional practices are common in the country; about 80 percent of women have undergone Circumcision and other harmful traditional practices. Early marriage of young girls is a common occurrence among most cultures in Ethiopia. Some studies and reports suggest that violence against women is quite high and increasing every year.

Ethiopian women also experience heavy workloads and mainly domestic work. It is estimated that on average women work 15-18 hours per day. Women also do not have access and control to resources. According to the 2003 Agricultural census only 18.6% women among farming communities were able to have ownership of agricultural land. On the other hand, women among the pastoral communities can own property only if they have a male guardian.

2.2.14 National Policy on HIV/AIDS

The HIV/AIDS pandemic is spreading worldwide and hitting hard poor countries. Sub Saharan Africa with only 10% of the world population is having 80% of the world HIV infection and AIDS cases. Among the Sub Saharan African countries, Ethiopia stands fifth in HIV/AIDS infection rates.

Ethiopia is one of the countries in the world that is facing HIV/AIDS pandemics, and about 3.5% of the population is said to be HIV/AIDS positive. HIV/AIDS has now become a major social and economic problem of the country. Having understood the magnitude of the problem, the Government issued a HIV/AIDS policy in 1998.

The general objective of the policy is "to provide an enabling environment for the prevention and control of HIV/AIDS in the country". The policy also urges government ministries and the civil society to assume responsibility for carrying out HIV/AIDS awareness and prevention campaigns.

The policy outlines the large social, psychological, demographic and economic impact that HIV/AIDS will have and introduces a number of issues relating to HIV/AIDS. These are:

- HIV/AIDS is not only a health problem but also a developmental problem,
- Gender inequality contributes to further spreading HIV/AIDS,
- Women, including those living with HIV/AIDS, need access to information and services regarding HIV/AIDS and to family planning provision to help them make reproductive choices and decisions,
- The magnitude of the problem will need considerable resources and a multi-sectoral effort to control the HIV/AIDS epidemic
- There is a need for a holistic approach in the provision of care to people living with HIV/AIDS,

- Human rights of people living with HIV/AIDS need to be recognized,
- HIV/AIDS has the potential for a catastrophic impact.

The National AIDS Council was established in 2000 under the Chairmanship of the FDRE President; and in 2002 the HIV/AIDS Prevention and Control Office (HAPCO) was established to address the problem.

2.2.15 Ethiopian Roads Authority Policy for HIV/AIDS, ERA 2004

The transport and construction sectors are among the most susceptible sectors for the spread of HIV/AIDS. In light of this, in June 2004, ERA has issued a policy for HIV/AIDS in workplaces, and a three-year strategic work plan for HIV/AIDS prevention and control. The policy acknowledges that HIV/AIDS pandemic is a reality in the workplace, which may have detrimental effects on its work force. The policy is prepared with the objective of developing and implementing an effective workplace program.

The objectives of ERA's HIV/AIDS policy are to create awareness among its employees, to promote effective ways of managing HIV/AIDS and to create a supportive environment for those affected.

The principles of the policy are to ensure that employees living with HIV/AIDS have the same rights and obligations of all, to avoid discrimination and stigmatization of employees with HIV/AIDS, to seek to minimize the social, economic and developmental consequences, provide support, counseling and educational services to infected and affected employees; establish and maintain an employee assistance programme and ensure sustainable resources for prevention and control.

2.2.16 Resettlement & Rehabilitation Policy Framework

Ethiopian Road Authority prepared Resettlement and rehabilitation Policy Framework in 2006 to provide guidance on preparation of Resettlement Action Plan (RAP). The principles in the framework are adopted basically from the World Bank's policy on resettlement and rehabilitation. A threshold has been set whether or not to proceed with a detail RAP once a social screening is done on any proposed road development project. Road development that entails the relocation of more than 200 individuals or about 40 households is expected to draw up a detailed resettlement action plan. Those road projects that would displace less than 200 individuals are not expected to come up with a detailed/full scale RAP and instead appropriate compensation measures for lost assets, arrangements for logistical support and a relocation grant have to be determined.

The Resettlement/Rehabilitation Policy Framework clarifies the principles of social impact mitigation in the process of addressing social impacts induced by project operations. It provides guidelines to stakeholders participating in the rehabilitation/resettlement operations to ensure that project affected persons (PAPs) will not be impoverished by the adverse social impacts. The basic principles imply that PAPs should be compensated for loss of assets at replacement costs; be given opportunities to share project benefits; and be assisted in case of relocation or resettlement. Focus is on restoring the income earning capacity of the affected persons by improving or at least sustaining the living conditions prior to project operations or to resettlement.

The policy framework sufficiently places emphasis both on the compensation issues and the process required for the implementation of resettlement/ displacement. According to this policy framework a resettlement action plan (RAP) needs to be prepared only if the project affects more than 200 persons. On the other hand the Bank's OP. 4.12 Para. 25 states that "where impacts on the entire displaced population are minor, or fewer than 200 people are displaced,

an abbreviated resettlement action plan (ARAP) may be agreed with the borrower." OP 4.12, footnote 25 defines "impacts are considered 'minor' if the affected people are not physically displaced and less than 10% of their productive assets are lost".

The ERA/RPF Policy Framework is in line with the eligibility criteria contained in OP 4.12 of the World Bank's operational manual on involuntary resettlement applied in determining eligible persons for compensation. Accordingly, compensation for lost assets and replacement costs is made for both titled and untitled land holders and property owners. In this project the absence of formal titles will not be a barrier to resettlement assistance and rehabilitation.

All PAP and organizations losing land, buildings/houses, crops or sources of income will be compensated or rehabilitated according to the types and amount of their losses (permanent or temporary) at replacement cost. All PAPS, legal and illegal, are taken into consideration and accounted for.

Early recording (with a cut-off date) the numbers and names of affected populations entitled to compensation/rehabilitation is a major mechanism to prevent illegal encroachers and squatters, including an influx of non-residents into the RoW-to make themselves eligible for compensation. In case of lack of harmony between the World Bank Policy and the Ethiopian Law regarding issues related to compensation and resettlement, the Bank Policy will prevail. The issues of resettlement and rehabilitation are addressed in detail in the Resettlement Action Plan (RAP) document.

2.3 Legal Framework

2.3.1 The Constitution of the FDRE

The Constitution of the Federal Democratic Republic Ethiopia (FDRE), adopted in August 1995, forms the fundamental basis for enactment of specific legislative instruments governing environmental protection matters at national level. The Constitution has several provisions which have direct policy, legal and institutional relevance for appropriate implementation of environmental protection and rehabilitation action plans targeted to avoid, mitigate or compensate the adverse effects of development actions.

The Constitution thus contains a number of articles which are relevant to environmental matters in connection with development projects, as well as to the environment in general, and the prominent Articles relevant for the proposed Modjo – Hawassa Road Project include:

- Article 43 gives the right to people to improved living standards and to sustainable development;
- Article 44 states that all person have the right for a clean and healthy environment;
- Article 44.2 indicates that interventions for public goods that cause the displacement of people or adversely affect the livelihood of the local population shall give the right to commensurate monetary or other means of compensation including relocation (resettlement) with adequate State assistance. This provision has a strong relevance for the resettlement action plan;
- Article 92, which sets out national policy principles and objectives, includes the following significant environmental objectives:
    - 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,
    - Government and citizens shall have the duty to protect the environment;
- Article 40 states that ownership of both urban and rural land is vested in the State

and the people and is common property which is not subject to sale or other means of exchange.

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

The objective of this Proclamation is to assign responsibilities to separate organizations for environmental development and management activities on one hand and environmental protection regulations and monitoring on the other hand, in order to ensure sustainable use of environmental resources thereby avoiding possible conflicts of interest and duplications 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 EPA has been re-established as an autonomous public institution of the Federal Government of Ethiopia by this Proclamation.

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

The Environmental Impact Assessment Proclamation (proclamation No. 299/2002) has been issued on the 3rd of December 2002. The main objective of the Proclamation is to make the ESIA mandatory for specified categories of activities undertaken by public or by private sectors. Undertaking ESIA was not a legal requirement before the formation of this Proclamation. The general provisions of the Proclamation include:

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

The proposed Lot 4 Arsi Negele-Hawassa Expressway Road Project has a length of 51.48km, and requires opening of new pavement of 4 lane dual carriageway and construction of various other road components such as bridges, culverts, and development of ancillary works. It is therefore a Schedule I Project according to EPA environmental guidelines; hence requires a full ESIA

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

The Proclamation is developed on the obligation to protect the environment of the Country as a whole and it aims at securing the right of each citizen to a healthy environment. It provides the basis from which the relevant environmental standards can be developed and enforces the standards set based on the polluter pays principle. Environmental Inspectors are to be assigned by the EPA or regional environment offices, whereas thresholds have been set for industrial, agricultural and domestic wastes (EPA 2003). The Council of Ministers in 2008 approved a regulation to prevent pollution from industrial facilities. The EPA established a provisional standard limit of effluents for different category of industries in the country (no

standard yet developed exclusively for construction; but some of the applicable [common] standards such as noise, total dust and carbon monoxide from combustion sources and motor vehicles have been used at relevant sections of Chapter 7 of the report).

2.3.5 Proclamation on Public Health (Proclamation No. 200/2000)

The government of Ethiopia issued the Public Health Proclamation in March 2000. It is an important step for the promotion of the health of the society and for the creation of a healthy environment for the present and future generations. The proclamation has addressed important issues which are directly or indirectly related to the conservation of environment and occupational health. Major environmental health issues (mainly applicable to camps in this case) emphasized in the proclamation include the following:

- Prohibit providing water supply services from springs, wells or through pipes unless its quality is verified by health authorities;
- Prohibit discharging untreated liquid waste generated from septic tanks, seepage-pits and industries into water bodies or water convergences;
- Employers shall ensure the availability of occupational health services to employees;
- The use of any machinery or instrument which generates excessive noise is prohibited. Any person who uses such machinery or instrument shall install noise reducing apparatus or instruments;
- No person shall dispose solid, liquid or any other waste in a manner which contaminates the environment or affects the health of the society; (Applicable to construction camps)
- Any institution or organization providing public service has the obligation to organize clean, adequate and accessible toilet facilities for its customers.

Present and future congestion of traffic along the existing road is expected to result in adverse health impact to the traversed towns population and also effect on climate change. The proposed new dual carriageway highway is expected to partially relieve this problem. However, adverse impact on public health can result during the project construction due to air pollution (dust/noise), risk of public water source points, and creation of conducive habitat for water borne & related diseases (malaria). These impacts should be assessed and prevention measure implemented to prevent public health impact.

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

This proclamation describes the rights and obligations of users of rural land, including traditional subsistence farmers and private commercial estates. The proclamation makes statements oriented to preventing land degradation and maximizing productivity. Most importantly, it defines obligations of rural land users and land use restrictions.

The road project corridor, characterized by erosion prone land (some of the road route section falling in Bora wereda) should be supported with the necessary physical and biological measures to prevent erosion and ensure sustainability of the road. Implementation of appropriate land use should be promoted in the road micro catchments.

2.3.7 Expropriation of Land Holding for Public Purposes and Payment of Compensation (Proclamation No. 455/2005)

Proclamation no. 455/2005 states that a landholder whose holding has been expropriated shall be entitled to payment of compensation for his property situated on the land and for permanent improvements he made to such land. The amount of compensation for property situated on the expropriated land shall be determined on the basis of replacement cost of the property. Regarding displacement compensation the proclamation states that a rural landholder whose landholding has been permanently expropriated shall in addition to compensation paid for property situated on the expropriated land, be paid displacement compensation which shall be equivalent to ten times the average annual income he/she secured during the five years preceding the expropriation of the land.

The road project will take productive agricultural land and the impact is quite significant for the proposed road project as it is a new opening and requires a road reserve / ROW (90m). Therefore, compensation has to be made to affected persons according to the law.

2.3.8 Forestry Conservation, Development & Utilization (Proclamation No. 94/2007)

The Proclamation on Conservation, Development and Utilization of Forests was issued in 2007 to provide for the Conservation, Development and Utilization of Forests. The objective of this Proclamation is to provide the basis for sustainable utilization of the country's forest resources. The Proclamation categorizes types of forest ownership (State, Regional and Private Forests) and provides the power for designation, demarcation and registration of forests to the Ministry of Agriculture and the Regional Governments. According to this proclamation, state and regional forests shall be utilized in accordance with approved management plans. The Proclamation then provides specific direction for the utilization of State and Regional Forests and lists prohibited activities within protected forests.

2.3.9 National Proclamation on Water Resource Management (Proclamation No. 197/2000)

The available water resources in the region and the country at large have not yet been exploited adequately to serve the economic and social needs of the nation's population. The Water Resources Management and Administration in the country is based on the Ethiopian Water Resource Management Policy and on the Water Resources Laws of the country as indicated in Proclamation No 197/2000. The Ministry of Water and Energy and the Regional Water & Energy Bureau are entrusted with broad powers of 'planning, management, utilization administration and protection of water resources'. According to the Proc. No.197/2000, the duties of the MoWE include inventory of water resources, allocation of water resources, establishing standards for design and construction of waterworks (including hydropower dams), issuing guidelines and directives for the prevention of pollution of water resources as well as for water quality and health standards, establishing water users' associations, and settlement of disputes. However, relevant legislation and standards to support sustainable abstraction of water from different water sources (lakes, rivers, etc) have not been prepared yet.

Unlike irrigation or water supply projects, roads development projects do not envisage major water demand, although there may be some water requirement for various construction related activities. On the other hand, water resource, both in amount and quality, in the Rift Valley Lakes Basin (RVLB) was found out to be the major issue based on the RVLBIRMPSP. The RVLB master plan study discuss various issues with regard to water resource and quality, and among them are less than 300m3 per capita water share, majority of the lakes (except Lake Zeway) are highly saline, ground water resource is characterized by high concentration of

elements such as fluoride manganese iron, significant problem of sediment in the siltation of the lakes.

2.3.10 Solid Waste Management Proclamation

The Solid Waste Management proclamation was issued in 2007 as Proc. No. 513/2007with a primary objective "*to enhance at all levels capacities to prevent the possible adverse impacts while creating economically and socially beneficial assets out of the solid wastes*".

As applicable to the Project under consideration:

- The Solid Waste Management Proclamation requests for recycling (for instance, it is stipulated that: "*the manufacturer or importer of glass containers or tins/cans shall develop and implement a system that enables it, on its own or through other persons, to collect and recycle used glass containers or tin/cans*"; and
- It is stipulated in the Solid Waste Management Proclamation that solid wastes in general and household wastes, food-related wastes and construction debris should be disposed in an environmentally sound manner.

2.3.11 Labor Proclamation (Proclamation No 377/2003)

Part Six of the proclamation provides various statements on working condition of women and young workers among which are:

- Women shall not be discriminated against as regards employment and payment on the basis of their sex;
- Its prohibited to employ women on type of work that may be listed to be particularly odors or harmful to their health;
- Prohibit to employ persons under 14 years of age
- Grant leave to pregnant women without deducting her wage persons under 14 years of age;

Part Seven of the proclamation state on Occupational Safety, Health & Working Environment where an employer is required to take the necessary measures to safeguard the health & safety of the workers. Among the measures are:

- Comply with the occupational health & safety requirements provided in the proclamation;
- Take appropriate steps to ensure that workers are properly instructed and notified concerning the hazard of their respective occupation and the precautions necessary to avoid accident and injury to health;
- Provide workers with protective equipment, clothing and other materials and instruct them of its use;
- Ensure that the work place and premises do not cause danger to the health and safety of the workers;

The project road contractor is therefore should comply with all the relevant statements of the Labor Proclamation so that the employment opportunity and health and other safeguard conditions for youth & women are ensured.

2.3.12 Proclamation on Development, Conservation & Utilization of Wildlife (Proclamation No 541/2007)

The major objectives of this proclamation are:

- To conserve, manage, develop and properly utilize the wildlife resource in the country;
- To create condition necessary for discharging government obligations assumed under treaties regarding the conservation development and utilization of wildlife;

- To promote wildlife based tourism and to encourage private investment;

Wildlife conservation area to be designated and administered by federal government described by the proclamation with:

- National parks that are nationally and globally significant and known to have representative ecological zones and embrace immense diversity of wildlife;
- National parks and wildlife sanctuaries that are inhibited by the countries endemic and endangered species;
- Any wildlife conservation areas geographically situated within two or more regions
- Any trans-boundary wildlife conservation areas that may be established in accordance with agreement with neighboring countries;

It also describes wildlife conservation areas to be designated and administered by regions, private investors and local communities. Part three of the proclamation states on Economic activities, Wildlife Resource Based Tourism, Trading in Wildlife and their Products.

It's stated that development activities in or outside of wildlife conservation areas shall be carried out in such a manner that the wellbeing of ecosystem of the area are not disturbed. The proposed road project is located near ASLNP boundary therefore all necessary measures should be considered as per this proclamation and regulation for its realization (Regulation No 163/2008).

2.3.13 Wildlife Development, Conservation & Utilization Regulation N0.163/2009

This regulation is formulated to realize statements enshrined in proclamation on Wildlife development Conservation and Utilization (Proc No541/2007). Part Two of the regulation elaborates, among others on Management of wildlife conservation area, Wildlife Conservation Areas to be administered by the Federal and Regional Government, Prohibited Activities in National Parks Wildlife Sanctuaries and Wildlife Reserves.

It's stated that the existing boundaries shall be maintained or they may be re-delineated by the Federal and Regional governments to improve their administration. EWCA is entitled for administration of 12 Wildlife Conservation Areas, including the ASLNP which is located near the project road route. The regulation describes quite a number of prohibited activities in Wildlife Conservation Areas such as possessing or transferring of any weapon, hunting or fishing, propelling any vehicle aircraft or boat, undertaking agricultural activities, grazing, allowing passing through or keeping any domestic or wild animals, etc

The proposed Expressway road project traverse near the ASLNP boundary, on the east side of the existing road. It will not directly impact ASLNP. Nonetheless, the road design construction and operational activities will be in accordance with the proclamation and regulation stated for the protection and conservation of wildlife.

2.3.14 Regulation on Compensation Procedure, Regulation No 137/2007

Regulations No. 135/2007 issued by the Council of Ministers 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 3.2.6) 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, 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.

2.3.15 Proclamation of 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. The Proclamation defines the objectives, powers and duties of the Authority (ARCCH. It also has provisions on Management of Cultural Heritage. Among these are provisions on Ownership and Duties of Owners, Classification, Registration, Conservation and Restoration, Removal, the Use, and Expropriation of Cultural Heritage, Preservation of Cultural Heritage Situated on Land given in Usufruct, and Establishment of Museum. Furthermore, the Proclamation provides Articles on Exploration, Discovery and Study of Cultural Heritage. Article 41 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. Under Miscellaneous Provisions, the Proclamation states that, any person who holds permit to conduct construction works in a reserved area [an area declared to be containing an assemblage of immovable Cultural Heritage or an archaeological site] and who discovers Cultural Heritage in the course of construction activities shall stop construction and shall forthwith report same in writing to the Authority.

2.3.16 Oromia Regional state land administration and land use proclamation

Under proclamation No. 56/2002, of the Oromia regional state, Article 4, sub article 1, stressed that land is a common property of the state and the people and shall not be subject to sell or other means of exchange. Article 5.1 on the people, and shall not be subject to sell or other means of exchange. Article 5.1 on the other hand gives a full property right to holders over any property produced or built on the land including the right to alienate it in any manner. However, according to article 6.2, the right of alienation does not extend to the land itself. Article 6.4 again stipulates certain restrictions and obligations on the use right of land in which use right is subject to termination when the land is required for public uses.

2.3.17 Multilateral Agreement

The Federal Democratic Republic of Ethiopia has ratified several international conventions and protocols and the following can be related with the proposed road project implementation:

- United Nations Convention to Combat Desertification;
- Convention on Biodiversity (Rio convention) (1997);
- Framework Convention of United Nations on Climate Change (1997);

- Convention on the Control of Trans-boundary Movement of Hazardous Substance.
- Convention on International Trade on Endangered Species(1998)
- The Cartagena Protocol on Biosafety ratified on September 22, 2003
- The Convention for the protection of World Cultural and Natural Heritage.

2.4 Relevant ESIA Guidelines

2.4.1 ESIA Guidelines of EPA

Environmental Impact Assessment Procedural Guideline has been issued by EPA in 2003, detailing the required procedures for conducting an ESIA in Ethiopia and the requirements for environmental management. These requirements are presented on a step-by-step basis and the guideline specifies tools that may be considered when engaging in the ESIA process. In addition, the ESIA Guideline provides the categories, the relevant requirements for an ESIA, and lists project types under each category. On this basis, projects are categorized into three schedules:

- **Schedule 1** - projects which may have adverse and significant environmental impacts and therefore require a full Environmental Impact Assessment.
- **Schedule 2** - projects whose type, scale or other relevant characteristics have potential to cause some significant environmental impacts but are not likely to warrant a full ESIA study.
- **Schedule 3** - projects which would have no impact and do not require an ESIA.

The Road and Railway Sector Environmental Assessment Guideline was issued by the Federal EPA in 2004. The guideline describes major environmental issues, possible beneficial and adverse impacts and enhancement and mitigation measures related to road or railway projects.

The construction of Lot-4 requires full environmental impact assessment and falls under the category of Schedule 1.

2.4.2 ERA's Environmental Procedure and Quality Manuals

ERA has prepared Environmental Procedural Manual in 2001 which provide a comprehensive statement of the types of environmental assessment required at different phases of a project cycle. It also sets out clearly a list of typical adverse impact, mitigation measures and environmental management plans. ERA updated the 2001 manual, and prepared Environmental & Social Management Manual in 2008. This manual represents a compilation of various manuals and guidelines produced for and by ERA over the past years. The manual is arranged in two Volumes. Volume I provides background to the relevant policy, legislative and institutional framework that applies to Environmental and Social Assessment (ESA) in Ethiopia, guidance on the expectations of external funding agencies, flowcharts for guidance on how ESA is applied at various phases of road development and development of an environmental management system. Volume 2 of the manual provides a series of guidelines for addressing environmental issues commonly encountered on road projects.

ERA has also produced a series of Quality Manuals in 2011 of which Volume 5 is dedicated to Environmental & Social Management. It principally describes the content & format to be followed in ESIA & RAP studies.

2.5 Institutional Framework

2.5.1 Federal Democratic Republic of Ethiopia and Administrative Regions

The Federal Democratic Republic of Ethiopia (FDRE) was formally established on August 21, 1995. The FDRE comprises of nine Regional State members. The relative roles of government at the different levels (Federal, Regional and Local) in terms of power and duties, including 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 respective regions.

2.5.2 Regional Governments

The proposed road project route falls, exclusively in three weredas (Lome, Bora & A/T/J/K) in east showa zone of ONRS. The proposed Expressway falls in Oromia National Regional State (ONRS).

2.5.3 The Federal Environmental Protection Authority

The Environmental Protection Authority (EPA) was established in August 1995 under Proclamation No.9/1995 and is an autonomous government body reporting directly to the Council of Ministers. It has a broad mandate covering environmental matters at federal level. The Proclamation sets out the main responsibilities and broad organizational structure of the EPA.

After the establishment of the EPA, ERA has established the ESMT and the ONRS established the OBoLEP in order to handle environmental matters in the Region.

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

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

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

Key elements include:

- to establish a system for ESIA of projects, policies, strategies, laws and programs;
- to enforce implementation of this ESIA process (i.e. review ESIA reports) and the

recommendations which result from it for projects that are subject to Federal licensing, execution or supervision;
- to determine environmental standards and ensure their compliance;
- to enter any land, premises or any other places that falls under the Federal jurisdiction, inspect and take samples as deemed necessary in view of ascertaining compliance with environmental protection requirements;
- to ensure implementation of environmental protection laws.

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

2.5.4 Regional Environmental Protection Authorities

In line with the proclamation for establishment of environmental protection organ, the regions have established their respective independent environmental organ. The proposed project road route falls, exclusively in ONRS and the region has established the Bureau of Land and Environmental Protection (BoLEP) responsible to environmental management aspects in the region. The environmental structure goes down to Weredalevel.

Discussions and consultations were made with these environmental organs whose units determine compensation PAP in collaboration with other concerned organs and assist in the implementation of the ESMP.

2.5.5 Ethiopian Roads Authority (ERA)

The Ethiopian Roads Authority (ERA), which is an autonomous public authority of the federal government, was re-established under Proclamation 80/1997 and has responsibility for the overall planning of national road network development and maintenance and construction of trunk and major link roads while responsibility of rural roads has been decentralized to Regional Rural Road Authorities (RRAs). The most important divisions of ERA in relation to ESIA of the proposed road project are briefly described below:

Environmental & Social management Team (ESMT)

ERA has established an Environmental and Social Management Team (ESMT) within the Planning and Programming Directorate to address environmental matters arising from the road development program. The main responsibilities of the unit include:

- Advising senior management and assisting in the decision-making process on all road sector environmental issues;
- Ensuring that environmental issues are adequately addressed in connection with the activities of all ERA departments and divisions;
- Carrying out or supervising ESIAs for road sector projects.

ERA's Design and Build Contract Management Directorate Right-of-Way (ROW) Teams

Following ERAs new restructuring which took place in 2010 five Right-of-Way Management Teams, have been organized under The Regional Office Directorate. The ROW Management teams are established in five regions and are responsible for making available the required land for road/highway construction and maintenance, the establishment of materials sources

(borrow pits and quarries) and camp sites and for implementation of Resettlement Action Plans (RAP).

Right-of-Way Management Teams in liaison with the respective regional/local authorities, Weredacouncils, Kebele administrations and community representatives establish the required compensation for structures, crop, vegetation and others and effects payments to the project affected people. The legal aspects of claims and dispute resolutions shall be carried out by the legal advocate personnel assigned in each region.

ERA's Design and Build Contract Management Directorate

The Design and Build Contract Management Directorate is under the Legal Affairs Service Division which is accountable to the Director General of ERA. Some of the activities and responsibilities assigned for the division consist of drafting, reviewing, analyzing and approving construction contract documents. Contract awarding with other assigned members of committee is the other responsibility of the division in the authority. The legal affairs service division develops and implements strategies for claims and dispute resolutions which serve as inputs to the ROW Management Teams and regional legal advocates.

2.5.6 Ministry of Transport

The Ethiopian Roads Authority is currently made accountable to the Ministry of Transport (established with Proclamation No. 691/2010) which shall have among others, the powers and duties to:

- promote the expansion of transport services;
- ensure that the provision of transport services are integrated and are in line with the country's development strategies;
- ensure the establishment and implementation of regulatory frameworks to guarantee the provision of reliable and safe transport services; and
- ensure that transport infrastructures are constructed, upgraded and maintained;

In addition, the powers and duties given to the Ministry of Transport and Communications by the provisions of other laws, currently in force, with respect to matters relating to the transport sector are hereby given to the Ministry of Transport.

2.5.7 Ministry of Health

According to Proclamation No. 691/2010, the Ministry of Health shall have the powers and duties to:

- formulate the country's health sector development program; follow up and evaluate the implementation of same;
- support the expansion of health services coverage; follow up and coordinate the implementation of health programs financed by foreign assistance and loans;
- direct, coordinate and follow up implementation of the country's health information system;
- devise and follow up the implementation of strategies for the prevention of epidemic and communicable diseases;
- follow up and coordinate the implementation of national nutrition strategies;
- take preventive measures in the events of emergency situations that threaten public health and coordinate measures to be taken by other bodies;

- ensure adequate supply and proper utilization of essential drugs and medical equipment in the country;
- prepare the country's health services coverage map; provide support for the expansion of health infrastructure;
- supervise the administration of federal hospitals;
- collaborate with the appropriate bodies in providing quality and relevant health professionals' trainings within the country;
- provide appropriate support to promote research activities intended to provide solutions for the country's health problems and for improving health service delivery;
- expand health education through various appropriate means; and
- Ensure the proper execution of food, medicine and health care regulatory functions.

2.5.8 Ministry of Culture and Tourism

The Ministry was established with Proclamation No. 691/2010 having the powers and duties of:

- cause the study and preservation of history, cultural heritages and values of the nations, nationalities and peoples of Ethiopia;
- attractions and its positive image on the world tourism market, and encourage domestic tourism;
- ensure that the country's tourist attractions are identified, properly developed and organized, tourist facilities are expanded and that local communities share the benefits derived from tourism;
- facilitate the studying and preservation of the country's natural heritages and the development and utilization of them as tourist attractions; ensure the proper management of wildlife conservation areas designated to be administered by the federal government; and
- serve as a focal point for forums established to facilitate the coordination of the multi-sectoral efforts required for the provision of quality tourist services and for ensuring the well-being of tourists;

2.5.9 Authority for Research and Conservation of Cultural Heritage

Research and conservation of Ethiopian Cultural Heritage are regulated by proclamation No.209/2000 of Ethiopia. The defines cultural heritage broadly as “anything tangible or intangible which is the product of creativity and labour of man in the pre-history and history times, that describes and witnesses to the evolution of nature and which has a major value in its scientific, historical, cultural, artistic and handcraft content”.

Protection and conservation of cultural heritage from man-made and natural hazards is one of the duties of the Authority for Research and Conservation of Cultural Heritage (ARCCH).

Prior approval of the Authority for Research and Conservation of Cultural Heritage is required to remove an immovable cultural heritage from its original site, (Art. 21/1). Whenever a registered movable cultural heritage is encountered during the execution of the project it is possible to remove such property by notifying the Authority in advance (Art. 21/2). However, it

is also stated that the removal of any cultural ruins is to be carried out under strict supervision of the responsible authority, ARCCH.

Any person who destroys or damages cultural heritage intentionally shall be punished with gregarious imprisonment not less than 10 years and not exceeding 20 years (Art. 45/2/).

Article 42 of the same proclamation states under 'Reserved Area' that the Authority has the power of issuing building permission for any work to be carried out in an area declared reserved by the Council of Ministers.

3. DESCRIPTION OF THE PROJECT ROAD

3.1 General

3.1.1 Location

The proposed road project starts at a point located at km 150 and terminates at km 20148 at the ousecert of own of Hawassa, capital of the SNNPRS. The road corridor traverses two administrative weredas in the ONRS (Arisi Negele and Shahemene) covering about 85% of the total road length. The remaining section of the road is located in SNNPRS Capital, Hawassa and constitutes only 15 % of the total road length. Table 3.1 shows administrative regions and towns along the road project corridor, and Figure 1.1 shows the road project location map.

Table 3-1 Administrative zones and towns along the project road

Regions	Zone	Weredas	area (km2)	Towns
ONRS	West Arsi	Arsi Negele	1,400	Arusi Negele
		Shashemene	760	Kuyera, Shahemene
SNNPRS	Sidama	Hawassa	1,830	Hawassa

3.1.2 Purpose &Justification of theProject

The ever increasing economic development in the country requires an improved and modern road network and transport system to carry agricultural input and products, raw materials and industrial products. The main purpose of the project is to foster the regional and national economy and contribute to realize the agricultural transformation strategy.

The existing Modjo-Hawassa road is providing service for various slow and fast moving vehicles, mixed motorized –non motorized means of transport, which significantly reduced its efficiency and also results in accidents that take away human life and in a considerable loss of resources. The traffic flow on the project road has manifested a marked increase over the last eight years with average annual growth rates between 11 and 13%. Furthermore, the traffic trend and transport demand study foresees a significant increment of traffic in the coming years, which cannot be accommodated by the existing road. The traffic volume projection for the year 2030-34 showed over 10,000 as compared to the present average 3,000AADT. Implementation of the Dual Carriage Highway can therefore contribute to curb the traffic and associated problems encountered on the existing Modjo-Hawassa highway road.

Implementation of the proposed new Dual carriage Highway also contribute to arrest present and potential congested of traffic in urban sections which ultimately results in reduction or avoidance of pollution from poorly controlled exhaust gases.

Most of all, the proposed road is essential in relation to the growth and transformation strategy which is formulated to bring about fast economic development in the country and the the current increasing economic development in the recent years requires an improved and modern road and transport system to carry agricultural input products, raw materials and industrial products.

The other important aspect implementation the proposed road is that it is part of the Trans-African Highway, the Cairo-Gaborone-Cape Town highway, the longest amongst the Trans-African highways covering a total of more than 10,000km and linking within its central part

Addis Ababa with Kenya and the port of Mombasa. The Kenyan section, from Moyale to Isilo and Nairobi is under rehabilitation and thus the rehabilitation of the Ethiopian part, will complete the upgrading/rehabilitation of the link Addis-Mombasa. The Modjo –Hawassa road project is a continuation of Government efforts to improve the standard of Trans-East African Highway as a member of COMESA countries and its import-export corridors to minimize the cost of its transit traffic.

The Arsi Negelle-Hawassa (part of the Modjo-Hawassa) highway road has also quite significant national and international tourist flows use the road to visit important tourist attraction sites in SNNPRS and ONRS; the known destination are ASLNP and generally the lakes strip that include Hawassa, Zeway, Shalla, Langano and Abyata. Implementation of the proposed road is therefore will give momentum to the already accelerating tourism industry in the southern part of Ethiopia.

The other justification to the proposed Dual carriageway is related to it's flexibility to be changed in to expressway when the need arise in the future. This is due to having the same geometric standards to that of the expressway option and therefore, transformation into an expressway in the future will only require some ancillary works and no demolition/replacement of works. As the dual carriageway route is not fenced, it will allow free access across the road route. Nevertheless, underpass will be provided by the project to avoid people, livestock and other local transport means interference with traffic and reduce/avoid accident risk.

3.2 Main Project Components, Activities & Features

3.2.1 Project standard components & structures

The proposed Lot 4Arsi Negelle – Hawassa Road Project has DS-1 standard construction of 4lane dual carriageway, a length of 51.48kmand 90m ROW.

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 (over 95%) 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 potential sliding degraded and rugged terrains.

Environmental considerations have been taken while establishing the new road route near protected area or environmental sensitive area within the project influence area. The last section of the road route has been modified to avoid adverse impact on Cheleleka swamp area which is in line with the environmental recommendation to prevent adverse impact on sensitive habitat.

A brief summary of the project feature and technical parameters based on data obtained from the highway design engineers is shown in Table 3-2.

Table 3-2: The proposed dual carriageway road main features & design parameters

Main Project Features & design Parameters	Lot 4Arsi Negelle – Hawassa New Highway Dual Carriageway Road Project
Standard	DS-1
Design length	51.62km
Carriageways	Dual
Lanes per carriageway	2x3.65m + paved and unpaved shoulder (inner and outer side)
Median width	9 m (Area separated)

3.2.2 Principal Earthwork

The essential components and activities involved in the road project implementation consist of principal earthwork, various structures associated with construction of dual carriageway and development of ancillary works. 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. High rise embankments are required at several locations to protect the paved road from flooding damages and water inundation.

3.2.3 Land requirement

The major land requirement for the project comes from laying the new dual carriageway pavement and ROW (90m) and together with the link roads a total of 846.2ha of land will be taken permanently. Material sites which include development of borrow pits and quarry sites will take up65ha of land, and the total land for establishing the camp and garages would be 20ha. The total land requirement for the project is there for calculated to be 931.2ha (see Table 3-3).

Table 3-3Summary description of main land-take categories required by the proposed dual carriageway

Land-take categories	Land take in ha	land take in %	Remark
Dual carriageway pavement & ROW(90m) including link roads & roundabouts	846.2	90.9	Permanent
Material sites (Borrow & quarry)	65.0	7.0	Permanent/temporary
Camp & Garage site	20.0	2.1	Permanent/temporary
Total	**931.2**	**100.0**	

3.2.4 Land use & cover features along the proposed dual carriageway road project corridor

The proposed dual carriageway route corridor deviates from the exiting Modjo-Hawassa asphalt road; and main land use and land cover along the project corridor and construction

sites include crop cultivation, acacia woodland (mainly from start near Zeway to Arsi Negele area), scattered trees of Montanan forest (mainly from Arsi Negele to Shashemene road route section), scattered rural settlements along majority of the route and urban section in the last section, seasonal flood palin mainly around Tikure Wuha river and degraded area mainly in the Arsi Negele section. Table 3.4 provide a brief land use/land cover and other environmental features encountered in the proposed dual carriageway ROW and route corridor based on site survey and assessment, data from RAP study findings, information obtained from other sources like Google Earth.

The majority of the proposed road route corridor (80%) traverses in smallholder mixed crop cultivations (main crops being Maize, Sorghum, Wheat, Pulses, Pepper etc) in sparsely populated rural settlements.

The route corridor also traverses Montana Forest vegetation with scattered rare trees species left in farm land. This natural vegetation consists of about 12.6 % of the total new road route corridor. The road route then traverses through bare and eroded soils with scant vegetation near Bulbula Rivers and some part in Arsi Negele area. Flood plain, settlement, and degraded area constitute about 0.9%, 0.5% and 0.8% of the total road route area respectively. Table 3-4 shows major land use and land cover along with estimates of area in ha from the total dual carriage way road (90m ROW) and link roads (50m ROW).

Table 3-4Land use types in the new dual carriageway route corridor (*90*m ROW) & link roads (50m ROW)

Major Land use Land cover types	area in ha	In %	Remark
Crop	720.8	85.2	
Forest/woodland	107	12.6	
settlement	7.4	0.9	
flood palin	4	0.5	
degraded	7	0.8	
Total	**846.2**	**100.0**	

3.2.5 Settlement services & infrastructure

The proposed dual carriageway road project starts near Arsi Negelle town forming a connection with the end point of Lot 3 Zeway-Arsi Negelle New Dual Carriageway Road Project. The majority of the road route traverses scattered rural settlement area with very limited service and infrastructure condition.

The proposed dual carriageway traverse across people and livestock paths and community roads (mud), regional roads (gravel), and also the existing Modjo – Hawassa asphalt road.

3.2.6 Development of ancillary works

- **Material sites (borrow/quarry)**

Relatively large quantities of crushed stone will be needed for base course and surfacing material. However, subbase course and aggregate for concrete are scarce along the road project corridor, and those sites identified for limited production of sub base are located in proximity of Zeway, Shashemene and Hawassa towns. Normally, quarry sites for selected material are needed at about 10kms interval while quarries of stone blocks for gravel are required at 50kms interval along the road. Availability of suitable quarries for stone blocks and gravel at some locations might be a constraint with consequent need of transportation from

relatively distant places. Large quantities of crushed stone are going to be transported long distance especially for the first section of the road which extends up to Zeway area.

The soil and material study have identified availability of suitable material sites for the project road construction including sites for borrows pits, gravel sub-base, rock quarry sites, water and sand sources. These material sites are located along the road route surrounding area, and some of them were used some years back during rehabilitation of the existing road. Almost all identified material sites are accessible; majority of the site's land use and land cover is bare/rocky and used as extraction of material. Table 3.5 to Table 3.7 show summary description of material sites and for the detail the soil and material study report shall be referred. Sand source for the project are available in the project road area around Awash, Meki and Kore rivers and from Lake Langano. Water for the project construction is available along the project road route from Bulbula and Dedeba Tiliku Rivers.

Table 3-5Description of suitable borrow sites

No.	Station (km)	Description of materials	GPS	Quantity (m3)	Laboratory Test Results			Recommendations
					PI (%)	CBR (%)	CBR swell (%)	
1	172.0 both LHS & RHS	Light brown silty sandy gravel	458443 803340	30,000	14	56	0.04	Suitable
2	178.0 both LHS& RHS	Light grayish silty sandy gravel(pumice)	453759 799967	30,000	NP	59	0.04	Requires blending with material having sufficient plasticity for binding
3	186.0 both LHS& RHS	Light grayish silty sandy gravel(pumice)	447969 794636	30,000	NP	57	0.13	Requires blending with material having sufficient plasticity for binding
4	191.2, LHS 5,2-km	Reddish brown sandy silty mixed with Pumice	447800 790850 1669	100,000	7	21	0.68	Suitable
ERAs' Specification Requirements					Max 30	CBR Min 5%	Max 1.5%	

Ser	**Station (km)**	**Description of materials**	**GPS**	**Overburden thickness (m)**	**Quantity (m3)**	**Veget. cover**	**Remark**
1	159.0, LHS 1.0-km	Decomposed tuff inter bedded with pumice, sand and ash	463440 819507	Nil	45,000	Few	• New site
2	163.0, LHS-1.0-km	Decomposed tuff inter bedded with pumice, sand and ash	462046 815005	Nil	30,000	Few	• New site
3	170.5, LHS 0.7-km	Decomposed tuff inter bedded with pumice, sand and ash	459835 807426	Nil	90,000	Very few	• New site • Exposed near the river bank
4	179.5, RHS 0.2-km	Partially weathered to decomposed tuff	455003 800660	Nil	10,000	Nil	• New site
5	183.0, RH 5.4	Inter bedded sandy silty clay and pumice underlain by scoria	446448 800960	0.5	100,000	Nil	• Existing pit • Bottom part could be used as sub base
6	191.3, RHS 1.4-km	Weathered to decomposed trachy rhyolite with inter beds of pumice	442768 793789	Nil	400,000	Nil	• New site
7	196.0, RHS 0.5-km	Sandy silty clay inter bedded with pumice and sand	440553 789477	Nil	100,000	Nil	• New site

Table 3-6 Description of selected borrow for gravel sub base construction

S.no	Station (km)	Description of materials	GPS Coordinates	Quantity (m3)	Accessibility	Laboratory Test Results (%)		Remarks
						PI	CBR	
1.	206.0, 4.4Km RHS	Reddish scoria	442887 775732	**50,000**	Accessible & existing sources	NP	102	To be checked

S.no	Station (km)	Description of materials	GPS Coordinates	Quantity (m3)	Accessibility	Laboratory Test Results (%)		Remarks
						PI	CBR	
ERAs Specification Requirements						Max 12	Min 30	

S.no	Station (km)	Description of materials	GPS (N & E)	Overburden thickness (m)	Quant. (m3)	Vegetation	Accessibility	Remarks
1	183.0, RHS 5.4-km	Scoria overlain by sandy silty clay and pumice	446448 800960	5-6	100,000	Nil	Accessible	Existing pit Needs selective pitting
2	183.0, (Shashemene), RHS 11.8-km towards Sodo, RHS 2.2-km	Reddish scoria	442900 804211	Nil	250,000	Nil	Accessible	Existing pit
3	183.0, (Shashemene), RHS 7.7-km towards Wendo Genet, LHS 50m	Partially weathered to decomposed trachy RHYOLITE	455558 787541	Nil	150,000	Nil	Accessible	Existing pit
4	193, LHS 2.4-km	Reddish scoria	448407 788716	Nil	25,000	Nil	Accessible	Existing pit
5	206.0 (Awassa University), LHS 2-km (Chefe locality)	Reddish scoria	445815 779647	Nil	150,000	Nil	Accessible	Existing pit

Table 3-7 Description of rock quarry sites

S.no	Station (km) and offset from CL	Materials description	GPS	Quantity (m3)	Overburden (m)	Accessibility	Laboratory Test Results in %				
							Soundness	ACV	LAA	Water Absorption	Bituminous Aff.
1.	179.5, LHS 4.5km up to Shshemene and 6-km from Shashemene along Kokosa road, RHS 0.5-km	Grayish, basaltic rock	461430 793574	200,000	2-3m top soil	Accessible	0.78	14	18	1.49	Above 95
2.	211.0, 500m RHS (Outskirt of Awassa town on Dila side)	Grayish, fine to medium, fresh, columnar Trachy basalt	445270 775070	200,000	Nil	Accessible	1	19	22	2.4	Above 95
ERAs' Specifications Requirements for AC aggregate							Max 12	Max 21	Max 30	-	Above 95
ERAs' Specifications Requirements for base course							Max 12	Max 25	Max 40	-	
ERAs' Specifications Requirements for cement concrete aggregate							Max 12	Max 25	Max 40	-	

No	Station (km) and offset	Materials description	GPS	Quantity (m3)	Overburden (m)	Vegetation cover	Accessibility	Remarks
1	159.6, LHS 4.1-km along earth and asphalt road (165.0, LHS 400m)	Ridge forming, massive to widely jointed IGNIMBRITE/IGNIMBRITE	463921 8772 12	50,000	2-4	Nil	Accessible	Kuyera quarry Existing
2	193.0, LHS 8.1-km	Ridge forming, blocky to widely jointed trachy RHYOLITE, strong	447592 7897 02	200,000	1-2	nil	Accessible	New site

- **Construction camps and garages**

The contractor will establish principal construction camps at convenient locations within the specified sites. Camp facilities will include office and residential accommodation for senior supervisory staff and operators, plant 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.

For the proposed dual carriageway road project construction, a total of about 20ha of land would be required for establishment camp and garages facilities at convenient locations for construction and at the same time with minimal adverse impact. Subsidiary camps with relatively smaller area requirement may be established between the main camps.

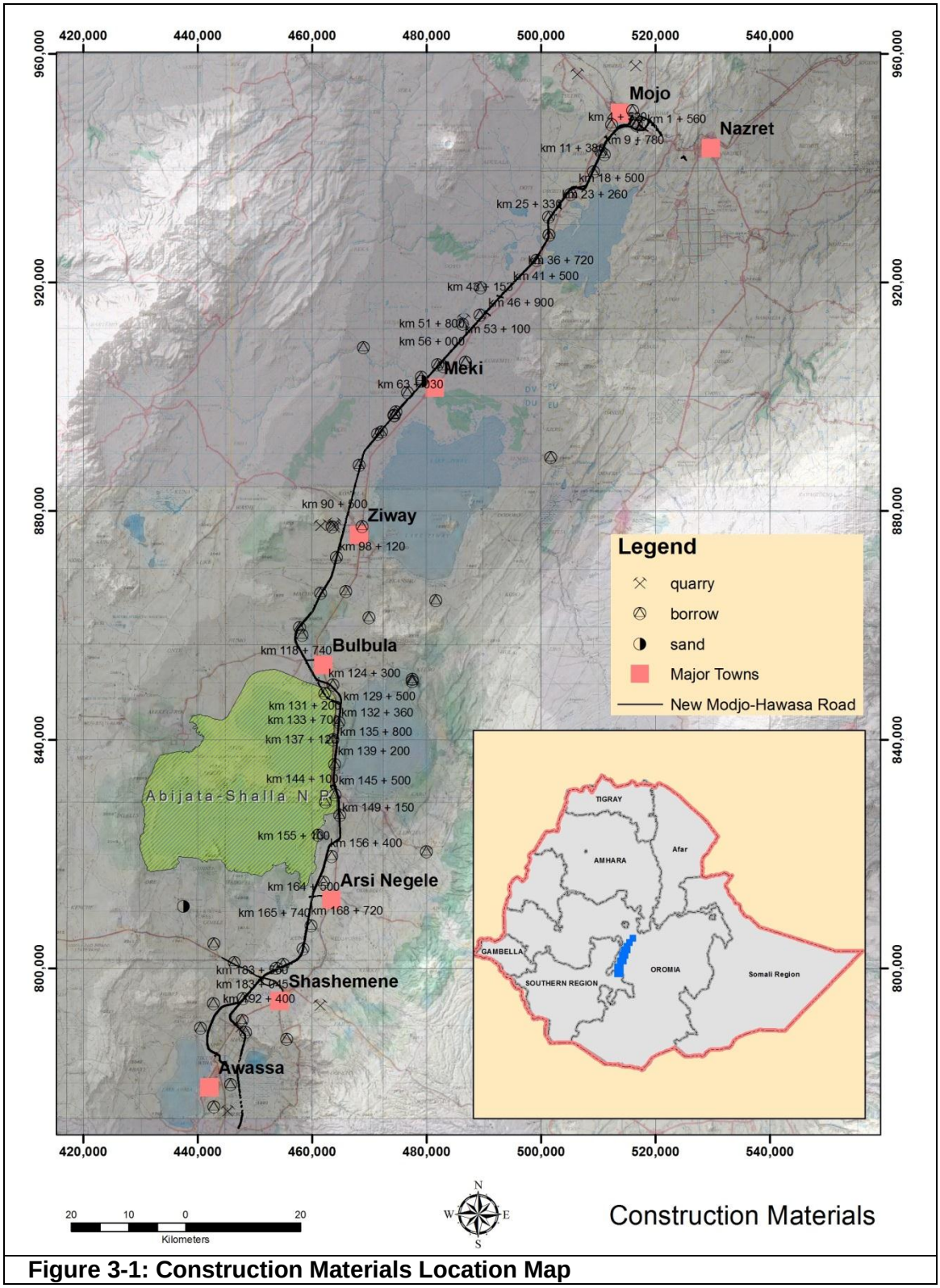


Figure 3-1: Construction Materials Location Map

4. BASELINE OF THE RECEIVING ENVIRONMENT

4.1 Physical Environment

4.1.1 Topography

The road project is located in the central Rift Valley which is characterized by flat land and depressions that formed the lakes, run off from the highlands drains through stream channels. Generally, the elevation in the road project area ranges from 1600masl to 2000masl. The topography along the project road route is dominantly flat plain, about 66% of the route is characterized by a slope gradient <3%, whereas 32% displays a slope gradient between 3 and 5%. The streams crossing the road corridor originate from hilly and mountainous areas in the road project surroundings. The new dual carriageway route differs from the existing route and most of the road corridor will be aligned west of the existing road route where the land is relatively elevated and with high slope gradient.

4.1.2 Climate and meteorology

The project is located in a warm temperate zone. The mean daily temperature ranges from 12.5°C to 31.5°C area-wide, with 6.6-21°C excursion in Modjo and 8-31°C in Hawassa. Annual rainfall varies from 750mm to 1250mm area-wide increasing from 875mm at Modjo to 1100mm in Hawassa (see table 4.1).

The distribution of rainfall in the road project area is highly influenced by orographic factors and is significantly correlated with altitude, i.e. the climate along the route varies as a function of elevation. The seasonal rainfall distribution within the project area results from the annual migration of the ITCZ. Two rainy seasons are experienced in a year. The main rainy season often extends from the end of June through to the end of September with a lesser rainy season from the end of February to the middle of May, the rest of the months in the year being generally dry. The following tables show climatic features at the end of the project for Hawassa town.

***Table 4-1*Climatic Data-Hawassa**

Month	Max. Temp. (°C)	Min. Temp. (°C)	Humidity (%)	Rain fall mm/month
January	28.6	9	70	29
February	29.1	11.3	64	52
March	29.3	12.2	69	60
April	28.3	13	71	96
May	27.1	13	82	107
June	25.7	13.1	82	91
July	24	13.7	83	151
August	21.9	13.2	82	124
September	24.8	12.8	83	133
October	26.2	11.7	80	76
November	27	9.2	68	28
December	27.9	7.7	66	14

Annual values	26.66	11.66		961

4.1.3 Soils and geology

Soils

The subgrades of the alignment soils are largely alluvial and lacustrine in origin. These are often underlain by thick deposits of volcanic ash and pumice. There are also soils derived from the in situ weathering of mainly acid volcanic parent rocks, thus constituting residual to a very large extent. Dark expansive soils (vertisol) are observed covering less than 10% of the road corridor, mainly around Tikure Wuha River. The vertisol are difficult for civil work construction as they swell during wet and crack when dry. The soils to most part of the road corridor are light reddish and light gray soils with varying proportions of sand gravel silt and clay and they are dominantly used for crop cultivation.

Geology

The project road crosses mainly Quaternary Deposits and Rocks of Volcanic Origins. The geology in the project road route corridor is made of two litho-stratigraphic units; the first section is made of Alluvial and Lacustrine Deposits with Volcanic which consist mainly of sand, silt and clay with thick deposits of Volcanic Ashes and Tuff. The geology in the remaining road segment consists in Ignmbrite with ash flows, Pumiceous Tuff and unwelded Tuff.

A small section of the route, especially along the Arusi Negele, Kuyera and Shahemene area,is constituted by Rhyolitic and Trachyte Volcanics, composed of mainly Obsidian, Pumice Taff and Ignimbritc with trachyte. The geology along the proposed dual carriageway route is the same to that of the existing road.

4.1.4 Water resources and quality

a) Surface water resource (rivers, streams, lakes)

Rivers

The road project road traverses exclusively the Rift Valley Lakes Basin (RVLB). Generally, rivers with perennial flow are scarce and the main river traversed north to south by the road project is Tikur Wuha (Table 4.2).

Table 4-2Summary description of Tikur Wuha River

Name of the river	Catchment area (km2)	Max Mean Daily (m3/sec)
Tikur Wuha	625	9

Source: Hydrology team analysis from collected metrological data

The newhighway requires construction of new bridges along the above rivers to be located few kms upstream or downstream of the existing bridges along the existing Modjo-Hawassa road. The new routealso requires high embankments in the flat plain areas around Tikure Wuha River.

Lakes

The last section of the proposed route liesdownstream of Cheleleka swamp in the ring road of Hawassa town (if it happens to end after Tikur Wuha Bridge).Natural and human induced activities such as steep slope cultivation, deforestation in the upstream watershed, excessive sedimentation have already resulted in degradation of the wetland. The wetland provides

various ecosystem services & benefits such as flooding control, water purification, and habitat for various aquatic flora and fauna. The RVLBIRMPSP 2008 indicates that the Hawassa & other lakes in the RVLB are suffering from increased sedimentation and pollution from domestic, agricultural and industrial effluents; anda summary description of Hawassa Lake is provided in Table 4.3.

On the other hand, Box 4.1 presents the description of Lakes in the Hawassa Catchment while the map of the catchment is depicted in Figure 4.1(Ayenew, T. (2009).

Table 4-3 **: Principal Features of Lake Hawassa**

Lakes	Main tributaries	Surface area (Km^2)	Avaliable water volume (Mm^3)	Max depth (m)
Lake Hawassa	Wendo Genet, kedo	93	143	23

Source: RVLBIRMPSP 2008 Annex A: Environmental Status

Box 4.1:

Lakes in the Hawassa Catchment

The Hawassa catchment represents a large collapsed caldera bordered by highlands to the north and east. The centre of the caldera is occupied by Lakes Hawassa and Shallo (Cheleleka). The elevation of Lake Hawassa is 1,680 masl representing the culmination of the Ethiopian Rift floor level occupied by lakes. The floor of the caldera is faulted and dotted by volcanic hills such as Tabor and Alamura forming eye-catching view around the town of Hawassa.

Hawassa is the smallest of all the major lakes south of the Awash Basin. The catchment has no surface outlet. It is about 15 km long and 5.5 km wide with a maximum depth of 22 m. The surface area of Lake Shallo (Cheleleka) is 12 km^2; and the elevation difference between the two lakes is around 5 m. Lake Cheleleka is remnant of of a much larger lake that includes the surrounding swampy plain covering the floor of the caldera northeast of Hawassa town.

The caldera floor is distinctly separated from the surrounding highlands by scarps and steep mountain slopes. The elevation difference between the floor of the caldera and the bordering scarps and volcanic complexes ranges from 200 to 900 m. Rivers drain into the lakes from the mountain areas. The rivers from the eastern and south-eastern highlands feed Lake Cheleleka throughout the year. The main rivers are Wesha, Werka, Burura, Gomesha and Wema. Overflow from Cheleleka drains into Lake Hawassa via Tikur Wuha River (Figure 4.1). In the eastern, western, north-eastern and southern sides of the catchment, no perennial rivers reach the lake. Seasonal streams terminate in wide-open fractures before reaching the lake.

Lake Hawassa is a major source of fish for the local community. The fishing shore at Hawassa town, especially when the commercial fish catch is being landed and sold, is a dramatic and beautiful place (scene) to see.

Although Lake Hawassa has no snad beaches, it is one of the best sites to watch variety of

birds including: ducks, waders, herons and pelicans. There are also plenty of woodland bird species including blue-headed coucal around the Lake (on Hawassa town side).

(Source: Ayenew, T. (2009):16, 19-20)

b) Ground water resource

Ground water resource in the project area is characterized by shallow seated flow, generally parallel with the ground surface, from valley sides to valley floor and within the valley floor according to local topography. The RVLBIRMP study indicated that the aquifers in the lacustrine deposits of the valley floor are potentially extensive and groundwater flow may be relatively rapid, although there may be little groundwater storage except where thick layers of alluvium have developed.

c) Water quality

Environmental information with regard to water quality in the project area has been obtained from discussions with stakeholders, previous professional knowledge and review of relevant study documents. Review of the masterplan study report5 indicates that the streams are provided with fresh water, low level of mineralization and high level of suspended solids and are chemically suitable for irrigation water supply (purification) although pollution hotspots were identified mainly in relation to domestic wastewater disposal and industrial effluent around larger towns such as Hawassa and Zeway. Table 4-4 shows water quality analysis results for some of the streams along the project road, based on studies review. Local people and study documents indicated that soil erosion and sedimentation is the major problem affecting the streams and lakes water quality.

*Table 4-4 **:** shows water quality data of the lakes in the project influence area, based on secondary data collection.Figure 4-1*

[5]RiftValleyLakesBasin Integrated Resource Development Master Plan Study Project, Annex D EnvironmentSEA MoWR 2009

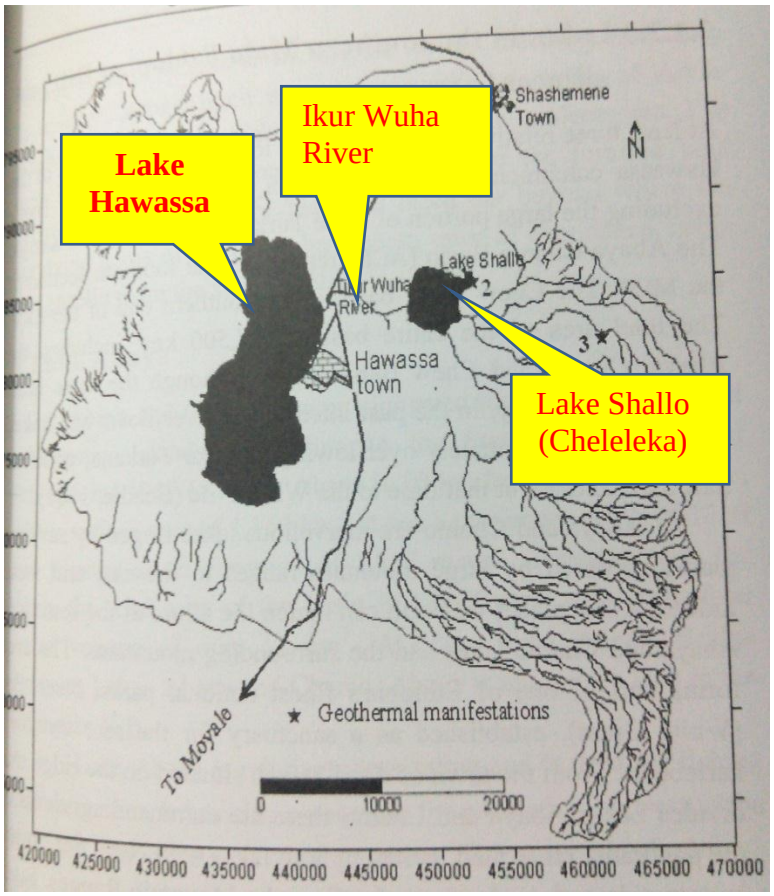


Figure 4-2 Map of the Hawassa Catchment

Table 4-5 Water quality data of Lake Hawassa

Lake	Sampling time	Physico-Chemical Parameters								
		pH	TDS	EC	DO	Ca^{+2}	HCO_3	Cl^-	F^-	Na^+
	Units	-	mg/l	µS/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Hawassa	April	9.0	424	886	6.7	11.2	237	32	7.65	162
	August	8.98	408	848	6.8	10.4	315	31	7.6	168

Source: RVLBIRMPSP 2008 Annex A: Environmental Status

Table 4-6 Water quality data of some rivers crossed by the project road
Source: RVLBIRMPSP 2008 Annex A: Environmental Status

Parameters	Tikur Wuha		Meki		Bulbula		Huluka		Lepisi		Gedemso	
	April	August	April	August	April	August	April	August	April	August	April	August
TDS (mg/l)	175	109	7.94	7.25	231	211	58	65	69	37	79	26
EC (µS/cm)	368	229	530	3600	482	442	122	137	146	78	165	58
TSS (mg/l)	196	68	142	43	96	122	886	440	46	262	32	298
Na (mg/l)	57.5	35	294	90.4	54	60	6.6	8.9	9.3	4.1	12.7	4.4
K (mg/l)	13.5	6.0	5.6	6.4	12.3	10.6	7.4	4.9	5.8	2.5	6.8	2.5
Ca (mg/l)	8.8	9.6	530	3,600	21.6	20.8	14.4	10.4	11.2	4.0	10.4	3.2
Mg (mg/l)	4.86	2.92	29	15	8.748	6.8	3.89	3.89	2.43	2.916	3.4	1.944
HCO_3 (mg/l)	151.28	75.64	10.1	5.9	246.44	190.32	58.56	34.16	56.12	17.08	63.44	7.32
Cl (mg/l)	13.0	13.5	25.6	4.8	14	12.5	5.5	5.5	5.0	3.8	5.5	3.8
SO_4 (mg/l)	40.73	2.2	6.804	0.486	6.14	0.4	19.15	2.8	1.69	3.1	3.28	2.6

4.1.5 Land use

The land use and land cover along the project corridor is established through use of Google Earth, satellite imagery, onsite observation and checking supported by information obtained from previous studies. Prevailing land uses include crop cultivation, acacia woodland and scattered remnant trees of Montana forest. Table 4.6 shows the major land use types and coverage in ha with the proposed dual carriageway road project and Figure 4-3 shows representative photos taken in the project road area.

The majority of the proposed road route corridor (85.8%) traverses in smallholder mixed crop cultivations (main crops being Maize, Sorghum, Wheat, Pulses, Pepper etc) in sparsely populated rural settlements.

The new dual carriageway road route traversessparsely populated rural village settlement with very limited service and infrastructure condition except the last section that falls close to Hawassa town.

Table 4-7 Land use and land cover in the project road corridor ROW

Major Land use & land cover category	area in ha	area in %
Crop	720.8	85.2
Forest/woodland	107	12.6
settlement	7.4	0.9
flood palin	4	0.5
degraded	7	0.8
Total	846.2	100.0

Figure 4-3: Physical environmental features along the road corridor and surrounding environment

roads traversed by the new road

Exiting road traversed by the new road

Seasonal flood plain, community trail around 24km

Proposed road route in private investment190-198km

The existing road for all kind of transport use

Montana forest indigenous trees, in the proposed road route

4.2 Biological Environment

4.2.1 Environmentally sensitive and protected conservation areas

There are no environmentally sensitive sites in this Lot except the possible impact if it would cross Tikur Wuka River apart from the site of the existing bridge (possibly on the upstream side of the existing bridge site).

The proposed road route corridor is modified to avoid direct adverse impact on Cheleleka swamp which is environmentally sensitive habitat providing various ecosystem services and benefits like water purification, recharge of Hawassa Lake, livestock grazing, important bird area, fish breeding etc. In the last section of the project has been modified and the new dual carriageway route aligned along the existing road (about 500m away east of the existing road) a new bridge across Tikur Wuha river (a km upstream of the existing bridge), and then laid in the eastern corner &ring road of Hawassa town.

4.2.2 Vegetation/Flora and Wildlife

Vegetation type

Terrestrial habitat in the road project area is associated with the type of vegetation available and human interference. The vegetation types encountered in the project road influence area include Acacia woodland in combination with savanna, Dry evergreen Montana forest and Riverine vegetation. The acacia woodland is typical of the central Rift Valley and is the dominant vegetation cover along the project area. The Dry evergreen Montane forest mainly occurs between Arsi-Negelle and Shashemenne, people usually leave some of the indigenous tree in their farm. Road route ROW for the dual carriageway will result disruption of trees falling in the Montna forest. The Riverine vegetation is more pronounced along Bulbula and other streams with noticeable perennial flow.

Dense acacia woodland used to be the dominant natural vegetation in the road project and surrounding environment as reported by local elders and during the various consultation meetings. At present, the main terrestrial habitat in the road project section are mainly associated with the ASLNP, remnant acacia forest patches between Adamitulu and Bulbula and scattered trees in the farmland. Significant portion of the natural vegetation has been disappeared in the past 3-4 decades following establishment and expansion of settlement centers and intensification of crop cultivation, deforestation for fuel wood and charcoal making. Natural vegetation is still the main source of fuelwood for people in the project area and elsewhere in the country. The remaining natural vegetation, especially acacia sps is cut and prepared for charcoal sale. Quite many youth are engaged in charcoal business as observed during site visit. Eucalyptus, an exotic species which has been planted in homesteads, along farmland perimeters, on private plantations, in government protected and enclosure areas, supports wood requirement for construction and fuel wood as well as improves family subsistence through sales proceeds. Indigenous tree species with important economical and ecological importance are very limited.

Roadside trees and shrubs vegetation found in the potential link roads with the proposed dual carriageway route interchanges (graded) through roundabouts. The species mainly consists of introduced species and common species found in such locations as Acacia albida, Acacia seyal, Acacia tortilis, Euphoriba tirucalli, Argemone mexicana, Grevillea robusta, Lantana camara, Opuntia ficus-indica, Schinus molle and Spathodea nilotica.

Land cover and flora species along the road route and surrounding environs

The land cover in the proposed dual carriageway route corridor generally alternates between agriculture and acacia woodland cover with various flora combinations, and the main species include Acacia tortilis, Balanites aegyptiaca, Calotropis procera, Ehretia cymosa, Echinops sp., Parthenium hysterophorus, Solanum incanum and Xanthium spinosum. Parthenium hysterophorus and introduced invasive species found in the project road area.

The common plants in the starting section near Zeway town include some native (Acacia tortilis and Cordia africana) and introduced ones (Casuarina equisetifolia, Delonix regia, Melia azedarch, Schinus molle and Spathodea nilotica).

The road section between Horo Kelo River and Shahemene and further to Hawassa is populated by Alo sps, namely Aloe gilbertii, A. pubescens and A. macrocarpa. Aloe gilbertii is the most common with bright red flowers and with stems up to 1.5 m long. Aloe gilbertii and A. pubescens are narrow endemics and A. macrocarpa is widely spread in Africa. However, it should be noted that all species of Aloe found in the wild are protected by an International Convention for the protection of Wild fauna and Flora (CITES). The species is also encountered near Dedeba River.

The vegetation type from Arsi Negele to Shahemene is Dry Evergreen Montane Forest with remnant indigenous trees distributed in the area. This vegetation type and the associated remnant tree species will be affected by opening of new highway road route. The main plant species in this section are Albizia schimeriana, Podocarpus falcatus and Ficus vasta. The trees are observed scattered throughout farm and settlement areas, the density being generally low, estimated between 16 to 40 tree stands/ha.

The list of plant species observed during the site visit and reported by stakeholders (ASLNP, weredas Bureau of Agriculture and Rural Development) are shown in Table 4.8.

Table 4-8: **List of flora species found in the project influence area**

Flora Scientific Name	Vegetation type
Acacia albida	*Acacia* woodland
Acacia cyanophylla	*Acacia* woodland
Acacia lahai	*Acacia* woodland
Acacia Senegal	*Acacia* woodland
Acacia seyal	*Acacia* woodland
Acacia tortilis	*Acacia* woodland
Acyranthes aspera	*Acacia* woodland
Albizia schimperiana	DEGMF*
Aloe gilbertii	*Acacia* woodland & DEGMF
Aloe macrocarpa	DEGMF
Aloe pubescens	DEGMF
Amamarnthus spinosus	*Acacia* woodland
Argemone Mexicana	*Acacia* woodland
Arundo donax	*Acacia* woodland
Balanites aegyptiaca	*Acacia* woodland

Flora Scientific Name	Vegetation type
Calotropis procera	*Acacia* woodland
Casuarina equisetifolia	*Acacia* woodland
Ceiba pentandra	*Acacia* woodland
Combretum molle	Riverine vegetation
Cordia Africana	*Acacia* woodland & DEGMF
Cordia monoica	*Acacia* woodland
Croton dichogama	*Acacia* woodland
Croton macrostachyus	*Acacia* woodland & DEGMF
Datura stramonium	*Acacia* woodland
Delonix regia	*Acacia* woodland
Echinops sp.	*Acacia* woodland
Ehretia cymosa	*Acacia* woodland
Euphorbia candelabrum	*Acacia* woodland & DEGMF
Euphorbia tirucalli	*Acacia* woodland
Eucalyptus camaldulensis	*Acacia* woodland & DEGMF
Ficus sycomorus	*Acacia* woodland
Ficus thonningii	Riverine
Ficus vasta	*Acacia* woodland & DEGMF
Grevillea robusta	*Acacia* woodland
Heliotropium sp.	*Acacia* woodland
Hypericum lanceolatum	DEGMF*
Justicia schimperiana	*Acacia* woodland
*Lantana camara***	*Acacia* woodland & DEGMF
Leonotis raineriana	*Acacia* woodland
Ocimum gratissimum	*Acacia* woodland
Melia azedarch	*Acacia* woodland
Nicandra physaloides	*Acacia* woodland
Opuntia ficus-indica	*Acacia* woodland
*Parthenium hysterophorus***	*Acacia* woodland
Pistia striates	*Acacia* woodland
Podocarpus falcatus	DEGMF*
Polygonum sp.	*Acacia* woodland
Pterolobium stellatum	*Acacia* woodland
Ricinus communis	*Acacia* woodland
Rumex nervosus	*Acacia* woodland
Salvia merjamie	*Acacia* woodland
Schinus molle	*Acacia* woodland
Senna didymobotra	*Acacia* woodland
Senna occidentalis	*Acacia* woodland

Flora Scientific Name	Vegetation type
Sida schimperiana	*Acacia* woodland
Solanum incanum	*Acacia* woodland
Spathodea campanulata	*Acacia* woodland
Urtica simensis	*Acacia* woodland
Xanthium spinosum	*Acacia* woodland
Xanthium strumarium	*Acacia* woodland

Fauna

The natural vegetation used to be an important habitat for wildlife, but the numbers of species and individuals have declined with the extensive change of land use to crop production. The wildlife population and diversity in the project area is very limited. According to the relevant wereda agriculture offices the main wildlife species that can be observed sporadically are Snakes, Monitored Lizard, Hippopotamus, Warthog, Greater Kudu, Baboon, Porcupine, Wartoug, Pig, Hayna, Common Bushbuck and Hare. Various bird species were observed during the site visit around the lakes Zeway Abijata, Hawassa, and the swamp near Tikure Wuha River. Encroachment of the National Park by farmers and conversion of Acacia woodland to farmland has also significantly reduced terrestrial habitats.

Table 4.9 shows Mammalianfauna species that are present in the Rift Valley along the project road and its vicinity including the Abijatta-Shalla National Park (Source Hillman, J.C. 1993.Ethiopia: Compendium of Wildlife Information 786pp)

Table 4-9: **Known fauna present in the project road influence area**

Family		Common Name
	Bats	
Pteropidae	Epemophorus minimus	
	Epemophorus labiatus	Little Epauletted Fruit Bat
	Epemophorus gambianus	Gambian Epauletted Fruit Bat
	Rousettus aegyptiacus	Egyptian Fruit Bat
Emballonuridae	Taphozous petroforatus	Egyptian Tom Bat
Mycterdae	Nycteris thebaica	Common-Slit faced Bat
Rhinolophidae	Rhinolophus simulator	Bush Horseshoe Bat
	Rhinolophus blasii	Peak-saddle Horseshoe Bat
	Rhinolophus fumigatus	Ruppell's Horseshoe Bat
	Rhinolophus hildebrandtii	Hildebrandt's Horseshoe Bat
Hipposideridae	Hipposideros caffer	Sundvall's African Leaf-nosed Bat
	Hipposideros megalotis	Large-eared Leaf-nosed Bat
Vespertilionidae	Pipistrellus somalicus	Somali Serotine Bat
	Pipistrellus capensis	Cape Serotine Bat
	Myotis tricolor	Temminck's Hairy Bat
	Myotis scotti	Scott's Hairy Bat
	Scotophilus dinganii	Giant Yellow House Bat
Molosidae	Tadarida pimula	Little Free-tailed Bat
	Tadarida condylura	Angola Free-tailed Bat
	Tadarida ansorgei	Ansorge's Free-tailed Bat

Family		Common Name
Hedgehogs and shrews		
Soricidae	Crocidura fuscomurina	
	Crocidura olivieri	
	Crocidura phaeura	
Rodents		
Sciuridae (Squirrels)	Heliosciurus gambianus	Gambian Sun Squirrel
	Xerus erythropus	Geoffroy's Ground Squirrel
Gliridae (Dormouse)	Graphiurus murinus	African Dormouse
Mridae (rats and mice)	Tatera robusta	Large Gerbil
	Dendromus melanotis	Grey Mouse
	Otomys typhus	Swamp Rat
	Mus tenellus	Pigmy Mouse
	Mus mahomet	Mahomet's Mouse
	Praomys fumatus	African Medow Rat
	Praomys albipes	White-footed Rat
	Praomys erythroleucus	Multi-mammate Mouse
	Arvicanthis abyssinicus	Ethiopian Grass Rat
	Arvicanthis niloticus	Lowland Green Rat
	Pelomys harringtoni	Harrington's Scrub Rat
	Lophuromys flavopunctatus	Harsh-furred Mouse
Rhizomysidae (Molerats)	Tachoryctes splendens	Common Mole Rat
Hystricidae	Hystrix cristata	Crested Porcupine
Primates- Bushbabies and Monkeys		
Lorisidae (Bushbabies)	Galago senegalensis	Senegal Bushbaby
Cercopithecidae (Monkeys)	Ceropithecus aethiops	Grivet Monkey
	Papio anubis	Anubis Monkey
Colobidae	Colobus guereza	Guereza
Carnivores		
Mustelidae	Ictonyx striatus	Zorilla, Stripped Polecat
	Mellivora capensis	Ratel
Canidae	Otocyon megalotis	Bat-eared Fox
	Canis adustus	Side-stripped Jackal
	Canis aureus	Golden Jackal
	Canis mesomelas	Black-backed Jackal
Viveridae	Viverra civetta	Civet
	Genetta felina	Common Genet
	Atilax paludinosus	Marsh Mongoose
	Helogale parvula	Sothern Dwarf Mongoose
	Herpestes sanguineus	Lion-tailed Mongoose
	Ichneumia albicauda	White-tailed Mongoose
Hyaenidae	Crocutta crocutta	Spotted Hyaena
Felidae (Cats)	Felis silvestris	Wildcat
	Felis serval	Serval
	Felis caracal	Caracal

Family		Common Name
	Panthera pardus	Leopard
Even-toed Ungulates		
Hippopothamidae	Hippopotamus amphibius	Hippopotamus
Suridae (Pigs)	Phacochoerus africanus	Common Warthog
Bovidae	Silvicapra grimmia	Bush Duiker
	Oreotragus oreotragus	Klipspringer
	Ourebia ourobia	Oribi
	Redunca redunca	Bohor Reedbuck
	Redunca fulvorufula	Mountain Reedbuck
	Gazella granti	Grant's Gazelle
	Tragelaphus imberbis	Lesser Kudu
	Tragelaphus strepsiceros	Graeter Kudu
	Tragelaphus scriptus	Bushbuck
Hyraces		
Procaviidae	Procavia capensis	Rock Hyrax
Hares and Rabbits		
Leporidae	Lepus fagani	Fagan's Hare
Aardvark		
Orycteropodidae	Orycentropus afer	Aardvark

Aquatic habitat flora & fauna

The aquatic habitat in the project road area is characterized by streams with perennial flow, the lakes and surrounding swamp area. There are very few rivers in the project area notably Tikur Wuha river. The proposed road project requires construction of new bridge structure across these main rivers and streams. Most of the rivers are reported to have problems of silitation affecting the lake storage and aquatic biodiversity. The lake habitat-especially Hawassa Lake-is encountered downstream towards the end of the project.

4.3 Socio-economic Environment

4.3.1 Project Affected Weredas

Lot 4 is 51.48km in length affecting the following two weredas and a city found in two zones and two regions. The Project Road is located in Oromia Region, West Arsi Zone, Arsi Negele and Shashemene Zuria woredas.

4.3.2 Demographic Characteristics

Population in the Project Area

The total population in the project affected weredas is 1,028,237 out of which the dominant majority (63.5%) lives in the rural areas. Table 4.10 provides the latest information available on population size of zones and weredas by place of residence and sex which is a projection from the 2007 census. Arsi Negele wereda is the most populous wereda followed by Shashmene Zuria is the least populous wereda.

Table 4-10Population data for weredas along the project road

Wereda	Urban + Rural			Urban			Rural		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Arsi Negele-Wereda	308803	153001	155802	61178	30385	30793	247625	122616	125009
Shashemene /Town/-Wereda	119251	60133	59118	119251	60133	59118	-	-	-
Shashemene Zuria-Wereda	292949	146082	146867	12100	6164	5936	280849	139918	140931

Source: Projected population for 2013 from the Census 2007

Sex composition

The sex ratio of the affected weredas is 101 which indicate a higher proportion of male population. The distribution of sex ratio among the weredas is uneven. The lowest sex ratio (99) is observed in Arsi Negele and Shashemene Zuria woredas (rural and urban); while the highest sex ratio (106) is observed in Hawassa.

Urban Area Population

Table 4-11 shows the population residing in the towns traversed by the project road. The total population of the affected towns is 420,990. The towns Hawassa is the most populous (61.5%) followed by Shashemene (24%), Arsi Negele (11%) which are the capitals of the affected woredas.

Table 4-11Population data of towns along the project road

Name of Wereda/Town	Population		
	Both sexes	Male	Female
Arsi Negele-Wereda			
Arsi Negele Town (wereda capital)	47,292	23,418	23,874
Golije-Town	4,243	2,178	2,065
Shashemene Zuria-Wereda			
Shashemene Town/Wereda	100,454	50,654	49,800
Kuera Town	10,193	5,192	5,001
Hawassa City	258,808	133,123	125,685
Total Project Area Urban Population	420,990	214,565	206,425

Source: Compiled from data obtained from each wereda

Population Density

The population density along the project road ranges between 186 persons per square km in Arsi Negele wereda; and 406 to 457 persons per km in Hawassa city and Shahemene Zuria woreda as shown in Table 4-12.

Table 4-12 Crude Population Density for weredas along the project road

Wereda	Area sq km	Density per km sq
Arsi Negele	1400	186
Shashemene Zuria	760	457
Hawassa	1830	406

Source: Compiled from data obtained from each wereda

Ethnic composition

The population of all affected weredas is heterogeneous by ethnic background. In Arsi Zones the majority (88%) of the population belong to the Oromo ethnic group with a minority of Amhara population (4%). In Hawassa the highest proportion of the population belong to the Sidama Ethnic group (48%) followed by Amharas and Wolayitas that make 15% and 14% respectively. Oromos and Gurages constitute minority ethnic groups comprising 5.2% and 4 % of the population respectively.

Language

Consistently with the homogenous ethnic background the population use the language of their own ethnic group. Afan Oromo is the language spoken by the majority population residing in the West Arsi zone affected weredas (87%), followed by Amharigna (6.4%) respectively. In Hawassa city Sidamegna is spoken by 48.7% of the total population while Amharigna and Wolayitagna are spoken by 31% and 10% respectively.

Religion

The majority of the population of the project affected weredas is composed by Muslims (46.6%), followed by Orthodox Christians (34%) and Protestant Christians (11.3%). The spatial distribution of the population following the three faiths is uneven among the affected woredas. In West Arsi woredas Muslims are the overwhelming majority (80% of the population) followed by Orthodox Christians (11%) and Protestant Christians (7%). In Hawassa city the proportion of Protestant Christians increases to (60%) followed by Orthodox Christians (27%), Catholics (16.2) and Muslims (5%). The proportion of followers of other religions is negligible.

Household size

The average household size in the affected woredas is 4.9 persons per household, in urban and rural parts 3.7 and 5.1 respectively. Thus the proportion of small size households is higher in urban areas.

Age distribution

In ONRS the age structure is characterized by a high proportion of young individuals, reflecting the high fertility rate. Population below 15 years makes up 43% of the total, and whereas persons above 64 only constitute 3.5%. The proportion of population aged 15 to 64 is 53.5%. Unfortunately differentiated data age distribution data for the project affected weredas was not available.

Dependency ratio

The age structure of the population in the project area implies a high level of dependency. Overall dependency ratio for the region is 86.9 with dependency ratios of 80.3 for the young and 6.5 for the old, respectively.

4.3.3 Public service & infrastructures

Education (*School Enrolment)*

There are 84 schools in the project affected weredas of which 71 primary schools and 13 secondary schools. In the year 2008 the total students population was 189,278 of which those in grades 1 to 8 comprise the highest proportion (78%), followed by students in grades 9 to 10 (11.5%) and 11 to 12 (10.5%) respectively (see Table 4.13).

There are a several training centers in Hawassa city owned by government and private organizations. The main public institutes are under the Debub University. There are also Technical Vocational Training centers that produce medium level personnel.

Table 4-13No. of schools and students along the project road

Wereda	No of Schools				No of students								
	1-8	9-10	11-12	Total	1-8			9-10			11-12		
					Male	Female	Total	Male	Female	Total	Male	Female	Total
Arsi Negele	16	2	1	19	28430	27149	55579	5311	3864	9175	1009	590	1599
Shashemene Zuria	23	1	1	25	20635	18340	38995	495	367	862	372	151	523
Hawassa	32	6	2	40	25,486	27,397	52,883	6,873	4,864	11,737	10,772	7,153	17,925
Total	**71**	**9**	**4**	**84**	**74551**	**72886**	**147457**	**12679**	**9095**	**21774**	**12153**	**7894**	**20047**

Source: Compiled from data obtained from each wereda

School enrolment rates in the affected weredas have shown very good progress in the last 10 years. In the year 1994 the gross enrolment rate in the project weredas was 48% for grades (1-4) and 11% for grades (5-8) (CSA 1994). The present gross enrolment rate is above 100% for grades (1-4) and over 40% for grades (5-8) in all affected weredas.

This is the reflection of the high number of schools constructed and of increased educational benefits awareness. On average in the affected weredas the teacher / student ratio has reached 1:50. It has been reported that the issue now is to improve the quality of education

The proportion between females and males is more balanced in grades (1-8) but proportion of female students sharply falls down to around 42% in grades (9-10) and to 39% in grades (11-12). This trend is to be attributed to the prevalence of early marriage of females due to cultural reasons.

Access to Health Institutions

In the project affected rural weredas there are 53 Health posts, 24 clinics, 5 health centres and 7 drug stores (refer to Table 4-14). The situation is drastically different in two urban centres i.e Hawassa and Shashemene. There are a several health institutions owned by government and private organizations.

Table 4-14Health Institutions in the Project Affected Weredas

Wereda	Hospital	Health centre	H/Post	Clinics	Drug store
Arsi Negele		2	17	14	2
Shashemene Zuria		3	36	10	5
Total		5	53	24	7

Source: Compiled from data obtained from each wereda

In the rural woredas the health personnel/population ratios show that the number of qualified doctors is insufficient. At least one clinical nurse and health assistant are available in each health centre or clinic and there are at least 2 community health agents in each kebele. Qualified doctors are available only in hospitals (Table 4-15).

Table 4-15 Health Personnel in the Project Affected Weredas

Wereda	Doctors	nurses	Health Officer	Health extension workers	Lab technicians	Pharmacy technicians	Sanitarians	Total
Arsi Negele	2	28		85	6	2	4	125
Shashemene Zuria		25	3	74	3	3	5	113
Total	**2**	**53**	**3**	**159**	**9**	**5**	**9**	**238**

Source: Compiled from data obtained from each wereda

Access to Water Resources

In the project affected weredas, population has very limited access to potable water supply. Particularly rural households that have access to clean water are very limited, ranging from 51% to 64% (see Table 4-16). Access to unprotected water supply sources is also difficult and the supply level varies significantly by season. Almost all towns traversed by the project road have better access to potable water. Arsi Negele, Kuyera and Shashemene have piped schemes.

Table 4-16Water Supply Coverage in the Project Affected Weredas

Weredas	Hand Dug/ Shallow Well	Spring	Motorized	Coverage
Arsi Negele	2	5	10	51.4%
Shashemene Zuria	32	15	16	64%

Source: Compiled from data obtained from each wereda

Road Network in the Affected Weredas

Community roads length in the affected weredas was 1,-72km in 2009. The density of community roads per 1000 sq km is around 119 (Table 4-17).

Table 4-17 Road Network in the Project Affected Weredas (km)

Weredas	Asphalt	All Weather	Dry Weather
Arsi Negele	42	72	196
Shashemene Zuria	30	430	135
	72	502	331

Source: Compiled from data obtained from each wereda

Electric Power Supply

The Interconnected System (ICS) from the national grid reaches 3 towns and 24 villages along the road alignment, which have been supplied with electric power system. These are:

- Arsi Negele woreda: Arsi Negele town and 24 rural kebeles;
- Shashemen Zuria: Kuyera town and Shashemene town.

The rural areas along the route do not have electric supply. There are a few towns with private diesel generators, usually of very small capacity, which run in the evening only.

4.3.4 Economic Activities

Agriculture

The area of influence is characterized by intensive cultivation with low productivity. The shortage of arable land is a key factor, leading to average household landholdings as low as 1.2 ha. In most of the weredas, a large proportion of the households cultivate less than 1 ha of land which is greater than 0.5 ha of land that represents the minimum requirement to fulfil the food needs of an average household for a year.

Virtually all the agricultural production in the project area is rain fed and single season cropping is practiced. Land preparation is carried out by oxen drawing, sowing of most crops is by broadcasting seed, and subsequent cultivation is all done by hand. The farmers mostly grow combinations of crops mainly consisting in cereals, pulses and oil crops in order to achieve food self-sufficiency.

The total cultivated area in the project affected weredas was 105,946 hectare and the total volume of crop production was around 3 million quintals in the year 2009 (refer Table 4-18). In the year indicated about 16,601 ql of chemical fertilizer and 2,776 quintals of improved seeds were distributed to the farmers in the area.

Table 4-18 Crop Production and Cultivated Land in the Affected Weredas (2009)

Wereda	Cultivated Land (ha)	Total Crop produced (ql)	Irrigation	Fertilizer	Improved seed
Arsi Negele	58,782	2,297,948		16601	2776
Shashemene Zuria	47,164	754,624	14.5		
	105,946	**3,052,572**	**15**	**16,601**	**2,776**

Source: Compiled from data obtained from each wereda

Food Aids, Food Self- sufficiency and Situation of Droughts

Arsi Nagele is considered a food self-sufficient area yet there are households that experience food insecurity problems. The severity of the problem varies from year to year depending on rainfall conditions. It also varies from village to village, as a result villages are not equally vulnerable to drought. The amount of food distributed by governmental and non-governmental organization and the population benefited (2009) is displayed in Table 4-19.

Table 4-19 Food Aid and Beneficiaries in Arsi Negele wereda

Year	Amount of aid by type				No. of beneficiaries
	Grain(qt)	Pulses (qt)	CSF(qt)*	Oils(Dez)	
1999/2000	4980	306.7	178	58.41	43420
2000/2001	1597.5	15.98	91.33	35.16	10650

**CSF=Children Supplementary food. Source: Obtained from Arsi Negele woreda*

Livestock rearing

Livestock is an integral part of the farming system in the project area and are economically complementary to crop production. It provides fertilizer for crops and to a lesser degree, it supplies milk, meat, cash income and serve as an investment against risk for rural households. In times of famine, livestock is sold to purchase food. The livestock population in the weredas traversed by the project road is shown in Table 4-20.

The official animal population estimate in the affected weredas amounts to about 700,000, of which 448530 cattle, 48444 sheep, 34686 goats, 1830 mules, 55799 donkeys, 16018 horses, and 108354 poultry in 2009. 60% of the livestock population is located in Arsi Negele wereda.

Table 4-20 Livestock Population in the Project Affected Weredas

Wereda	Cattle	Sheep	Goat	Mule	Donkey	Horse	Poultry	Beehive
Arsi Negele	286418	48444	34686	870	35420	9895	12240	
Shashemene Zuria	162112			960	20379	6123	96114	
Total	**448530**	**48444**	**34686**	**1830**	**55799**	**16018**	**108354**	

Source: Compiled from data obtained from each wereda

Other activities

There are a number of private small-scale business enterprises mainly in the urban centers along the project road: government projects, private sector industrial enterprises, handicrafts and service cooperatives. Small-scale business establishments include flour mills, brick and hollow block plants, tailoring and traditional weaving/knitting establishments. Flour mills make up the major portion of the enterprises, mostly located in rural areas.

Tourist attractions

Lake Hawassa and the town of Hawassa itself are the potential tourist destinations in the Project Area.

4.3.5 Travel Pattern of the Project Area

During public consultation with local people discussion was conducted on travel needs and transport means of the local people. This section summarizes findings of the discussion on travel needs and the transport efforts involved in meeting the households' domestic, agricultural and external activity patterns in the project area in a gender dis-aggregated manner.

A. Domestic transport pattern

Women are responsible for domestic activities and their travel needs emanate from fulfilling this responsibility. The two most important components of this type of transport are collecting water and fuel, which together account for the highest time and longest distance covered on a daily basis. This usually involves each household making from 1 to 2 hours journey depending on the settlement pattern and location of water and fuel sources. Women and female children are mostly involved in these activities carrying heavy loads on their back.

Only in those areas where the location of water sources is very far (4-6 hours away) do men, donkeys and donkey drawn carts assist and replace household women in domestic transport.

B. Agricultural transport pattern

In overall terms, agricultural transport involves the household making trips to and from farm lands. The frequency of these trips to farm fields increases during the cultivation period. Agricultural activities, excluding trips, take up most of the farmers' time at least 8 hours per day.

Such trips can be divided into two distinct stages. The first involves the cultivation and harvesting of crops with the exception of weeding, men are overwhelmingly responsible for crop cultivation. This suggests that a gender division of labour is still common in the area. The second stage concerns the purchase of inputs prior to the farm season and the post cultivation marketing of surplus crops. This involves transport beyond the kebele, usually the wereda town or further away from the farm field and is typically dominated by men using donkeys. Carrying small items on the back of the shoulder is also a commonly practiced transport mode for both men and women. Women and men share the responsibility for marketing.

C. Travel pattern to services, facilities and other places

This type of travel tends to reflect the household's need to use social services and maintain its social network. This type of travel tends to be the second most important user of travel time. The most important component is travel outside the kebele which is usually by foot and whenever motorized public service vehicles are used it is for destinations outside the wereda.

Visits to the market, which are usually located more than 1 hour walking away seem to be the next most important travel outside rural villages. Most households seem to rely on local markets for purchasing supplementary foods and other items and these visits tend to be undertaken by both women and men.

In general, households in the project area stay most of the time in their localities in order to attend to their domestic and cultivation activities. Travel outside the kebeles generally occurs once in a week time.

4.3.6 Administration

A. Zone Administration

At the zone level the government structure constitutes administration set up only. This zonal level administration is not an independent unit but rather functions as an extension to the regional administration. No sectoral office exists at zone level.

B. Wereda Administration

Weredas play the central role in the Decentralization Policy of the Government. Weredas have become administratively independent. This implies, that, the wereda administration have authority on matters pertaining to their wereda. The wereda council decides on budget distribution, human resource, internal administration, and so on. In this regard, the wereda centres have become increasingly important and are operational in providing the requested services to their population.

C. Kebele administration

Kebele administration is an important structure with an independent autonomy of administration. The wereda uses the kebele structure to implement policies and projects. The kebele administration comprises the executive body, is known as a cabinet, with the chairman as the only salaried personnel in the kebele leadership. The five cabinet members, the Ganta meri / militia commander and the three social court members are the main active people in the leadership. The kebele administrative unit, is divided into three Mengistawi budin (hamlet level) this mengistawi budin is further divided into 1:30 and 1:5 households structure.

There is also a structure known as Neus Kebele (sub-kebele) in which two or more gott form a common leadership that deals with common problems. Each gott is further divided into Mengistawi budin and then into Hiwas or cells. A Mengistawi budin is run by seven elected people (one head, one secretary and five members) whereas Hiwas may be formed by 6-10 neighbours depending on spatial proximity.

Land tax and all other types of government imposed taxes and contributions are collected by the kebele leadership using the social courts and the militia to force people who do not cooperate. Kebele officials announce to the people when they want them to gather or when there is group work to do, such as water harvesting and reforestation. disputes between Muslims and Christians. Such disputants used to generalize personal grievances.

5. PUBLIC AND OTHER STAKEHOLDERS CONSULTATION

5.1 Purpose of Consultation

According to the FDRE Constitution, Article 92; “People have the right to full consultation and expression of their views in the planning and implementation of environmental policies and projects that affect them directly”. Accordingly, in the project road corridor, consultations with the project affected people (PAP), located along the project alignment, was made in order to consult PAPs and obtain relevant feedback on various aspects of the planned road construction project. More specifically the purposes of the consultations were to:

- Disseminate information about the planned road project to the community;
- Obtain feedback on the attitude of the community towards the project;
- Discuss on anticipated project impacts on the socio-cultural life of the community; and
- Identify the stakeholders and their specific role in the project activities.

Consultations were made with the public, stakeholders and local officials. Detail description on the consultations conducted is given below.

5.2 Public Consultations

In the project road corridor, consultations with the project affected persons (PAP) located along the project alignment was made in order to inform PAPs about the planned project, consult and obtain relevant information on existing conditions or constraints of the study area. Public consultations were carried out with the different groups of the population drawn from the kebeles/villages crossed by the project road. The locations where public consultations were carried out include Toga, Daleti kebeles in Shashemene wereda, Shashemene wereda and Bishan GurachaThe consultation focused on a number of issues such as, the selection of assessing social impacts and benefits of the road to the community residing in the direct influence and indirect influence zone; payment of compensation for affected properties and other related rehabilitation measures.

Formal as well as informal consultations were conducted during the field survey in different times .The final public consultation on the final new alignment from Km 187+500-201 has been done in August 9-15 at Toga and Daleti kebeles in Shashemene wereda. In addition to this ,consultation also taken place with Shashemene wereda and Bishan Guracha town administration government cabinets and sector office experts whom the main stakeholders of the desired road. Informal discussions and interviews were made with key officials and experts of relevant regional, zonal and Wereda level offices, as well as some individuals found along the road. Formal consultations also had been carried out at public meetings that were held at two key locations during the previous field visits before August 2014.

A total of 5 (five) public consultations were held with more than 159 PAPs and communities attending consultation meetings.

A) Consultation with Local Authorities

- On Shashemene wereda all the cabinet of the weredas led by the wereda administrator discussed on the whole activities of the project road. During the consultation the wereda cabinet and sector office experts which came from Wereda Agriculture, land administration, Natural resource, Health, Education, Women and Youth and other relevant sector offices participated on the consultation meeting. During the consultation participant give their support for the project road as the countries development plan. On the other hand participants also figure out their fear and opinion on the project. The main fear of the participants was the issue of fair and just compensation payment for farmer's properties, that will be demolished during the construction period.
  On the same consultation different compensation, grievance and redress and property valuation committees are formed.

- The same to Shashemene wereda Bishan Guracha town Administration cabinet also participate and raised their opinions on the consultation. The main issue on the cabinet consultation was the issue of Bishan Guracha town master plan. However, the final alignment has no overlapping with the town master plan.

B) Consultation with PAPs

- Apart from the wereda cabinets public consultations also done with PAPs, kebele cabinets and other local and religious leaders at Daleti and Toga kebeles, in Shashemene wereda. The same to wereda cabinets PAPs also have positive zeal to the project road since it will facilitate the transportation network of the country and becomes the main route which connects different regions in the country and the country to other part of the continent.

  Some relevant information related to the positive and adverse impacts of the proposed road construction was mentioned by the participants. During the consultation period PAPs were concerned mainly on the issues of compensations. PAPs strongly demanded fair and just compensation to be carried out by ERA and other compensation committees that will be formed and activated on weredas and kebeles level. On the same token, the PAPs indicate their worries on the adverse impact of the road project. Since the road will have 90m width it will take some times the whole part of some once farm plot. This will followed by a permanent displacement of farm owners. For this reason participants of the consultation strongly demanded to get full compensation rate in accordance with the Federal government compensation payment Regulation and Proclamation. During the consultation period the issue of different grave yards, which are located on the road alignment was also repeatedly raised by the participants. Grave yards will be relocated from the alignment following the local religious and cultural ceremonies with full compensation of replacement cost. The details of stakeholders and public consultations are provided in **Appendix 2.**

The consultation focused on a number of issues such as, adverse environmental and social impacts during the planned road construction, access during and after construction, social and economic benefits of the road to the community residing in the direct influence and indirect

influence zones; payment of compensation for affected properties and other related rehabilitation measures. The participants of the public consultation included;

- Project Affected People;
- Elders and informal leaders;
- School Teachers, Health and Agricultural extension workers;
- Representatives of Women and Youth Associations; and
- Wereda and Kebele Administration representatives.

Key agenda points that were forwarded for discussion from PAPs and community groups included environmental and social impacts of the project both positive and negative on local community members, issues regarding property registration and valuation for compensation, presentation and discussion of compensation options available to PAPs.

The majority of project affected people were aware of the project and about the need for resettlement. The consultation revealed a high degree of support for the project among the people as well as people's concerns on:

- Receiving fair compensation;
- Minimizing land acquisition; Ensuing adequate land allocation;
- The local authorities expressed their willingness to provide land for constructions of fully affected households;
- Local authorities were consulted about their responsibilities and commitments during the operational stages for which all agree vehemently; and
- Local authorities had been consulted about their role in monitoring the proper usages of compensation payments, especially in restorations of livelihoods including land-for-land or monetary compensation as the case may require. They all agreed to encourage and help the affected people to properly use the compensation.

5.3 Stakeholders' consultation

Different stakeholders' who have either direct or indirect responsibility, and stake with the construction of the project road were consulted with a view to achieve sustainable investment of this project. The primary stakeholders that have major role to play and consulted included Wereda administrators, experts drawn from Wereda sector offices and political leaders and NGO representatives operating in the project area.

The stakeholders were consulted to provide their expert opinion and views towards the environmental and social impacts of the project road corridor, their role and involvement in the planning and implementation of this project.

5.4 Consultations with Local Officials

Consultations were held at Toga, Daleti kebeles in Shashemene wereda, Shesemene wereda and Bishan Guracha town Administration with local officials with the intention of informing them on the nature and scale of impacts and their roles and responsibilities in the project, and

discussing viable options and strategies for income and livelihoods restoration including the availability of government land for resettlement of PAPs.

Local officials have a key role to play in the project including the power to expropriate landholdings and the responsibility to actively participate in the designing, planning and implementation of various sustainable development initiatives devised to restore income and livelihoods of PAPs,

- Local officials have pledged to ensure that the cut-off date will be observed by PAPs and other community members,
- Local officials will continue supporting the project at all stages and participate in various committees that may have to be formed for the execution of the project,
- Compensation, valuation and grievance and redress committee also formed on Wereda officials consultations,
- Members from the project affected people, religious leaders, women Wereda offices experts and agricultural experts are also included in the Wereda Committee.
- Women and project affected persons representatives also included in the committee.
- Officials understand the problems that vulnerable groups are likely to face. Therefore, every effort will be made to provide them with special assistance throughout the project.
- Representatives of PAPs need to be involved in Kebele Resettlement Committee.
- All the consultations meeting minutes also signed by the participants and the Wereda administration stamps also put on the minutes.

5.5 Summary of Public and Stakeholders' Consultations

Both the public and stakeholders consultation participants consider that the construction of the road to be highly beneficial and important to improve the socio economic situation of the population in the project road corridor and that its construction is also critical for the socio economic development and growth of the Administrative zone and Weredas; and the community in general crossed by the project road. The community underlined that the environmental impacts are temporary and they will require to have temporary access during the construction phase and a permanent access when the construction is completed. They senior citizens voiced to the team that due to the soil type in the area dust will become a problem in their daily activities and the project must look for options to mitigate impacts of dusts.

The public has high expectations with the construction of the project road corridor and are of the opinion that they will have improved and easy access to transportation and that their livelihood also will be improved following the construction of the road. They also assume that delivery of social services will be enhanced.

Summary of key issues discussed are sub divided into relevant topics and presented in Table 5-1.

Table 5-1: Summary of Public and Stakeholders Consultations

A) Anxiety, Fears and Concerns:
• We do not know how much we are going to receive as a compensation payment for loss of assets.
• Fear of homelessness for the whole family.
• What will happen if the cash compensation turns out to be inadequate to replace lost assets?
• Some of us will lose partly or all farmland dwellings. If there is no land available in rural areas where can we be relocated?
• We cannot afford to access urban land either. Where are we supposed to go?
• We do not know the dates when compensation payments commence so that we can't plan self-relocation.
• How will we know that our affected land and property is measured accurately and recorded or registered appropriately?
• Some of the affected property is not registered by oversight. What are the chances for correcting mistakes in registration of affected property?
• What if the impact of the road affects farmers beyond the often-mentioned 90 meters RoW?
• Those of us who are of old age, no matter how much money we receive as compensation, is not going to help us as we are unable to do much with it.
• What is the plan for someone who lost both a residential house and farmland or if the remaining land is economically unviable?
• Land expropriation and compensation payment should be planned synchronized in such a way that is in harmony with the local agricultural calendar.
• We, PAPs need to be made aware of land expropriation ahead of time so that we can plan and prepare for self-relocation.
• How do you provide access to us and our cattle's during construction?
• Are we going to have a permanent access when the road is completed?
• What measures do you take to avoid hindrance of our routine activities due to dust during construction?
B) Preferences and Additional Demands
• We do not want "land for land" compensation, just cash compensation.
• Ten years' equivalent compensation is too little to compensate for a farmer who lost his/her farmland for good,
• We trust that all affected property are included and registered accurately.
C) Expectations, Hopes, Aspirations and Needs:
• We elderly people expect to be provided by special assistance.
• Project affected persons should be given a special consideration in all available employment opportunities both short-term and long-term.
• We hope and aspire to help ourselves through using compensation payments for useful and productive purposes such as building dwellings, opening retail shops and business, opening restaurants to serve the demand that might come with the project, engaging in agricultural goods trading, organize ourselves into groups and

engage in services such as ground transport (vehicular) and grain milling.
• If the road project helps us to form associations, we can support ourselves with different income generating activities like oxen fattening, small scale irrigations and vegetable crop productions.
D) Appreciation and Positive Comments:
• We agree on and pledge to observe the cut-off date as per the project request,
• We commit ourselves to support the implementation of the various components of the project in every way we can.
E) Questions and Clarifications:
• As the farming season has already approached we need to know the verdict of affected land. Can we use the land until we receive compensation?
• What are the plans for family graves that will be affected?
• Can we use the affected farmland temporarily to grow annual crops?
• What about the indirect impact of the road component on farmers residing close to it as they will be affected adversely by dust, noise and rolling stones during civil works.
• What are the procedures put in place to effect compensation payments?
• Is it before or after receipt of compensation payments that we are supposed to give our land and all affected property?
• What is a person supposed to do if that person has a house under construction at the moment?

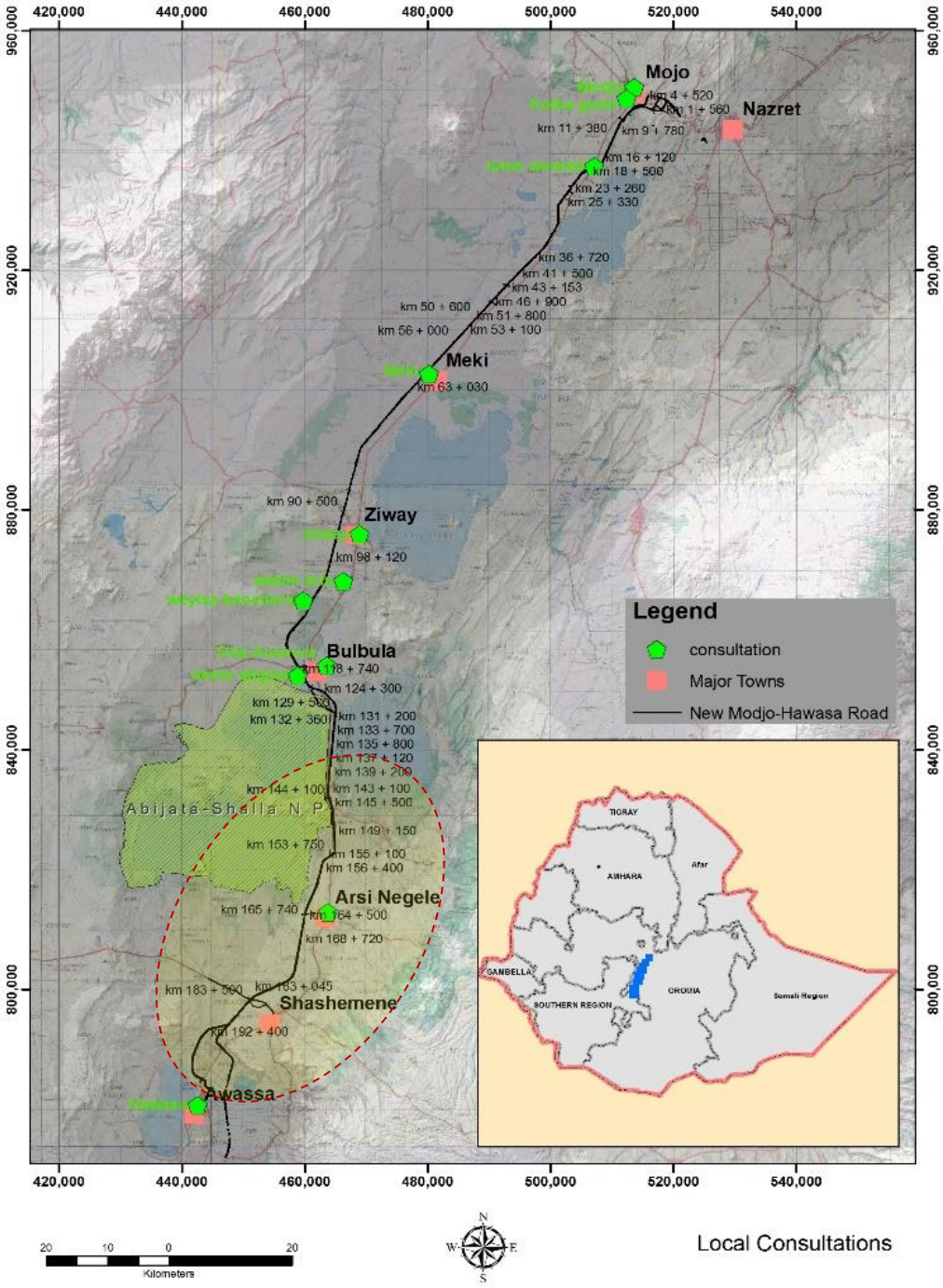
5.6 Consensus and agreement reached with PAPs and Stakeholders

The consensus reached following the public consultation are summarized as follow:

- An understanding has been reached that local officials will provide all required support in the implementation of the project and all support for households that may lose their land and assets.
- The Wereda will provide support in planning and implementing livelihood restoration measures for PAPs in collaboration with ERA's ROW agency. This could be done by organizing them through micro and small scale enterprises in a form of cooperatives or associations based on the interest and willingness of PAPs.
- The Wereda agrees to provide special support and care for vulnerable households identified in this project and assist them in re-establishing their livelihood.
- At Wereda level, a special task force will be formed to oversee and assist the day to day implementation of the project in a timely and proper manner.
- The Wereda will facilitate and coordinate the establishment of the various committees required in this study at all levels and as indicated in FDRE Government proclamations.
- The Wereda administration agrees that it will monitor the implementation of the project is carried out as per the law and ensure that PAPs are compensated for lost assets and properties as per the proclamation and as indicated in this project.

- PAPs consulted in all the kebeles that are crossed by the project road have agreed to provide all their support towards the implementation of the project.
- In places where family grave yards will be affected due to the construction works of the project road, the kebele authorities and the public have reached understanding to relocate the grave yards to new locations. The kebele administration has also agreed to coordinate its removal and reburial to new a locations in line with the cultural and religious practices of the communities.
- PAPs have agreed and committed not to carry out any construction activities inside the ROW after the agreed cut-off date.
- It has been reported to the PAPs that the project scope includes provision of temporary access during construction and permanent access for communities and cattle's.
- Contractor is required to provide a control system and must water the areas where people are living to lessen dust problem and this will be followed by the monitoring consultant and the implementing agency.

Figure 5-1: Public consultation locations



6. ANALYSIS OF PROJECT ROAD ALTERNATIVES & SCOPING

6.1 Functional assumptions

Typical service objectives of an expressway are high level of safety and efficient accommodation of large volumes of traffic at high speeds. To achieve these objectives the expressway must have fully controlled access, grade-separated interchanges at selected junctions and underpasses and/or fly overs at intersections with other roads to limit the interference with local traffic and communities activities.

As part of the route selection process, and to fulfil the Modjo-Hawassa expressway functions, the expressway route was selected to be as short as possible and not far from the development areas, settlement areas and main urban centers located along the existing road. In addition, the route was selected to have a vertical and horizontal geometry to reduce the transportation costs. The corridor identification was confined within a single corridor as topography east of the existing road beyond the lakes is ragged topography and far from any type of development activities and no noticeable significant settlement. On the other hand, the area between the lakes on east and west side of the existing road is predominantly constrained with the existence of five lakes and a major change in altitude of the topography on both sides of the existing road. This limits the areas suitable for the expressway to only one corridor along the existing road which varies in width from a maximum of 20km to a minimum of 5km between the Langano and Abijata lakes.

The final route selection followed the following steps:

(i) Selection of an acceptable route corridor
(ii) Identification and evaluation of two expressway routes within the selected corridor
(iii) Optimization of the selected route taking into consideration ground constraints.
(iv) For the selected route, evaluation of design options.

6.2 Demarcation of the corridor route

The expressway corridor was demarcated based on the following three factors. The factors are:

- Topography / terrain,
- Obligatory points, i.e. presence of lakes and rivers, and
- Connectivity, i.e. proximity to major settlement or investment or urban centers,

In selecting the corridor, the major constrains faced were that the project road traverses within the Ethiopian Rift Valley; that it is located on the central axis of the rift system; and it is constrained by the shape of the rift. Moreover, the existence of five lakes also limited the corridor's band width. Similarly, the location of settlement areas and / or urban centers had dictated the shape and width of the usable corridor with a view to optimize the link roads that would be required to connect the existing road, urban centers and the proposed expressway. **Figure 6.1** overleaf depict the only pragmatic corridor for the project.

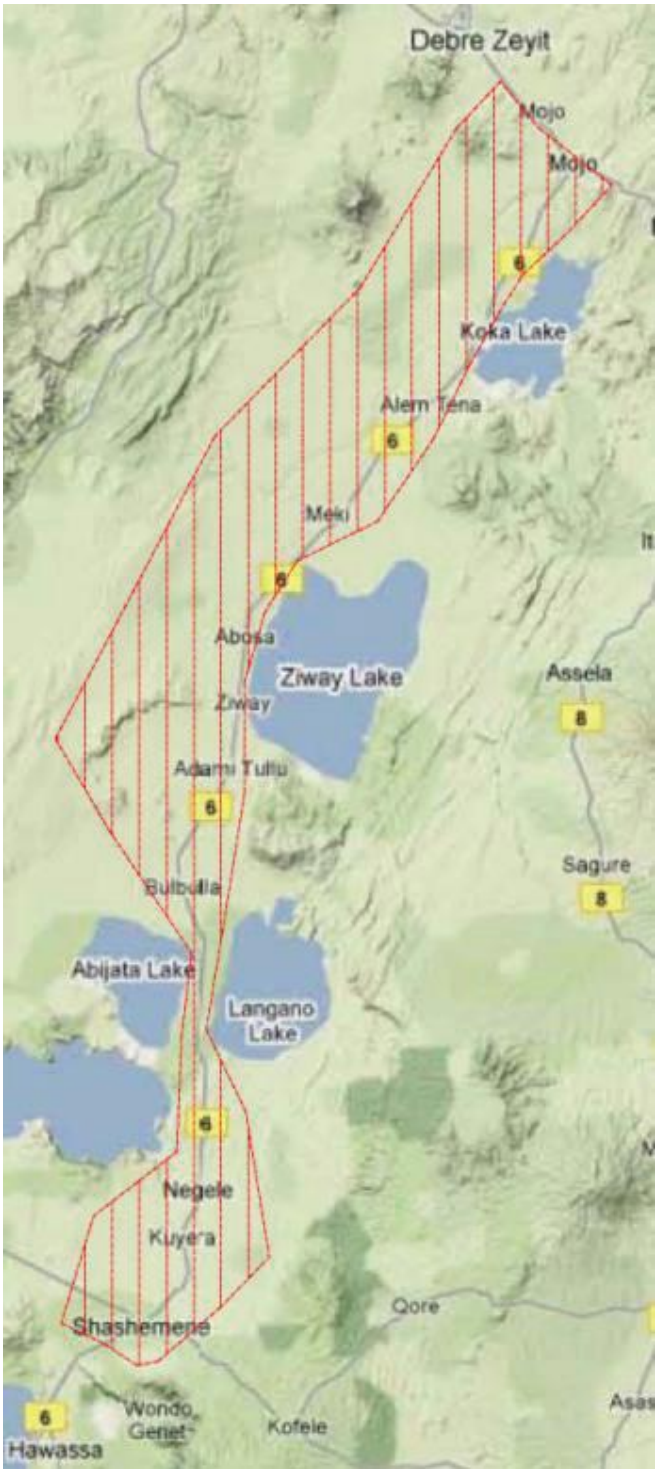


Figure 6-1: Route's Corridor

As shown on the map, the project corridor starts at Modjo and runs in the direction of Bulbula village. From Modjo to Bulbula, the corridor is approximately 12km wide bordered by the surrounding hills. After Bulbula up to Arsi Negele the corridor width decreases to 10 km between Langano and Abjijat Lakes and to 4-5 km before Arsi Negele. Thereafter and up to Shashemene the corridor widens to 8 km. Most of the corridor width stretches on the west side of the existing road and significantly narrows on the east side of the road largely due to the existing settlements, lakes and hills.

6.3 Identification and evaluation of Routes

Two Expressway routes were identified in this corridor, see **Figure 6-2.** Route"A" starts from Modjo town while Route" B" starts 2 km back north of Modjo town. Both routes run parallel to each other and next to the existing Modjo-Hawassa road.

Description of the identified Routes:

Route A

Route A has a total length of 209.74km until it reaches Hawassa. Route A runs for about 16 km east side of the existing road at an average distance of 1 km, and after crossing the existing road near Ejere village, the route traverses for nearly 108 km on the west side of the existing road at an average distance of 2 km until it reaches past Bulbula village where it changes direction to east side to avoid encroachment into the APSNP area.

The route traverses close to the existing road on the east side of the existing road while passing between the Abijata and Langano lakes, thereafter diverting westwards at a distance of 6-7 km bypassing Arsi Negele then after the route follows west side until it reaches Hawssa and intersects with the existing road at Tikur Whia village.

The terrain traversed is predominantly flat and rolling that would allow to design a relatively smooth horizontal and vertical alignment for the expressway.

Route B

Route B has a total length of 212.33km. This route option predominantly traverses west side of the existing road for 136km of its reach at a distance 3 to 12 km from the existing road, thereafter the route runs close to the existing road until it passes the Langano lake area where the road changes its direction and traverses on the east side of the existing road within a distance of 1 to 7km until it reaches Hawassa This route traverses through Cheleleka wetland and connects the expressway with that of the existing trunk road at Hawassa. The route predominantly traverses flat and rolling terrain while small stretch of the road traverses mountainous topography therefore more earthworks will be required to ensure a vertical and horizontal profile compatible with the expressway standards.

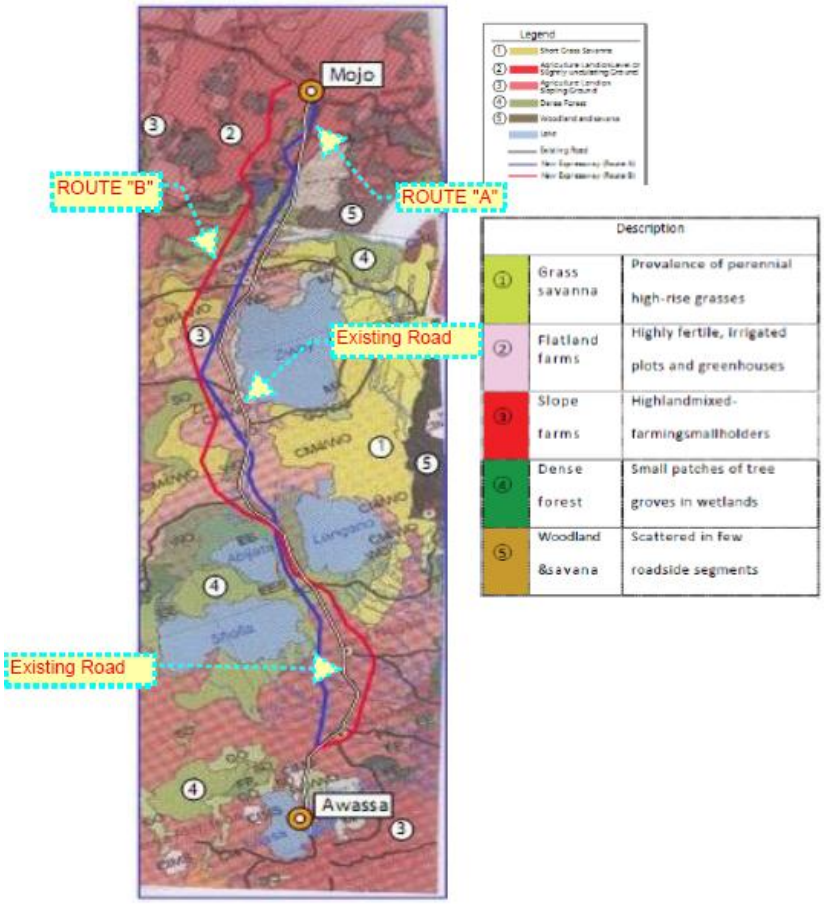


Figure 6-2: Routes “A” and “B” before optimization

6.4 Route selection

As part of the route selection, criteria were set to select the best route for the expressway. The selection procedure took into account four groups of criteria aimed at providing a comprehensive assessment of the two identified routes. The criteria were:

- engineering,
- socioeconomic,
- environmental and
- construction costs

Table 6-1: Major route selection criteria and weighing

Criterion		Weighing (%)
1.	Engineering criteria	35.0
2.	Socioeconomic criteria	22.5
3.	Environmental criteria	22.5
4.	Construction cost	20.0
	OVERALL SCORING	**100.0**

6.5 Assessment of engineering aspects

Assessment and comparison of routes A and B with regard to engineering took into account four sub-groups of criteria that related to the design, construction and utilization of the expressway. The sub-groups were physiographic factors, geological and soils, construction complexity, connectivity and riding condition.

6.5.1 Assessment of engineering aspects

Geology and soils
Geological and soil assessment considered two main characteristics. These were: the type of subgrade soils and the availability of construction materials.

Construction complexity
Considering that design standard for the expressway would be same irrespective of the selected route, the complexity of the construction work will depend mainly on the magnitude of earthwork and number and importance of structures (bridge and viaducts). From the concept design development, the volume of earthwork for Route "A" and "B" were estimated and the routes with less volume of earth movement is rated the highest score while proportional to the cut and fill volume route "B" is rated accordingly.

Number of major of structures

Route A requires 13 river crossings including the Modjo and Awash river crossings where the bridges' length is 82 and 112 meters respectively (based on hydrology); the limited number of river crossings is due to the favorable route on the east side of the existing road until it reaches the first 16km permitting to avoid the crossing of 5 small rivers. At each crossing two bridges, one per carriageway, are required, such structures would be independent so as maintenance operations can be done easily. The total length of bridges for each carriageway would be 570m totaling 1140m for both directions. Route A crosses 3 times the existing road, crossing points are unsuitable for interchanges with urban centers therefore the foreseen structures are expressway independent viaducts permitting the overpass of the existing road without traffic interferences.

Route B requires 16 river crossings of which 14 are small bridges and only two important bridges on the Awash and Modjo Rivers, the bridge length on Awash rive will be 112m (based on hydrology). Similarly to Route A at each crossing two bridges, one per carriageway, are needed, such structures will be independent so as maintenance operation can be done easily. The total length of bridges for each carriageway will be 562m totaling 1224m for both directions.

Route A requires small number of bridges and hence less budget for construction and allotted with the highest point and Route B is assigned proportionally.

Right of Way issues

On the basis of the typical cross section presented in Figure 6.5 a right-of-way width of 90 m has been adopted including area for future widening.

Connectivity
The service level of the expressway would become high if adequate connectivity with the existing road and urban centers is established. The number of controlled access (interchanges) are the same for both routes as a result the connectivity assessment would depend on the location of interchanges, or on the function of interconnected roads.

6.5.2 Assessment of socioeconomic impacts

The criteria utilized to assess the routes form the socioeconomic point of view are

- Resettlement/displacement compensation budget,
- Social acceptability,
- Change in way of life,
- Induced development.

The assessment is based on secondary data from various sources complemented by a preliminary survey and consultation meetings at Wereda level and with local community.

6.5.3 Assessment of Environmental Impacts

Consideration of alternative routes at early stage of road and other projects planning has significant importance in securing intended goal and objectives of project and at the same time contributing to the project design and in minimizing adverse impacts. The two routes (A and B) were assessed from environmental impacts perspective using the criteria mentioned below:

The types of impact assessed were as follows:

- Soil disturbance and erosion
- Impact on water resource (surface & ground)
- Impact on land use (crop cultivation and grazing)
- Impacts on vegetation (forest, plantation)
- Protected area (Natural parks, lakes buffer zone)

6.5.4 Aggregate assessment of the two routes

Rating is done based on attributes for engineering, social, environmental and construction cost. The highest point 100% is allotted for route with less impact on social and environment. On the other hand for engineering and construction cost, the route with less work volume or construction cost is assigned the highest point 100% and the other route is rated proportionally.

According to the selection criteria mentioned above, Table 6-2 below shows the rote selection assessment and Route A scored the highest weighting and revealed that it is the best and preferred route. In terms of rating (see table below), its overall aggregate scoring is 98.96% while Route B scored only 78.4.

Table 6-2: Route A and B Aggregate scoring

Criterion		Attributes		Rating		Weighing	Aggregate scoring	
		Route A	Route B	Route A	Route B		Route A	Route B
1	Engineering criteria							
1.1	Physical factors: Route length, terrain and hydraulic structures							
1.1.1	Length of the route	209.74	212.33	1.00	0.95			
1.1.2	Terrain			1.00	0.82			
	Flat	80%	71%					
	Rolling	20%	21%					
	Mountainous	0%	8%					
1.1.3	Hydrology major river crossings	13	16	1.00	0.81			
1.2	Geology and soils							
1.2.1	Subgrade soils (suitable subgrade soils)	75%	85%	0.88	1.00			
1.2.2	Construction materials (expected quality and hauling distance)	57.5%	52.5%	1.00	0.91			
1.3	Construction Complexity							
1.3.1	Magnitude of earthworks (Cut, m3)	6,683,100	12,003,600	1.00	0.56			
1.3.2	Number and importance of structures, Length in meter	1218	1302	1.00	0.93			
1.3.3	Right of Way issues [hectare]	1822	1911	1.00	0.95			
1.4	Connectivity and riding condition							
1.4.1	Connectivity	67%	58%	1.00	0.87			
	Average rating and weighed scoring of engineering criteria			**0.99**	**0.87**	**0.35**	**0.345**	**0.304**
2	Socioeconomic criteria							

Criterion		Attributes		Rating		Weighing	Aggregate scoring	
		Route A	Route B	Route A	Route B		Route A	Route B
2.1	Impact on resettlement and compensation budget	30%	40%	1.00	0.75			
2.2	Social acceptability	40%	20%	1.00	0.50			
2.3	Impact on way of life of the community	40%	60%	1.00	0.40			
2.4	Impact on induced development	60%	40%	1.00	0.67			
	Average rating and weighed scoring of socioeconomic criteria			**1.00**	**0.58**	**0.225**	**0.225**	**0.130**
3	Environmental criteria							
3.1	Soil disturbance and erosion	20%	50%	1.00	0.40			
3.2	Impacts on water resources	25%	30%	1.00	0.83			
3.3	Impact on land use (crop cultivation and grazing)	70%	60%	0.86	1.00			
3.4	Impacts on vegetation (forest, plantation0	10%	15%	1.00	0.67			
3.5	Protected area (Crossing of natural parks)	10%	30%	1.00	0.33			
	Average rating and weighed scoring of environmental criteria			**0.97**	**0.65**	**0.225**	**0.219**	**0.146**
4	Cost criteria							
4.1	Construction cost per km USD	3.5	3.7	1.00	0.95			
	Average rating and weighed scoring of cost criteria			**1.00**	**0.95**	**0.2**	**0.200**	**0.189**
	OVERALL SCORING					**1**	**0.989**	**0.769**

6.6 Optimization of the selected route (Route A)

6.6.1 Project start point at Modjo

The original proposed Modjo Hawassa alignment connected to the existing Modjo - Adama Expressway at the Modjo Toll Gate. However the proposed development by the Ethiopian Railways Corporation would have compromised the connection at the Modjo Toll Gate. As a result, several additional options such as traversing through Modjo town (option 3), construction of a new toll gate on the Modjo – Adama Expressway at 1 km (option 4) and at 3 km (option 5) east of the dry port, etc. were considered. Eventually, the alignment of the road at the start in Modjo was modified to take into consideration the future requirements of the Dry Port and to allow free and easy connection with the Addis Ababa-Adama expressway. The change has resulted in a minor increase in the length of the Lot 1 which changed from 56 to 56.8km. The options are further discussed in Appendix 4.

6.6.2 Project end point in Hawassa

The alignment at the end was re-studied with a view to avoid the social and environmental impacts while traversing through the Hawassa town and the Cheleleka swamps. The future continuation of the expressway to Mombasa corridor was considered during the route alternative study. Accordingly, a new alignment was established starting from Km 180 which allows the alignment to traverse west of Hawassa without entering into the town. The project road terminates at the existing Shahemne-Hawassa road before the Tikur Wuha village. Hawassa will be connected through a link road. The change has resulted in a decrease in the overall length of the road that has changed from 209.74km to 202.48km. The optimization of the alignment also resulted in avoidance of the Cheleleka wetland/ swamps.

Three options were studied. Option I that traverses on top of small ridge avoiding the drainage system while Option II is direct continuation of the mainline from Shashemene but follows the drainage system and traverses with in state farm area which is designated for South University and Option III crosses the existing road and traverses over private farm land, investment areas like horticulture and crosses Cheleleka wetland. Option I in terms of geometry, future continuation and environmental acceptability is the best.

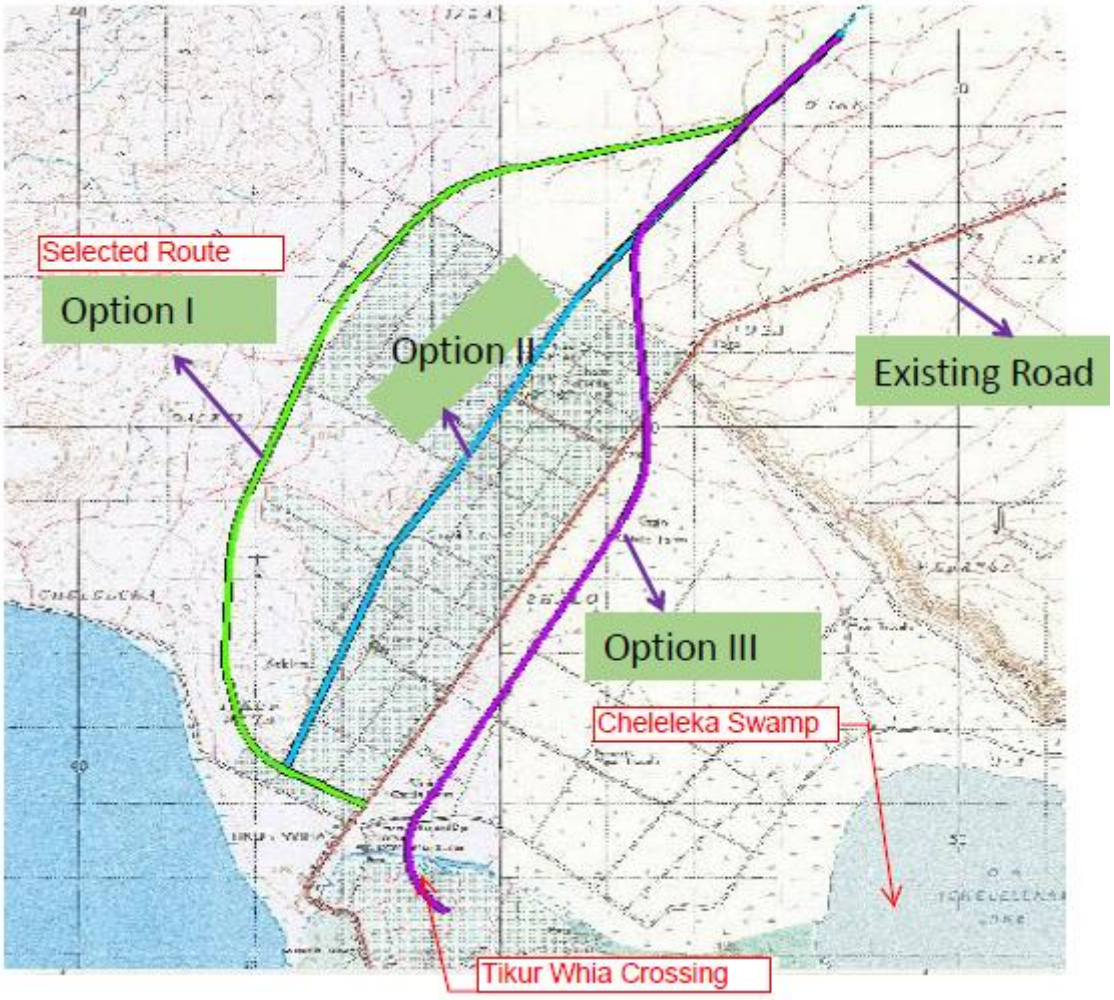


Figure 6-3: Re-alignment at project end (Hawassa)

6.6.3 The Bulbulla – Arsi Negele Road Section

Between Bulbulla and Arsi Negele section, the corridor is constrained by the Abijata Shalla Lake National Park (ASLNP) on the west side and Langano Lake on the east side. It is also constrained by the existing road. The corridor narrows from about 10 km at Bulbulla to between 4-5 km at Arsi Negele. The original route A clipped the ASLNP at the north east corner. To minimize impact on the ASLNP, Route "A "alignment was shifted to the east of the existing road and away from the park. The crossover point at Bulbulla was also shifted a few kilometers north to avoid intruding on the park. As a result the proposed Route A will have minimal direct impact on the Park.

To accommodate movement of people, animals and tourist traffic to Lake Langano a number of underpasses and over passes have been proposed to cross the Expressway. The exact numbers of under and over passes are being evaluated. The Project will construct the passes to facilitate the movement of people and animal and tourist traffic.

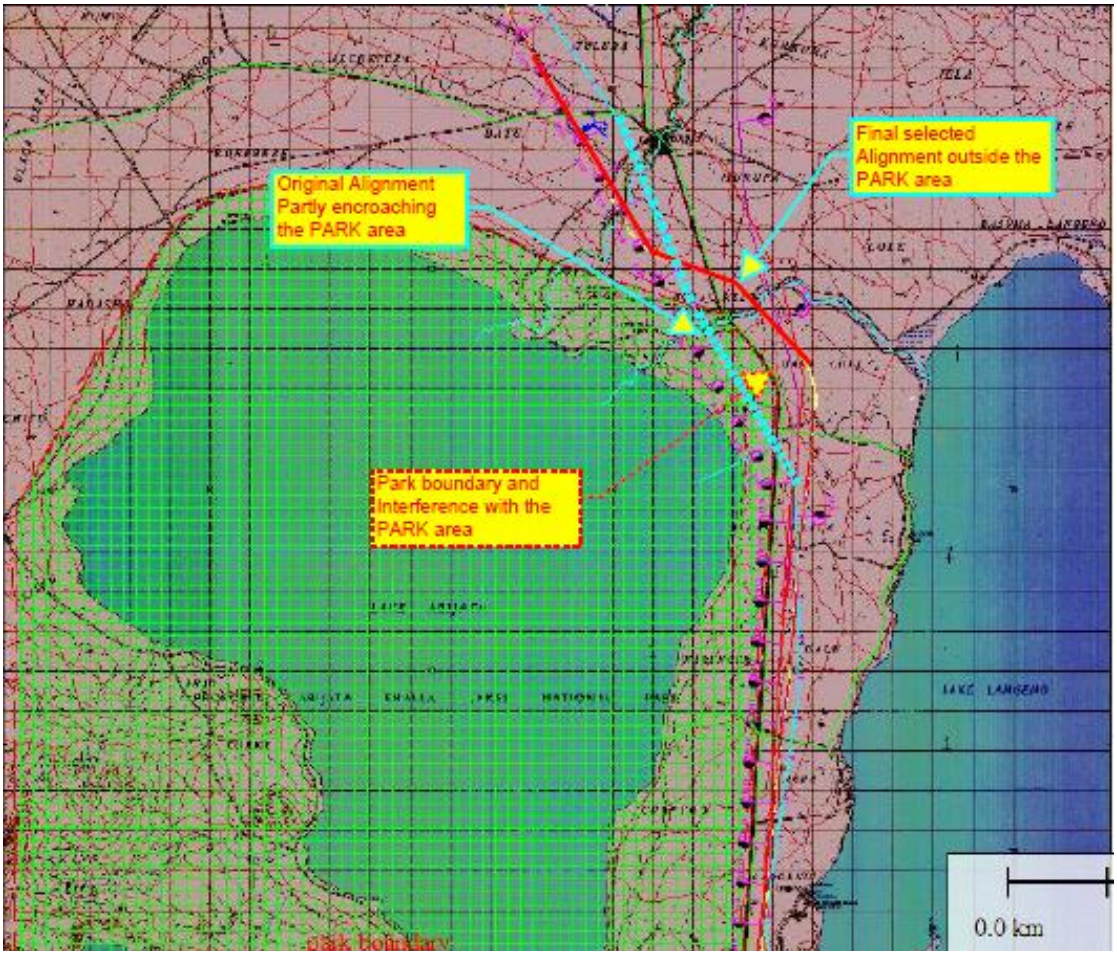


Figure 6-4: Re-alignment at Park Area

6.7 Design Options

Following the selection of Route A, design options that were of significant importance in achieving the intended goal and objectives of the project, while at the same time have minimal adverse environmental impacts were studied. The concept of alternative design options considered various aspects such as location, design, technology selection, construction techniques, and operating/implementing procedures.
Including the “base scenario” or do nothing option. A total of four alternative design options were identified and considered for Modjo-Hawassa Expressway Road Project. These were:

- Option 1: Expressway
- Option 2: Dual Carriage Highway
- Option 3: Full Upgrading of the existing road
- Option 4: Do nothing option: the “base scenario”

Assessment of the social and environmental impacts associated with the various design options is based on data collected from field visit, review of relevant study documents, evaluation of information obtained from discussion and consultation with public and stakeholders. Environmental and social impact identification and evaluation checklists were used after

establishing the baseline environment along each route and super-imposing the corresponding activities during the project construction and operation.

The section below provides description of the alternative design options, environmental scoping for identification & analysis of major environmental & social impacts/issues, and comparison of the different design options to support the decision making process.

6.7.1 Description of the alternative design options

The main road design features of the three options in tandem with the design changes are summarized as follows:

Option 1 – New Expressway.

This option considered the construction of the road to an expressway standard 4 lanes dual carriageway (with 2 lanes per carriageway), controlled access, grade-separated interchanges and a single toll gate or plaza with a view to integrate with the current tolling operation of the Adddis Adama road. The Expressway has a total length of 202.48 km. The route starts at the Modjo east of the Modjo dry port and connects with interchange with Addis Ababa-Adama expressway, and ends at the existing Shashemene- Hawassa road before Tikur Whia village.

The typical cross section (see Figure 6.5)of the e consists of two carriageways with two lanes each of 3.65m width, paved (hard) shoulders on inner and outside, unpaved (soft) shoulders on inner and outer side and area separated median (swale ditch) of 9m width. The entire length of the Expressway will be fenced to eliminate cross over traffic.

The median design was enhanced to replace the 1.5 meter wide pre-cast concrete physical barrier, separating the median from the carriageway, by an area separated, 9m wide swale ditch with a view to enhance safety, visual appeal and reduction in cost. A total of 10 grade separated and access controlled interchanges and link roads will be provided.

Option 2 – New dual-carriage highway

This option considered the construction of a new dual carriageway highway on the same alignment as the Expressway. The dual carriage highway will be identical and conform to the same geometric requirements (horizontal and vertical alignment standards) of the Expressway. However, access to the highway will be unrestricted at all cross roads and at-grade intersection / junctions be provided. The typical cross section of the highway will be identical to the Expressway option and will consist of: two carriageways with two lanes each of 3.65m width, paved (hard) shoulders on inner and outside lanes, unpaved (soft) shoulders on inner and outside lanes and the two carriageway area separated by a 9m wide median swale ditch. The highway will not be fenced.

Option 3 – Upgrading of the existing road to dual carriageway standard.

The plan involves upgrading of the existing single carriageway road to a dual carriageway standard, supplemented by bypasses at eight major urban centers traversed by the road. The geometry of the road would be only partially improved due to the constraints imposed by limited land and the doubling of the existing road. The bypasses are aimed at mitigating the traffic congestion at the crossings of major urban centers.

The final profile would include two carriageways with two lanes each of 3.65m width, paved shoulder of 2.5m width, and unpaved shoulder of 1m width and a median of 1.5m width separated from the carriageway by a pre-cast concrete kerb with safety guardrail.

Option 4 – Base case –"Do nothing" scenario

In this option, the there would be no actions taken to improve the road except for periodic maintenance. This option has the advantage of low capital cost and high maintenance cost. Environmentally, it would create high traffic congestion, high air and noise pollution and safety problems. Ultimately, the increase in growth and traffic volume will make this scenario unsustainable. Economically, it would adversely impact the country's growth and tourism potential.

6.8 Construction Cost Estimate

Cost estimates. Based on the revised optimized design options has been done for the three pre-design options. Table 6.3 below shows project cost estimate in USD.

Table 6-3: Cost estimate for the three design options

Design Option	Cost estimate [USD]
Expressway	688,146,000
Dual Carriageway Highway	629,327,000
Full Upgrading of Existing road	558,772,000

Although, the dual carriageway highway and Full Upgrading of existing road options are financially lower that the expressway option, speed reduction, safety, traffic congestions in settlement areas is a prime issue and the long-term operating benefits from free and safer traffic movement vividly outweighs the higher capital cost. This new envisioned Modjo-Hawassa road is generally located 3 to 4 kms away from settlement areas and will fall into expressway category and the relocation of houses will be minimized.

6.9 Environmental comparison of the alternative design options

The implementation of any of the proposed options will support in providing solution to the current road limitations and traffic congestion, enhance safety, and meet projected traffic and transport demand. The benefit arising from the options will vary from community to community, and at regional & national level. The highest benefit to local community is expected from Option 3 - Upgrading of the Existing Road to Dual Carriageway standard. The construction of a new Expressway (Option1) is expected to have the least impact on the local community since the road will be tolled and access limited to interchanges. Although over and underpasses will be provided, the fencing of the Expressway will limit mobility of people and animals.

The major direct adverse impact of Option 1 and 2 and to a limited extent Option 3 is permanent land take for the ROW and ancillary works such as interchanges, link roads, etc. The expressway and dual carriageway options take quite a large amount of land permanently (1825ha) and Full Upgrading (Option 3) has the least amount of land take which is 755ha. The alternative options also affects temporary land requirements in relation to quarry, camp and detour development

activities, and the amount of land required is directly related to the extent & complexity of work which is expected to be the highest in the case of Options 1 and 2 - the Expressway and the new Dual Carriageway followed by the Upgrading of the options.

The erosion effect is expected to be lower for the upgrading option due to the plain topography and limited construction activities as compared to the other two options (1 and 2). Although the Expressway and Dual Carriageway terrain is fairly flat, the construction of a new road in a Green field alignment and the associated supplementary works would result in soil erosion and land degradation unless supported with the necessary conservation and mitigation measures. For the Dual Carriageway, although it travels the same alignment as the Expressway, the volume of the earthwork is lower and hence the erosion impacts will be slightly lower.

The Full Upgrading (Option 3) follows the existing alignment, all the way throughout the route, except the town bypasses. Therefore, disruption on the physical environment and overall land take will be smaller as compared to opening of a new alignment. Widening of the existing road will significantly affect public facilities and trees/shrubs along the route. It will result in clearing of old indigenous roadside trees around Modjo river crossing bridge. The bypasses will reduce the direct adverse impact on urban facilities and residences and reduce urban pollution from vehicular noise and smog during project operation.

With regard to protected area & sensitive environment, the full upgrading option is expected to have minimal impact on the protected habitats of ASLNP. The new dual carriageway and expressway options follow a “green-field” alignment and hence adverse impact compared to the full upgrade is relatively high. However, during route optimization, the green-field alignment was moved to the east of the existing road, thus minimizing direct impact on the park.

Irrigation activities in the project road area, dominantly found in the section between Koka and Zeway area, using the lakes water & shallow wells (pumping), and the irrigated area fall east of the existing Modjo-Hawassa asphalt road. There could be some adverse impact by Option 3 road construction activities like expanding the existing road, realignment, access & detours. No adverse impacts are anticipated with the Option 1 & Option 2 since the new expressway or dual carriageway is located on the west side of the existing road and far away from the irrigated fields.

With regard to urban centers services facilities and private investment, minimal adverse impacts are expected with the Expressway and Dual Carriageway options. Such impacts, if any, will mainly occur at the starting section in Modjo town. The town bypasses will minimize adverse impacts on urban settlement centers services & infrastructures in Option 3.

Table 6-4: environmental and social impacts of the various design alternatives.

Impacts	Option 1 Expressway	Option 2 Dual Carriageway	Option 3 Full Upgrading	Option 4 Do Nothing (base scenario)
Permanent loss of land for establishing link roads, ROW etc.	1,825ha	1,825 ha	755ha	0
Temporary loss of land for quarry, camp, detour etc.	125ha	125 ha	50ha	0
Benefit to the local economy	+	+++	+++	++
Benefit to the national economy benefit	+++	+++	+++	+
Change in fuel consumption and level of vehicular emission	+++	++	++	---
Loss of protected conservation area, ASLNP	Nil	Nil	Nil	Nil
Important habitats as seasonal food plain, lakes and wetlands	- -	-	-	-
Clearing of vegetation, acacia woodland and savanna for ROW and other construction activities	187ha	187ha	50ha	0
Impact on fauna, wild animals and birds due to direct and secondary effect on the other lakes	- - -	-	-	--
Loss of esthetic value	-	-	Nil	Nil
Change of storm water runoff due to road embankment, gradient	- -	- -	-	-
Soil erosion and sedimentation	- -	- -	-	-
Air pollution from dust and gas emission to the atmosphere	+++	++	++	---
Increased noise level during construction and operation	-	-	- -	Nil
Water pollution from project construction and operation	-	-	-	-
Loss of agricultural land, mainly cropland	1983ha	1983 ha	878ha	0
Damage to cash crop irrigation fields	Nil	Nil	-	-
Impact from influx of labor force	- -	- -	- -	Nil
Disturbance to urban centers and loss of public service and facilities, private investments	-	- -	- -	0

Impacts	Option 1 Expressway	Option 2 Dual Carriageway	Option 3 Full Upgrading	Option 4 Do Nothing (base scenario)
Local employment benefit during construction and operation	+++	+++	+++	0

Key

Impact direction:	beneficial (+)	adverse (-)	
Impact magnitude:	major (+++/- - -)	moderate (++/- -)	minor (+/-)

In line with the Engineering assessment, from the safe and efficient operations perspective, Option 1 is recommended.

6.10 LOT-4: Arsi Negele-Hawassa Road Section

Overview. This Lot starts from a point located at km 150 (well before Arsi Negelle town) and the expressway terminates at km 201.68 (at the entrance of a small town of Tikur Wuha on the northern outskirts of Hawassa). The Project Road is connected with the existing alignment of the Hawassa-Hageremariam Road with at grade roundabout.

Route constraints. No route constrains are noted for this section.

Horizontal alignment. route traverses flat and rolling terrain and characterized by long tangents connected by larger radii of curve.

Vertical alignment. The vertical alignment has a maximum gradient of 3 % while the minimum gradient is 0.3% connected with long vertical curves.

Cross-sections regard: The typical cross section for the mainline expressway and link roads are shown in ***Figure 6.5.***

Table 6-5: Cross Sectional features of the project road

Main Project Features		Expressway	Link road
Carriageways		2	2
Lanes per carriageway		2 x 3.65 + 2.25 m outer shoulder + 1.75 m inner shoulder	2X3.5+3 m
Median width		9 m swale ditch (area separated)	2.5 m
Pavement			
	Layer 1	50mm AC	50mm AC
	Layer 2	180mm DBM	-
	Layer 3	220mm crushed subbase	200mm crushed base course
	Layer 4	220mm natural subbase	250mm subbase
	Layer 5	300mm Improved subgrade	150mm Improved subgrade

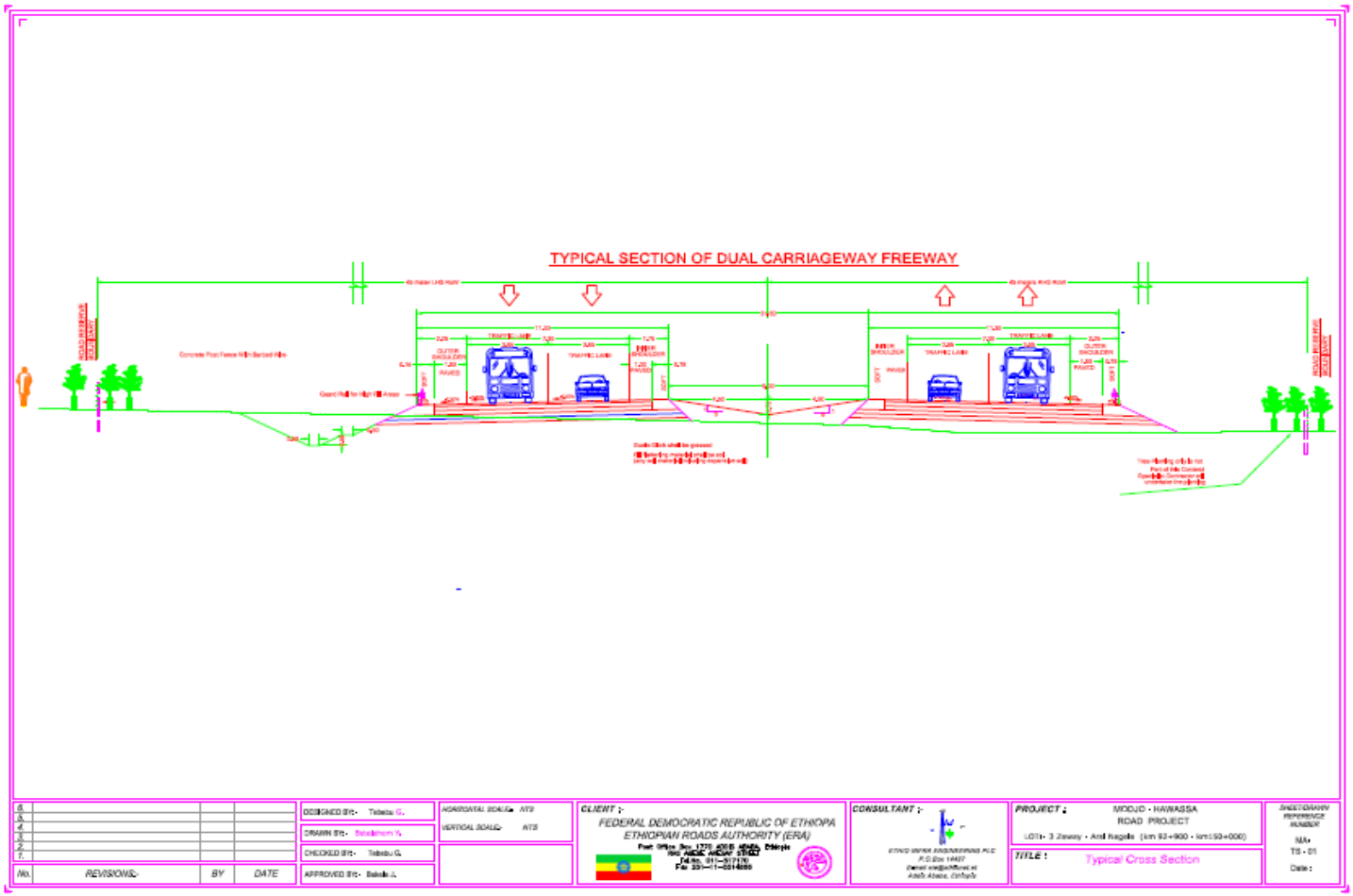


Figure 6-5: Typical Cross Section

7. POTENTIAL ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION AND ENHANCEMENT MEASURES

7.1 General

Implementation of the proposed Lot 4Arsi Negelle – Hawassa Road Project can result in various environmental and social impacts, both beneficial as well as adverse impacts. Majority of the impacts occur during the project construction phase, and can be controlled through careful and wise construction procedure and workmanship.

In this section of the report, the potential significant impacts of the project on the physical, biological and socio-economic environment will be discussed. Appropriate benefit enhancement or mitigation measures will also be identified and recommended for the adverse impacts considered to be major/moderate. Environmental consideration in the proposed road project design can go a long way to avoid/reduce many of the identified adverse impacts. Compensation and restoration measures need to be made for impacts that can't be mitigated with road design like land and property expropriation, clearing of vegetation in the expressway/new highway corridor and construction sites.

7.2 Impact Category and Characteristics

Environmental impacts caused by road development projects can be categorized into three major impact types. They are direct impact, indirect impact and cumulative impact types.

Direct Impacts of the Project

Direct impacts of the road include mainly impacts that are caused by the road construction like soil and land surface disturbances, vegetation clearance and material removal activity related to the various construction and operation activities. The major adverse direct impacts of the proposed Dual carriageway project are those related with land-take and establishment of the ROW and these include loss of productive agricultural land, soil erosion, loss of vegetation, disruption of settlements and public services.

Indirect Impacts of the Project

These are chain effects or impacts that result from the road construction indirectly and at distant locations from the construction corridor. These include induced development in the project area and at roadsides, water quality deterioration as a consequence of the vegetation clearance and soil erosion upstream of water sources, increased deforestation due to easier transportation of logs to market, cultural influences related to opening up of the area to tourists and interaction with external ways of life and so on. These impacts are normally observed during the operation phase of road projects.

Water quality deterioration and water shortages at downstream areas due to project implementation and related ecosystem changes can also be part of the indirect impacts experienced at furthest distances from the project area.

Cumulative Impacts of the Project

This type of impact results from synergic effects or cumulative effect of several impacts that end up in environmental or social changes. Cumulative adverse impacts on water quality, erosion and sedimentation may occur if the present poor conservation measures continue along with implementation of other projects with similar impacts. The cumulative impact on the economy is much higher considering the parallel implementation of private and public development projects, as well as the realization of the Addis Ababa-Adama Expressway.

7.3 Duration and Scale of Impacts

Major direct impacts on the natural environmental components are caused mainly during the construction phase. Adverse impacts like soil and water resources degradation, soil erosion and vegetation clearance, material removal and consumption from quarry and borrow pits etc. are caused during the construction period. Socio-economic impacts like displacement of people, damages to properties and crops, occur during the project construction period.

7.4 Major beneficial impacts of the road project

7.4.1 Significant contribution to regional and national economy

The proposed new dual carriageway highway is part of the Trans-African Highway n°4, the Cairo-Gaborone-Cape Town highway, the longest amongst the Trans-African highways, covering a total of more than 10,000km and linking, within its central part, Addis Ababa with Kenya and the port of Mombasa. Therefore, its construction will enhance new import/export opportunity through Mombasa. The proposed road will bring significant benefits to the regional and country economy following adequate, safe, cost effective and reliable transport service. A considerable reduction in vehicle operating costs is anticipated once the project has been implemented.

Businesses and communication between regions, and most importantly import and export from the central part of the country through Hawassa will be facilitated and strengthened. At the moment this trade and communication between regions is constrained mainly due to the lack of standard transportation facilities, poor existing road condition and congestion in urban centers 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.

7.4.2 Reduced air pollution/Reduction in fuel (petroleum/natural gas) consumption

The major pollutant source expected during the project operation originates from vehicles emissions. The impact of air pollution from vehicles is governed by traffic volume, traffic composition, speed of traffic, frequency of acceleration and deceleration and the road surface. The adverse impact is already felt in towns due to inefficient use of the road, poor engine performance and congested traffic.

The proposed new expressway will contribute to reduction of air pollution from vehicular emission since it diverts traffic from densely populated urban road sections where it causes adverse effects like pollution and inefficient transportation. The introduction of grade-separated junctions, the provision of a dual carriageway to facilitate overtaking of slow-moving vehicles and the absence of pedestrians and animals will allow the smooth flow of traffic, contributing to a reduction in emissions. As the new expressway traverses rural areas with low population density, and deviates from the highly populated urban settlements located along the existing route, the pollution effect on local communities will be reduced.

7.4.3 Creation of income generating activities

The construction of the project road is expected to create employment opportunities and jobs for the local communities. 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 considerable contribution to the reduction of poverty at household level during the project construction phase. The project construction is estimated to take about 3.5 years, hence significant benefit is expected from employment opportunities during this period. After the completion of construction, contractors will engage local labor for routine maintenance activities,

many of which are labor-intensive tasks that create local employment. Compared with a conventional road, additional employment opportunities will be created in the collection of tolls, when introduced, and the delivery of higher-level services to road users.

Required enhancement measures include:

- The contractor should employ work force mainly from the locality where the construction work is undergoing especially in positions that may not require special skill;
- In the process of employment, the contractor should give priority or preference to women especially in less risky jobs, and provide training for women in different skills as this contributes to the ongoing effort towards poverty reduction mainly at local level;
- Employment, wage system, and other administrative measures for the local workforce should be in line with the country's law.

7.5 Adverse environmental impacts

The adverse impacts described in this section are potentially the most important as far as the overall impact of the project is concerned. In all cases, there is a relatively high probability of occurrence of these significant impacts if no mitigation measures are adopted. The anticipated adverse impacts will be distinguished in biophysical and socio-economic categories and based on whether they occur during the project construction or operation phases. Summary of mitigation and management plan is presented in Tables 8-3 and 8.4.

7.5.1 Construction phase impacts

Key Physical impacts during construction phase

a) Impact on soil & proposed mitigation measures

The effect on soil resource can occur due to one or a combination of change on soil resource including soil erosion, soil pollution, compaction, top soil removal due to the various project construction activities. The effect on soil also influenced by factors such as terrain, land use and cover, soil characteristics and conservation practices.

The soil of the area is of erosive type and can easily be exposed to erosion effects due to construction related activities, lack of vegetation cover could facilitate erosion hazard especially in steep slope areas. The majority of the route corridor is flat plain land, opening of the new dual carriageway pavement in these area require fill embankment through appropriate material. There are also sections along the route that require earth cut and removal of material to keep design standard.

The project road design has to consider measures to prevent erosion, slope shapes and steepness shall be designed in terraced, stepped or edge rounding fashion at fill sites based on the soil type. Steep slope embankment sides have to be covered with grass and ensure growth through watering to prevent erosion.

The removal and clearance of the vegetation cover for the various project road components like pavement, construction of access and development of borrow pits and quarries will all expose the loose soil to erosion effects and to soil losses. Surplus excavated top soil shall be stored and used to rehabilitate degraded grounds.

The other impact on soil can result from compaction due to machinery and vehicular movements affecting crop fields and grasslands. Soil compaction results in poor productivity and poor vegetation growth, due to lack of air circulation and lowered infiltration of rain water. The effect is more pronounced at material production sites, access roads to material sites and also along the

sides of the proposed road alignment. The contractor, following completion of work in these areas, has to loosen by deep tilling of the land with tractors.

Impact on soil pollution can also occur due to leakage, inappropriate disposal of fuel, oils and other chemicals utilized by construction machineries and garage works.

Required Mitigation Measures

- Slope shapes and steepness shall be designed in terraced, stepped or edge rounding fashion at fill sites based on the soil type;
- Cover embankment sides with grass and ensure growth through watering, and prohibit animal grazing at road shoulders and embankment sides;
- Surplus excavated top soil shall be stored and used to rehabilitate degraded grounds;
- The road design shall provide adequate drainage structures so as to maintain the normal flow direction and attempt to maintain uniform water distribution over surfaces at downstream side of catchments. This can reduce flow concentration to specific direction that can result in flooding effects and erosion especially at steep slopes and rolling terrain;
- Line water receiving surfaces or ditches with stone ripraps or concrete;
- Provide adequate drainage lines in order to intercept flows, protect from entering erosion susceptible areas and reduce gulley formation;
- The contractor, following completion of work should loosen the compacted soil by deep tilling of the land with tractors and make ready for farming or vegetate with appropriate seedlings, as found necessary;
- the Contractor should work only on sections of road which he can comfortably handle at one time, rather than opening up long sections of the highway and stockpile material which he cannot utilize immediately;
- during wet seasons, activities such as earthwork should be halted as it may initiate soil erosion and transport sediment to the nearby water bodies.
- Spoil piles shall be leveled or vegetated to avoid erosion
- Storage of cut material prior to use or permanent storage.
- Excess spoil material left in stable piles covered with vegetation.
- Minimize work in or near rivers as much as possible, especially in wet season
- Plant or reseed native species on all bare ground when construction is complete, monitor until vegetation is self-sustaining.
- the road design shall include physical & biological measures (grasses, riprap, and other devices in water channels, as well as dispersal structures in main drains) to reduce speed of runoff and erosive effect;
- Demarcate all construction areas and keep all vehicles and equipment in the demarcated area. Minimal off-road movement; and
- Protection of water bodies from run-off by using settling ponds silt fences, hay bales, and other devices to slow/stop run-off.

b) Air quality (dust, gaseous emission) impact & proposed mitigation measure

Significant impact on air quality can occur during construction phase which is related to increased dust/particulate level in the atmosphere caused by construction related activities, and also increased emission from heavy construction equipment and trucks. The proposed road may cause significant volumes of dust in rural areas that mainly result from various earthwork activities such as excavation for pavement, earthen construction material production and construction traffic. It affects human health and may contribute to the incidence of respiratory and other diseases to the rural community and project employees. Air pollution can also be a major concern to urban areas due to transporting earthen material without the necessary precaution to prevent dust and gaseous emission impact. The impact is temporary occurring during the construction period and the extent of dust and emission is directly related to the amount of earthwork and the

workload of construction equipment. Majority of the air pollution impact can be reduced/controlled through construction method procedure and management.

The high and continuous dust cover in rural area can harm the surrounding vegetation when heavily deposited on the leaves. The majority of the corridor where the proposed road construction activities will take place is currently used for crop production hence reduced crop production may occur temporarily during the construction period.

Required Mitigation Measures

- Avoid, to the extent possible, using the existing road in towns as haul roads;
- Implementation of dust suppression measures like regular water spraying on paved and excavated grounds;
- Installation of dust suppression measures to equipment, machineries and crushers, and prevent location of crushers near densely populated settlement areas;
- Ensure regular and periodic maintenance of vehicles and machineries so as to reduce pollution related to motor exhausts;
- Implement occupational health safety measures, especially by project construction employees who are exposed to high dust & vehicular emission;
- Cover truck that transport earthen material to prevent dust, especially while traversing through densely populated urban centers;
- The contractor has to include the necessary cost for implementing mitigation measures to reduce/avoid air pollution impact such as cost for water spraying, machinery maintenance & service, occupational safety equipment, and safe transport of earthen material filled trucks in urban section;
- the Contractor should work only on sections of road which he can comfortably handle at one time, rather than opening up long sections of the highway and stockpile material which he cannot utilize immediately. At strategic locations such as schools, health facilities, markets, etc, where the young and the sick and large numbers of women and children gather, the Contractor should regularly water the road sections to suppress dust; and
- Speed breaks or control mechanism on haul roads and settlement areas.

In general, majority of air pollution impact can be reduced/controlled through proper implementation of standard method of construction procedure & management.

c) Noise & vibration impacts

Noise and vibration result from construction activities in general but particularly from operation of heavy machinery. Other operations generating significant noise include concrete mixing plants, blasting in areas of rock excavation and stone crushing. Sustained noise levels during construction are expected to be much higher than the ambient noise level in the project area. The project route & construction sites mainly fall in the rural area, and hence the impact is likely to fall on the sparsely populated rural communities in construction sites.

The other sensitive sites to be affected by noise are: churches, mosques and schools. There are no hospitals within the stretch of the project under consideration.

Noise & vibration can result in significant adverse impact on wildlife population.

According to the Provisional Standards issued by the EPA mainly for the industrial sector, a provision on noise standard is categorized into three areas; and for the Project under consideration, a 65 dB for day time and 55 dB for night time is adopted.

Required Mitigation Measures

Therefore, to minimize noise disturbance to the population around the sites, it is recommended:

- not to undertake activities producing nuisance noise level during rest hours and during night time. The timing of blasting operations should be arranged with the local administration, and the surrounding dwellers are informed prior to undertakings.
- Installing crusher plant should not be close to residential and town premises;
- That care has to be taken to avoid construction activities leading to noise nuisance in protected areas, especially in the ASLNP; and
- Residents along the project road will be notified about the construction in advance

d) Impact on water resource and quality

The project road construction related activities like excavation, generation of wastes, installation of embankments& crossing bridges, direct water abstraction for construction purpose may have effect on the existing water resource.

Rivers, ponds, groundwater and springs are used for potable supply purposes throughout the project area for drinking, washing purposes and cattle watering. There are also several water supply ponds along the project road. Pollution of these resources may arise at or close to the base camps or work sites as a result of inadequate provision of sanitary and waste facilities and accidental or deliberate spillage or leakage of polluting materials. Such pollution adversely affects those who depend on local water resources, and groundwater pollution in particular can have serious long term effects on water quality. Inappropriate disposal of refuse and of some materials used in construction can also lead to public and animal health hazards.

The adverse impact on water quality of the rivers and lakes is related to increase of suspended sediment and risk of residual chemical contamination from bridge construction and earth work activities, machineries and other construction activities. Oil products 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 proposed road project involves construction of new bridges that can result in adverse impact on water resource due to erosion/sedimentation and pollution from contamination of chemicals. The major adverse impact on water resource may be related to perennial rivers, lake body and swamp and seasonal flood plain areas that are traversed by the new road route or located in or near the road construction sites.

Excavations, grading and site clearances during construction generate large volumes of spoil soil that can get their way into the natural water body and result in siltation of rivers and the lakes as described in soil impact above. These spoil materials should be disposed in identified dump sites which may include the nearby excavated material sites. Otherwise, spoil material can be washed and carried by wind or flood, into tributary rivers and ultimately to the lakes body. Excessive transportation of soil and solids into the water bodies can cause undue silt accumulation and deterioration of the water quality, reduce the water carrying capacity and affect aquatic biodiversity (fishery).

The proposed road project require water for construction purposes such as adjustment of moisture content of fill, road sub base and base courses and watering of haul routes to suppress dust. Most of these requirements can be supplied from streams crossed by the route. Perennial flow volume in these rivers varies and their water availability is governed by current extraction for

domestic, agriculture and industry facilities which is already high. The road project also requires water for construction labour and at the base camps. The baseline data indicates limitation of ground water quality with regard to excessive salinity and fluoride along the road route & the central RVLB at large.

Required Mitigation Measures

- during construction use only “clean” fill material around watercourses, such as using quarried rock containing no fine soil to prevent siltation & sedimentation of water sources in downstream area;
- the road design shall include physical & biological measures (grasses, riprap, and other devices in water channels, as well as dispersal structures in main drains) to reduce speed of runoff and erosive effect;
- construction of settling basins so as to remove silt, pollutants, and debris from road runoff water before it discharges in to stream drainage;
- The construction of bridge & other major earthwork works around water sources should consider soil erosion protection measures, and be scheduled during dry seasons to minimize the entry of soil material into the rivers by flooding and runoff water;
- Spoil soil must be collected and carted away at designated disposal sites. Spoil soil must not be disposed or accumulated at river banks, close to the streams, lakes reservoir, and at water ways and flood routes. They can cause undue silt accumulation and hence deterioration of the water quality, reduce the water and affect the aquatic biodiversity (fishery);
- Waste from camps and garage sites should be collected and transported to waste disposal sites and/or the contractor should prepare its own facility for waste management in the camps’ compound;
- The water quality deterioration caused by pollution from oil products and chemicals can be minimized with timely maintenance of leaking machinery parts and good housekeeping practices in garages, campsites and at refueling stations by the contractor;
- Waste management and provision of waste handling facilities at garages, camp sites and at working places should be ensured by the contractor through establishing water supply sanitary & waste disposal facilities, like pit latrines, cesspools and solid waste land fill sites;
- Camps and garages, and associated sanitary facilities should be located away from sensitive sites, ponds and floodplains and away from water sources and river crossings;
- Construction of physical conservation structures like check dams at major discharge points of the runoff water may reduce direct entry of silt and pollutants to the water sources;
- Arrange for alternative water supply sources when project water requirement (construction, camp sites) interferes with requirement of local demand, consider water harvesting from ponds construction, transport from available areas, drill & water quality analysis to confirm suitability for water supply purpose.
- Upon the request by the local people, quarry sites and/or borrow pits, supposed to be rehabilitated at the end, may be left open to serve as temporary storages for water for agriculture or livestock. However, the perimeters of such quarry sites and borrow pits should be fenced for the safety of people (especially children) and animals, and the slopes should be trimmed to safer grade;
- The measures should be maintained in an effective condition throughout the life of the base camp and the contract shall include appropriate contractual provisions ;

- Washing of vehicles and plant in or adjacent to any water source should be specifically prohibited, all washing should be carried out at designated areas away from water sources;
- Minimize work in and near water bodies;
- Ensure adequate sanitary facilities for workers, placed well away from water;
- Limit work in wet weather as much as feasible, especially work near water bodies;
- Mark off all water bodies and prohibit access by workers except for necessary construction work; and
- Mark off all boreholes, dug wells, and ponds and prevent damage.

Key Biological/ecological impacts during pre-construction & construction phase

e) Adverse impact on flora

The baseline assessment showed that majority of the natural vegetation in and around the proposed road route corridor has already been cleared for crop cultivation, rural settlement and other socio economic purposes. Construction of the proposed road result in adverse impacts to the remaining natural vegetation in the project area due to opening of new pavement, establishing camp and garage sites, access road construction and material site development activities.

To this effect, impacts such as fire hazards and tree felling for domestic energy requirement, notably charcoal production, are anticipated.

Required Mitigation Measures

- Undertake preconstruction survey to identify the existence of indigenous tree species and report to the monitoring team;
- Try to retain remnant indigenous tree species found in the route corridor as far as possible, and within the limits of design parameters unless they critically conflict with the proposed road route alignment;
- Awareness and education should be provided, especially for Dozer and other construction machinery operators so as not to clear trees unless required for the project road construction;
- Undertake preconstruction survey jointly with the monitoring team before route selection for access to material sites should avoid dense vegetation covered areas, and as much as possible utilize existing access roads;
- Reforestation of uncovered and graded grounds excavated and abandoned quarry sites as soon as site work ends; and
- Replanting of at least 10 seedlings in place of every tree removed by the project work in the ROW & development ancillary sites. This should be done in close cooperation and consultation with the local people and relevant offices such as the Agriculture Office (to select appropriate tree species). It should also be made clear that the community and the Park Management, after the survival of the trees has been assured, will be the ultimate owners and responsible entities of the trees. To promote survival of the seedlings, the project would require setting up of a nursery at ASLNP in collaboration with the local Agriculture Office to supply 2-3 year old seedlings for compensatory replantation. The cost of the nursery, supply of plant stock and plantation would be born by the Project.

f) Adverse impact on wildlife in protected area/sensitive habitat

The proposed road route doesn't interfere or fall in a park boundary. In the last section of the project, the road route is modified and laid west of the existing Modjo-Hawassa road and far away from Cheleleka swamp and hence the project construction expected to have no direct adverse impact on the wetland habitat and fauna.

Required mitigation measures

- Majority of the proposed mitigation measures above to prevent adverse impact on vegetation and water resource are applicable to prevent impact on wildlife;
- Consider construction of underpass for wild animals;
- Maintain the vegetation cover and other aspects in the indicated wild animals crossing route through minimizing vegetation clearance and all other precaution not disrupt the area;
- Prohibit and regulate illegal timber cutting and charcoal trade in the park and surrounding area;

g) Adverse impact on aquatic habitat & fauna (fish/birds)

Direct adverse impact on aquatic habitat can be encountered during installation of bridge and other structures across or near water bodies (rivers, streams) which result in destruction of local habitat or disruption in natural flow regime.

The project construction activities can deteriorate water quality which indirectly affects aquatic habitat & fauna as the construction activities may lead to increase of suspended sediment and risk of residual chemical contamination from bridge construction and earth work activities, machineries and other construction activities.

Required Mitigation Measures

- The construction of bridge & other major earthwork works around water sources must consider soil erosion protection measure, and have to be scheduled during dry seasons to minimize the entry of soil material into the rivers by flooding and runoff water;
- Spoil soil should be timely collected and cart away at designated disposal sites. Spoil soil should not be disposed or accumulated at river banks, close to the streams, lakes reservoir, and at water ways and flood routes;
- Waste management and provision of waste handling facilities at garages, camp sites and at working places should be ensured by the contractor through establishing water supply sanitary & waste disposal facilities, like pit latrines, cesspools and solid waste land fill sites;
- Camps and garages, and associated sanitary facilities must be located away from sensitive ecological sites, ponds and floodplains and away from water sources and river crossings, it is required to get a clearance for ERA environmental team for the use of the area for the intended purpose;
- Minimize work in and near water to the extent possible;
- Demarcate water bodies and prohibit worker access except at designated locations;
- Fueling and use of paints or hazardous materails only at some distance (50m) from water or drainage ways (that is, non-perennial waterways); and
- Seasonal restrictions on work in and near water.

Key socio-economic impacts during pre-construction & construction phase

a) Land & property expropriation impact & mitigation measures

The project construction requires land on permanent and temporary basis. Majority of the required land is currently used for crop cultivation that provides the major means of livelihood to the rural population. The major direct adverse impact is due to permanent land take for new road route alignment corridor ROW and associated structures, link roads and interchanges. Temporary adverse impact on land result due to activities like access development of material sites (quarry/borrow), establishment of camp and damp sites. The RAP study indicates that a total of 853 household heads will be affected by the construction works of the project road. The majority of them, 711 (83%) are male headed households, 15% are women headed and 1% institutions. The total family members of the project affected households are 7281 out of which, 5875 (80%) are male and the remaining 1406 (20%) are female.

Land acquisition as a result of the project is likely to result in expropriating their land fully and as a result their livelihood the PAPs is likely to be severely affected. Otherwise, there will be no significant impacts on land & fixed properties in town as the new road route corridor and construction sites are located out of the existing asphalt road & towns. The project affected rural settlement villages and the local governments will provide replacement land for new construction, for private owners of affected houses. Those people who live in (government owned) rented accommodation are not entitled to receive compensation, and for them, there may be difficulties in finding another house to rent, unless the local authorities take action to provide alternative rental accommodation.

Proposed mitigation measures

- The process of land reallocation and compensation should be preceded by a detailed inventory of individual and communal properties in the new road route corridor and ancillary sites development;
- The inventory should include size of individual holdings of agricultural land, number of affected trees and immovable properties;
- In the case of businesses, the compensation payments should include business restoration cost to take into account any anticipated loss of income which may arise as a result of the need for relocation of business activities;
- Assessment of cash compensation or land-for-land compensation for properties should be carried out in a wholly transparent manner, resulting in payments which truly reflect current rebuilding costs;
- Livelihood restoration plan needs to be prepared to ensure restoration and improvement of income and livelihood of the project affected groups and individuals, which is in addition to, and separate from, compensation for property losses, through development of income generating activities;
- ERA needs to work closely with the local administration and the Small and Micro Enterprises Development Agency towards the realization of livelihood restoration activities
- All of these activities will have to be carefully planned and completed well in advance of actual construction to allow enough time for appropriate resettlement and relocation of project-affected persons; and
- No construction should commence until all land and property expropriation procedures have been completed, replacement land allocated and cash compensation paid.

b) Impact on water source competition& proposed mitigation measures

The contractors will require substantial volumes of water for various construction purposes such as adjustment of moisture content of fill, road 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. It is probable that some of the contractors' water requirements will be met by abstraction from watercourses. All watercourses in the project area are used for drinking, washing and cattle watering purposes. During the dry season, most watercourses which the road crosses have no flow and where there is, it will be very low and any scale withdrawals by contractors could reduce water availability to existing downstream users. In view of the widespread need for construction purposes and of the serious implications of reduced supplies for the local communities especially from the generally low flowing watercourses, potential impact is considered to be very significant.

Required Mitigation Measures

- The contractor has to make his own arrangements for water supply which will not affect the rights of others, and to provide an alternative supply if interference does occur by constructing ponds or boreholes.
- The monitoring must carefully inspect and approve contractor water sources.
- Water management plan must be provided.
- A clause should be included in the construction contracts to the effect that the contractor shall be responsible for making 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 users.

c) Disruption & impact on services infrastructures and proposed mitigation measures

Majority of the new dual carriageway route is laid in rural area where services and infrastructures are generally limited.

Required mitigation measures

- ERA should advise all service providers of the intended road works programme, at the earliest opportunity;
- ERA should then notify the appropriate authorities of the relevant dates and request completion of relocation works before those dates;
- A clause should be included in the construction contract which requires the contractor to specify, in the detailed construction programme prepared during the mobilization period, the earliest dates on which construction works will commence hence, the earliest dates that the services relocation takes place, may be required.
- A clause should be included in the construction contract which makes the contractor liable for any damage to services resulting from his or his subcontractors' actions. Any damage caused to services by the contractor or subcontractors should be made up without delay at the contractor's cost.

d) Interference with roads trail & proposed mitigation measure

Three types of road can be recognized in the project area as observed during site visit and review of the ONRS Regional Road Network Development Study Project (RRNDSP). These are federal ERA including asphalt and gravel road, regional roads of various standard and community roads mainly earth/soil surface. The standard roads connect zone/wereda administration, urban, market places, public transport services. The community roads are usually

mud surface, with no proper design, and managed and maintained by the community, and yet provide significant benefit to the rural community mainly during the dry season. Furthermore, there are trails for human and animals' path to access valuable sites like local market, watering point, local services etc

The new road route corridor will traverse these roads and paths, and hence the need appropriate structures to effectively utilize the infrastructures and also prevent accidents. These may include underpasses for crossing of people and livestock and also the provision of roundabouts to connect with main roads.

e) Impact on cultural historical & archeological sites & possible mitigation measure

So far, based on discussions with the Ethiopian Archeological / Cultural Relics experts, it appears that there are no identified physical and cultural resources defined as movable or immovable objects, and archaeological, paleontological sites in the proposed new Expressway corridor. However, during the actual construction works sometimes there is a possibility that human remains, fossils and artifacts could be excavated, when this happens immediately report to the Regional administration authorities and Culture and tourism Bureau, and at the same time report for Conservation and Preservation of Cultural Heritages Authority in Addis Ababa and seek approval on how to continue the construction works.

f) Impact associated with construction traffic & proposed mitigation measure

Construction traffic, mainly related to the haulage of borrows and quarry material, is likely to increase the total traffic flow considerably especially near the main construction fronts. Many of the haulage vehicles using the roads in Ethiopia are grossly overloaded. This causes considerable damage to pavements of the existing roads including the Modjo- Hawassa asphalt road causing damage to structures such as culverts and bridges. Such damage is detrimental to the interests of all road users. Overloading also has adverse implications in relation to road safety, through increasing the chance of failure of steering and braking mechanisms and reducing stability on cornering if excessively high loads are being transported. While laden haulage vehicles move relatively slowly, unladed vehicles tend to move relatively quickly and there is a danger of increased hazards to pedestrians, other road users and livestock.

It is likely that construction machinery and vehicles utilize the existing Modjo-Hawassa asphalt & other nearby roads to identified material sites. This construction traffic may contribute to increased congestion in towns located along the existing road route. Much of the haulage of materials are located near the existing road route, and high number of transporting earth material in the dry season may raise considerable volumes of dust, especially by relatively fast moving unlade vehicles. The impact is pronounces and significant if laded vehicles pass through densely populated town and rural settlement villages. The dust level will be raised and can cause considerable nuisance as well as result in increased incidence of diseases.

Required mitigation measures

- As much as possible avoid trucks transporting earth materials through major towns section, implement precaution measure to avoid adverse impact related to traffic safety, dust and gaseous emission;
- Service the exhaust systems of all vehicles and equipment on regular basis to ensure that noise and exhaust emissions are kept to appropriate levels;
- Limit traffic speeds and apply water regularly on dusty roads to suppress dust levels, especially in densely populated rural settlement area;

- A clause has to be included in the construction contracts, requiring the contractor to carry out repairs, at his own expense, to any public or private road pavements or structures which can be proven to have been damaged as a result of overloading of his or his subcontractors' vehicles;
- A clause has to be included in the construction contracts to the effect that the contractor must make every reasonable effort to minimize road safety hazards and inconveniences to other road users resulting from the passage of his or his subcontractors' haulage vehicles, compliance with speed limits should be imposed and enforced;
- A clause has to be included in the construction contracts to the effect that, in cases where haul routes pass through towns or major settlements, the contractor shall prepare construction traffic management plans, for approval by the Engineer, which set out clearly the steps which will be taken to minimize the impacts of his haulage traffic, including but not limited to the regular watering of un- surfaced sections to suppress dust and the speed limits which will be imposed.

g) Impact on public health to local communities

The top ten human diseases in the project area comprise: malaria, Accute Upper Respitory Infection, infectious parasitic, skin infection, gastric, helminthes, pneumonia bronco and other, amebiasis and hypertrophy tonsil. Malaria is widespread in the project area and is a serious concern for visitors and settlers alike, due to the number of people annually infected. It is recorded that in areas below 2000 m a.s.l. malaria is endemic although short lived transmission occurs even above 2000 m a.s.l. where the micro climate is favorable. The other major health problems of the project area are reported to be infectious diseases. Water related diseases are also common. Most illnesses are communicable and are related, either directly or indirectly to lack of adequate and safe drinking water supplies and sanitation, low living standards and poor nutrition.

The various construction work activities like excavation, development of borrow pits etc may create conducive foci for breeding of mosquito vector of malaria thereby increasing prevalence of the disease to the local community. During the project construction, construction workers will encounter increased risks from the common health problems occurring in the project area as well as from use of hazardous chemicals, water pollution and improper waste disposal.

Required mitigation measures

- Contractor must issue worker code of conduct and must be enforced accordingly;
- The contractor must look after (plan, provide, manage, monitor and pay for) health, water supply and sanitation, and any training requirements of construction workers in accordance with the Ethiopian laws;
- Water borne diseases: to prevent the increase of water born diseases in construction camps, sanitary facilities (safe water supply, latrines, adequate washing facilities etc) have to be provided by the contractor in accordance with the Ethiopian laws and IFC/EBRD standards on worker accommodations;
- Malaria: In the vicinity of construction camps, mosquito-breeding sites have to be removed. In areas below 2000 meters above sea level, the contractor should provide mosquito nets for construction workers. Preventive measures for malaria should be strictly enforced in construction camps. Important is also the use of insect repellents and medical treatment of malaria cases;
- Continuous health education to employees, camp followers and local people that are participating in the project construction activities;

- Proper storage and handling of hazardous substances and provision of protective clothing for workers.

h) Occupational health & safety issues

The proposed new road construction involves various major works and construction equipments &machineries that may expose the construction workforce to various health problems associated with the construction activities. During road construction works, accidental discharge or spillage caused from inflammable, toxic, explosive and chemical substances could create health risks on the work force. Similarly failure to provide protective clothing and failure to ensure that appropriate safety measures are adopted by the workforce might create unnecessary health risks and problem on the workforce. The contractors are not expected to provide full medical facilities for the workforce but provision of adequate first aid facilities for emergency and which can also provide a limited service to the local community, should be required. The contractor may make arrangements with the nearby health institutions for major injuries and treatments required by the workers.

Required Mitigation Measures

- Provide safety measures and create awareness and provide training of the workforce on the use of safety measures;
- Provide protective clothing for the workforce, especially to those employees who are exposed to activities potential health risk problem;
- The contractor should provide appropriate crossing for people and animals in the construction area;
- Ensure that accidental discharges or spillages may not be caused from inflammable, toxic, explosive and chemical substances;
- The construction contract must include a clause to the effect that the contractor must provide a first-aid post at the base-camp, and is staffed on a full-time basis by a fully qualified paramedical attendant. Simple first aid materials, suitable for dealing with minor injuries should be available at all times, at all worksites.
- The woredas health facilities and institutions can provide assistances based on their available spare capacities, but without affecting their regular community services;
- Hazard/risk analysis
- Worker training on hazards and mitigation
- PPE provided (to ALL employees) and enforced
- Special training for special hazards: working at heights, in confined spaces and excavations, with hazardous materials, with heavy equipment, etc; and
- Recordkeeping and reporting to EPC contractor: work hours, lost-time accidents and amount of lost time, serious injuries and fatalities

i) Exposure to HIV / AIDS and sexually transmitted diseases

Road and other similar type of project construction workers, that involve large amount of young aged labor force and truck drivers are considered as having high potential (or good vectors) for the spread of Sexually Transmitted Diseases (STDs) and 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 mobile, and are also forced to live in working camps. Contacts and communications created between local communities and construction workers who have come to the project area from different localities and mainly from major towns will expose the local community to new and alien cultures and behaviours that might be against local cultures and behaviours.

The introduction of new and alien cultures and behaviours may contribute to the spread of communicable diseases such STD and HIV/AIDS. Similarly, other unwanted experiences such as, the coming of sex workers to the project area from major towns and cities will contribute to the increase in the number of sex workers, alcoholism and crime.

Required mitigation measures

- Maximum efforts has to be made towards effective internal as well as external mainstreaming of HIV/AIDS, Gender and Sexual and Reproductive Health particularly Sexually Transmitted Diseases (STD) throughout the span of the project in order to ensure the mainstreaming of cross cutting issues.
- Promote and Distribute Condoms: The condoms that will be distributed are of standard quality and approved by the concerned authority for distribution. The main sub activities under condom promotion and destitution are: Establishment of condom outlets: Effort will be made to make the condom outlets to be accessible and confidential places. Promotion of appropriate use of condoms: the various benefits and appropriate use of condoms will be promoted. Condom distribution and follow up: Condoms obtained through social marketing schemes will be distributed free of charge.
- Monitoring and Evaluation HIV/AID Program: All monitoring and evaluation activities will be done within the Performance Mentoring Plan Framework developed for the project. Project accomplishments will be considered at the output and outcome level. In order to track changes at output and outcome levels, the KAP survey data that will be generated at the beginning of the project implementation will be used as benchmark to facilitate the follow up process. As part of the monitoring activities the following will be delivered to the client and other concerned bodies:
- Terminal evaluation report of the project: Evaluation involving construction workers, community along the intervention road, local administrations, HAPCO and other concerned bodies will be conducted using an in house capacity. The evaluation will be conducted at the end of the project period ad the outcomes and changes brought about as a result of the project intervention. After the evaluation, key findings and outcome of the assessment will be prepared and shared to all concerned bodies.

j) Uncertainties regarding land and property expropriation

As soon as it becomes public knowledge that the project will involve land and property expropriation, uncertainties are likely to arise in the minds of the population in the neighbourhood of the road, as to how and when they might be affected. This can have an adverse effect on any forward plans which a family may be making and generally leads to minor social unrest.

Required mitigation measures

- The provision of full, accurate and timely information regarding all aspects of the project, especially matters relating to land and property expropriation is generally sufficient to allay fears, and to reduce the possibility of rumours and arising of gross misconceptions.
- The preparation of RAP after the completion of detailed design, in consultation with the local stakeholders and the community. The local administration in each wereda should brief the community in areas where land and property expropriation will be needed. The briefing should include general information on the project and the reasons why expropriation is necessary, together with indication of which land and property will be affected, the procedures to be adopted in relation to compensation assessment and the schedule for implementation of the expropriation process.

h) Employment priority

Employment priority for unskilled activities must be given to the local people as far as feasible. Development of major conflicts between local communities and contractor's migrant workers are not to be expected along this road. However, minor contractor/local community disputes concerning real or perceived issues will undoubtedly arise during the construction period, particularly if labour is predominantly from communities not in the immediate vicinity of the roads. The local residents might easily accept the camps due to the increased trading possibilities. The suddenly created demand for items such as food, drinks and different services may considerably raise the prices of local products/services. The cash inflow may also temporarily inflate local prices and cause bad feelings in the local population. The people selling their products or services will benefit, while those who are dependent on the same purchases may suffer the increased prices. Therefore, occasional and personal conflicts will be expected due this and many other reasons.

Required mitigation measures

- Although labour recruitment is a matter for the contractors, who have the right to determine whom they shall and shall not employ, they should be formally encouraged to hire locally wherever possible, in order to maximize the benefit distribution and social acceptability of the project;
- The construction contract should include a clause which requires the contractor to use his best endeavors to maximize local hire of labor, in so far as this is compatible with his skill requirements; and
- The construction contract must require the assignment of responsibilities for liaison (who can speak the local language) with local communities and local authorities to a named individual from the Contractor's office that is permanently on site, and should require effective liaison to promote social integration and the development of mutually satisfactory solutions to problems affecting local communities.

k) Gender

The Resettlement Action Plan identified 651 vulnerable PAPs. The vulnerable PAPs constituted of elderly people (above the age of 60) (292) and women heads of households (358). The socio-economic profile of the PAPs showed that among the project affected households 15% have dissolved their marriages mainly by widowhood (13.9%) and in rare cases by divorce (0.7%). The proportion of widows is significantly high across the woredas placing women heads of households in a more vulnerable situation. Largely in the project area the traditional marriage law is followed which in most cases leaves widowed women with limited resources. Moreover, widowed women do not often re-marry implying that they need to survive with their own means.

Required mitigation measures

- At the time of implementing the compensation and the resettlement action plan of the project special attention, support and care must be given to female headed households and to the elderly. The support will be made in rebuilding their houses, transferring and transporting their household items and materials to the newly constructed residential houses or houses used for business purpose.
- In cases of resettlement/displacement, special emphasis needs to be placed on ensuring that the compensation arranged for both men and women, is fair. To this end efforts have to be made that project affected women will participate in decision making positions e.g. women to be represented in the committees to be established at the community and woreda level (30% of members to be women).
- New employment opportunities in the project especially positions that don't require skill have to be used as an instrument to decrease the vulnerability of the project affected

female headed HHs. During road construction equal opportunities should be given to men and women members of the local communities. At least 30% of the local people to be employed should be women.

Adhere to ERA's strategy of addressing Gender Issues

- In order to address these and other issues raised, and in line with the ERA's gender policies, the project has to incorporate Gender Mainstreaming Plan of Action to be carried out during implementation. The gender Plan of Action, among other things, will empower women through ensuring that women are encouraged to seek employment in the project and that they are not discriminated against in the recruitment process.
- 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.
- The day to day activities of the HIV/AIDS, STD and Gender activities will be monitored by the Environmental and Social Management Unit (ESMU)/ of the supervision consultant. The specialized service provider will prepare monthly and quarterly reports to be submitted to the supervision consultant. The reports will provide updated information on will include HIV/AIDS, STD and Gender program implementation highlighting key issues and problem areas and recommended measures for resolving identified bottlenecks. The supervision consultant will forward the progress reports to ERA's Women's Affairs Office (WAO). ERA's Women's Affairs Office (WAO)will monitor the progress of the Gender not only through these monthly and quarterly reports but will also make at least two field visits annually to the project site.

Issues to be incorporated in the Gender Plan of Action to be:

A. Human resource/staffing

- Consider the project gender gap in human resource planning
- Apply affirmative action to fulfil the human resource gender gap
- Show women's involvement and gender ratio progress in percentage
- Encourage female applicants for vacancies so that to increase the number of female professionals in the road project
- Empowerment women staff to be self-sufficient and confident which inherently linked to knowledge and voice

B. Technical skill to be done by contractor& or ERA

- Provide gender awareness and gender mainstreaming training to the staff and communities there should be tailored to bring change at individual and organizational and community levels
- Screen expertise's for their knowledge on gender analysis, mainstreaming , Monitoring and Evaluation
- Enhance the skill and knowledge of Gender experts
- Provide assertiveness training to women specific staff

C. Implementation to be perform by the Contractor

- Consider gender mainstreaming activities as part of core activity and supporting activates
- Development gender sensitive follow up and reporting formats
- Ensure the gender balance of beneficiaries and customers in project implementation process

- Data collection and analysis should be based on sex and gender disaggregation
- Make an employment of gender experts in the project area .

D. Women staff facilitation in project areas

- Provide transport facilities , women specific (for biological difference) senatorial supplies such as free distribution of modes to women staff and daily laborers in project camps and sites
- Water available & comfortable shelter with bath room in project camps
- Provide awareness on gender concepts, HIV/AIDS against harassment& harmful traditional situations technical capacity with regard to road work & other related topics
- Provider gender guideline & checklists on gender violence, sexual harassment and anti-discrimination in the work place that is articulated visibly
- Providing child care /in case if it is needed

E. Changing organizational culture

- This should be done by the Contractor
- Use gender sensitive language in all written and oral communications
- Put in place incentive and disincentive mechanisms regarding to gender mainstreaming
- Reward staff with high performance and contribution made to gender mainstreaming aspects
- Women should be delegated in different tasks
- Women should be delegation in of committee membership participatory should be 50%
- Gender mainstreaming by itself is not an end result, rather it is an important tool used in reaching to the equal participation &utilizing of both women andmen in the road sector result

F. Monitoring and evaluation

- Design a gender sensitive monitoring and evolution formula for all processes
- Use gender as one of performance and success indicators
- Make sure the automation system format and /or every date collection format contains a columns for sex
- Monitor and evaluate the gender aspects of projects
- Involve women as evolution and source of feedback in the process of evaluating programs and project

l) Pressure on local medical services

Construction is inherently a relatively dangerous industry, and accidents invariably occur. In rural areas, which already have relatively poor resources in terms of medical services, the presence of even a relatively small contractor's workforce can impose additional strains, reducing their effectiveness as far as the local population is concerned. It is also reasonable to expect that the contractor should exercise a duty of care towards his workforce in relation to injuries sustained at work.

Required mitigation measures

- As stated earlier, the contractor must pay attention to the health of the workers at least within the framework of the contract agreement. Therefore, it is required that the contractor must at least provide emergency medical facilities for the workforce through availing adequate first aid facilities at different sites; and if possible, provide a limited health service to the local community.

- To this end, the construction contract should include a clause to the effect that the contractor must provide a first aid post at the base camp, staffed on a full-time basis by a fully qualified paramedical attendant. Simple first-aid materials, suitable for dealing with minor injuries, should be available at all times, at all worksites. Medical facilities or services provided, for emergencies, by the contractor may be extended to local communities at marginal cost, as a goodwill gesture.

m) Water pollution from sanitary and other wastes and spillages

Rivers, ponds, groundwater and springs are used for potable supply purposes throughout the project area for drinking, washing purposes and cattle watering. Pollution of these resources may arise at or close to the base camps or work sites as a result of inadequate provision of sanitary and waste facilities, and accidental or deliberate spillage or leakage of polluting materials. Such pollution adversely affects those who depend on local water resources and groundwater pollution in particular can have serious long term effects on water quality. Inappropriate disposal of refuse and of some materials used in construction can also lead to public and animal health hazards.

Required mitigation measures

- Water source pollution is of potentially high significance along the project road. Therefore, the contractor should take all appropriate mitigation measures to minimize pollution;
- A clause has to be included in the construction contracts which requires the contractor to prepare, for approval by the Engineer, a detailed Site Environmental Plan (SEP) for the base camp, prior to its construction which also covers other work sites. The SEP must make specific and adequate provision for the disposal of sanitary and other wastes in such a way as will not result in any form of pollution or hazard to human or animal health;
- A clause has to be included in the construction contracts requiring the contractor to take all reasonable precautions to prevent spillages and leakage of materials with the potential to pollute water resources. The measures should be maintained in an effective condition throughout the life of the base camp;
- Washing of vehicles and plant in or adjacent to any water source should be specifically prohibited, all washing should be carried out at designated areas away from water sources; and
- A clause has to be included in the construction contracts which makes it clear that the contractor will be responsible, at his own cost, for cleaning up any pollution caused by his activities (to the satisfaction of the Client) and paying full compensation to those affected.

n) Sterilization of base camp and other worksite areas

Contractors will make their own arrangements to use land, probably through the local authorities. When the construction works have been completed, base camps and other areas used temporarily by contractors are often left in a deplorable condition. Scrap metal, other wastes and large masses of concrete can pose problems for the nearby communities who have the task of removing and disposing of them and may be left with contaminated land.

Required mitigation measures

- Careful siting of borrow pits, stockpiling areas, work depots and work camps can avoid sensitive areas, reduce air and noise pollution, minimize visual intrusion and help prevent local traffic congestion;

- Confining the handling and use of hazardous materials at the construction site to reduce the risk of accidental spills;
- Install sanitary service (latrine, waste disposals, safe water supply) in camp sites, and provision of the relevant environmental education to employees on health hygiene and sanitation;
- A clause has to be included in the construction contract requiring, on completion of construction and maintenance period activities to reinstate base camp and other areas, leaving them as far as possible in a clean and tidy condition, suitable for the purposes for which they were used prior to occupation by the contractor. On occasion, the land holder (community) or the Client may wish to retain some or all of the facilities which have been established by the contractor e.g. buildings, base slabs etc. Otherwise, the sites should be fully reinstated before abandonment and all wastes removed;
- Effective mitigation is possible through requiring the contractor to avoid as much as possible privately owned lands, reinstate all sites and imposing a financial penalty for failure to do so, which can be used by a third party to carry out necessary cleanup works;
- A clause has to be included in the construction contracts which require the contractor to advise the Engineer of the location of the proposed base camp site and any other temporary construction areas, prior to commencement of any use of such sites;
- The Engineer should take photographs (with date and time stamps) of each site so as to show the initial condition of each site, should any dispute arise regarding this matter. One copy should be given to the contractor and one retained for the project records;
- A clause has to be included in the construction contracts which require the contractor to prepare a plan for the approval of the Engineer, prior to abandonment of base camps, which indicates what facilities are to remain at the request of the landowner and what activities are to be carried out to clean up the site. These activities should include removal and disposal of all wastes, demolition and removal of unwanted structures, removal and disposal of any earth which has been contaminated by the spillage of diesel, bitumen or any other polluting material, and any others necessary to restore the site, as far as possible, to its initial state; and
- Separate nominated lump sum items should be included in the Bills of Quantity for the reinstatement of base camps and other temporary construction sites.

7.5.2 Impacts related to development of construction ancillary works

a) Impacts from camps& garages

The establishment of construction camps and residential houses for the construction workers sometimes competes with the limited local resources. The existence of camps for the constructions workers close to settlement areas could influence negatively on local life style and sometimes may lead to cultural and social conflicts. To avoid such type of conflicts and problems the establishment of the construction camps should be in a planned way without negatively affecting the local resources and society.

Site clearance for the camp establishment and excavation for the buildings and facilities can result in loss of vegetation and agricultural production. The workers residing in the camps might misuse the surrounding natural resources; forest, wildlife, water resource. They may attempt to cut down trees for fire fuel, timber trade, kill wild animal, dispose wastes and conflict with local communities.

Pollution of surface and ground water sources may arise at or close to the base camps or work sites as a result of inadequate provision of sanitary and waste collection facilities, and accidental or deliberate spillage or leakage of polluting materials. Fuel and used oil from garages and fuel refilling stations can also pose adverse impacts to both water and soil quality and ultimately to public health. Such pollution adversely affects those who depend on local water resources. Inappropriate disposal of refuse and used oil, fuel products and chemical materials used in construction can also lead to public and animal health hazards and pollution of the water and land resources.

Required Mitigation Measures

- Camp location and design will be required to consider the environmental sensitivity of sites like dense forests, and also future use of the facilities up on commissioning of the project. These considerations can assist safe and economical use of resources and can benefit the local administration and/or the surrounding community up on handing over of the camp facilities to the client.
- The continued use of the buildings and the camp facility after commissioning of the road would also avoid demolishing and disposal problems that could result both in economic losses and environmental damages to the surrounding area. So consultation with the regional, zonal or woreda administration would assist to identify the appropriate camp site that can serve dual purposes.
- Issue Worker code of conduct and educate construction workforce to respect culture, norm and values of the community;
- The establishment of the construction camps should be in a planned way - without negatively affecting the local resources and interests of the society;
- Camps should not be located near water points that provide supply to various domestic purposes including people drinking
- Contractual clauses should be included in the contract document, which requires the contractor to prepare, for approval by the Engineer, a detailed Site Environmental Plan (SEP) for the base camp, prior to its construction, which also covers other work sites. The SEP must make specific and adequate provision for the disposal of sanitary and other wastes in such a way as will not result in any form of pollution or hazard to human or animal health.
- Contractual clauses have to be included in the contract document, which requires the contractor to take all reasonable precautions to prevent spillages and leakage of materials with the potential to pollute water resources. The measures should be maintained in an effective condition throughout the life of the base camp.
- A clause has to be included in the construction contracts which makes it clear that the contractor will be responsible, at his own cost, for cleaning up any pollution caused by his activities (to the satisfaction of the Engineer) and the payment of full compensation to those affected.
- Dumping sites should be systematically identified to avoid also erosion prone soils and ground water sources. This can minimize the possibility of adverse effect on soil fertility and water quality.
- Used oil and grease must be collected in sealed containers and reused either by the contractor or a third party with licence to do so
- Worker camp must meet requirements of IFC/EBRD worker accommodation guidance note

b) Impacts due to access road & quarry development

The principal environmental concerns with quarry development are related to the location of the sites, extent of site clearance, aesthetic effects of quarrying, blasting operation and the effects of access road construction.

Existing access or new access roads are developed to quarry sites resulting in adverse impact to the existing land use which may include farm land, grazing land and vegetation. The impact is considered to be temporary; however, the land is likely to suffer long-term reduction in productivity as a result of soil compaction by haulage vehicles. This cannot easily be reused using traditional ploughs (pulled by animals-notably oxen). Compensation paid for temporary loss of use of the land is unlikely to take this factor into account, and adverse financial effects on landholders are likely to result. Access roads can also concentrate runoff and lead to increased erosion in adjacent lands.

The air pollution (due to dust) will be increased due to hauling vehicles resulting in adverse health impact on the rural community located adjacent to the access road

Similarly, it is unlikely that quarries would be developed in close proximity to settlements, since most rocky areas in the project are far from settlement. Locating quarry close to settlement are can have potential impacts associated including noise and dust nuisance and public safety aspects associated with the storage and use of explosives.

Required Mitigation Measures

The construction contracts has to have a clause to the effect that quarry sites and access roads are deemed to be part of the site, so that the powers and authority of the Engineer extend to them in the same way as to other areas where works are being undertaken

The construction contracts should have a clause requiring the contractors to prepare detailed Site Environmental Plans (SEPs) for approval by the Engineer, prior to commencement of any site development, and to execute all work at the sites in accordance with the plans. The SEPs should address all matters relevant to environmental protection and the minimization of impacts. Information provided in the SEPs should include, but not be limited to the following:

- A site plan showing the location and proposed extent of the quarry, access road and any other facilities which may be installed
- Details of all landholdings, vegetation and land use as shown in the RAP
- Distance from the site to the nearest habitation
- Measures which will be taken to minimize erosion caused by access road construction and drainage system operation
- Contractor must scarify and loosen the compacted soil after completion;
- Any other measures which will be taken to minimize environmental impacts, including orientation of working faces to reduce visual impact
- Vital infrastructures such as the water tanker at km 93 should be protected against distraction due to quarry operation on adjacent site; for instance, by utilizing the opposite face of the quarry under close supervision of the impact of the quarry operation
- Quarries should be acquired with the consent of the relevant bodies. After use, rehabilitate and replant disfigured and excavated land for quarry sites. In case where the reinstatement does not attain a safe slope, an appropriate type of live fence (such as thorny bush) should be installed along the edge of the cliff to protect people (especially children) and animals from falling into the deep pit;

- Dust from crusher should be suppressed either by watering on continuous basis during crushing (if it is not raining) or installing dust collection facilities such as cyclones, baghouses, etc.;
- Contractor must adhere to EHS Guidelines;
- the crusher site, after project completion, should be reinstated in such a way that: i) the consolidated soil should be loosened mechanically to allow increased percolation of rain water into the subsurface layer of the soil; and ii) spread top soil, if available, to prepare the land for farming;
- The Engineer should satisfy himself, prior to approval of the SEPs, that all reasonable precautions have been or will be taken to minimize adverse environmental impacts

c) Impacts due to Borrow pits Development

The principal environmental concerns associated with temporary loss of productive land (crop/grazing), erosion, pollution of ground water, create conducive foci for disease vectors and accidents. Access roads and borrow pits themselves may be developed in materials which are highly erodible, and may contribute to enhanced erosion of a sensitive landscape. The soils in the project area are susceptibility to erosion, and access road and borrow pit development can facilitate the situation unless the necessary environmental consideration are taken.

Deep pits may be developed which are a safety hazard to people and livestock, especially if they fill with water during the wet season and become breeding grounds for insect disease vectors. Surface runoff may collect pollutants drain in to borrow pit, and pollute ground water sources through percolating in natural crakes. Since borrow pits will almost certainly be developed close to the road, even if they are not located in agricultural lands, access roads will probably have to traverse grassland or cultivated land, with adverse effects on landholders if they are not properly reinstated when pit use ceases.

Required Mitigation Measures

The construction contracts need to have clauses to the effect that borrow pit sites and access roads are deemed to be part of the site, so that the powers and authority of the Engineer extend to them in the same way as to other areas where works are being undertaken

The construction contracts should contain a clause requiring the contractors to prepare detailed Site Environmental Plans (SEPs) for approval by the Engineer, prior to commencement of any site development, and to execute all work at the sites in accordance with the plans. The SEPs should address all matters relevant to environmental protection and the minimization of impacts. Information provided in the SEPs should include, but not be limited to the following:

- A site plan showing the location and proposed extent of the borrow pit, access road
- And any other facilities which may be installed
- Details of all landholdings, vegetation and land use
- Measures which will be taken to minimize erosion caused by access road
- Construction and drainage system operation
- Rehabilitation and replanting disfigured and excavated land for borrow pits. However, in the case of public request, the borrow pits may be left open for water harvesting and to recharge the ground water. But it should be borne in mind that the slopes of the pits should be safe especially for people (particularly children) and animals moving in the area;

d) Impact due to Asphalt Plant

The contractor will erect an asphalt plant under the project as there is no existing plant in the project area. The asphalt plant will adversely contribute to:

- soil pollution or contamination through leakages of bitumen, oil and fuel from the site; and
- air pollution

Required Mitigation Measures

The required mitigation measures for the asphalt plant are presented in the following matrix.

Pollutant Source	Mitigation Measures
Plant Location	• At least 1 km from settlement boundaries and sensitive land use areas. • At least 100 m from a watercourse. • At least 1 km from a lake or reservoir.
Site Preparation / Topsoil	• Clear only limited vegetation to accommodate construction activities. • Strip topsoil from all areas to be disturbed (road works, spoil areas, borrow pits, camp sites, quarries, etc.) for later use in rehabilitation. • It is required to, stockpile topsoil and subsoil separately. • Pave critical areas of the plant to minimize dust emissions • Stockpile topsoil no higher than 2 m to avoid compaction, and seed to reduce dust, soil erosion and suppress weed growth. . • Rehabilitate the disturbed areas as soon as possible after construction is completed.
Aggregate / Material Stockpiles	• Apply water to at least 80% of surface area for all open storage stockpiles or when there is evidence of wind driven dust, OR • Apply temporary covering, OR • Apply chemical stabilizers, OR • Erect 3-sided enclosure with less than 50% porosity which extends to the top of the piles.
Conveyors and transfer points	• Cover conveyors, OR • Apply water sprays or mist • Limit vehicle entrained dust from unpaved roads by controlling traffic volume, speed, access, etc. • Cover all haul trucks
Paved and unpaved roads	• For unpaved roads, water spray with chemical suppressants OR water daily, more often if dusting occurs • For paved roads, water flush and vacuum sweep daily or as necessary if dusting occurs.
Stationary Batch Dryers and Drum Mixers	• Fabric Filter (Outlet Concentration - 20 mg/m^3) OR • Wet Scrubber as an alternative for rural plants (Outlet Concentration – 90 mg/m^3)
Mobile Batch Dryers and Drum Mixers	• Fabric Filter (Outlet Concentration - 20 mg/m^3) OR • Wet Scrubber (Outlet Concentration – 90 mg/m^3)

Pollutant Source	Mitigation Measures
Mixing Tower and Screens	• Capture and duct to Fabric Filter (Outlet Concentration – 20 mg/m^3) OR • Wet Scrubber (Outlet Concentration – 90 mg/m^3)
Drums and Dryers	• Temperature control for burner and dryer/drum operation to minimize odor complaints • Annual burner check and calibration
Load-Out, Storage Silos, Asphalt Storage Tanks	• Cover trucks with tarpaulin and cleanup spillage • Enclose silo openings OR vent storage silos to drum/dryer
NOx, CO, organic compounds	• Select plant based on burner design to minimize the pollutants • Follow good operation and maintenance regime for the burner • Fine-tune burner at least once a year

e) Impact due to spoil soil disposal areas

It is expected that the project works will generate large quantities of spoil material as almost the whole work over the stretch is a new road construction. Spoil soil normally can be generated during opening of the new pavement excavation earth cut, and as long as the materials are suitable, they will be accommodated in the road construction work. However, there are cases where excess materials are unsuitable and need to be removed or disposed.

The main environmental concern associated with spoil soils are spoils are aesthetically unfavorable, affects the natural landscape and creates obstructions of natural runoff if accumulated and left for longer period. In addition, material eroded from the spoil itself can be deposited in watercourses, with adverse effects on channel morphology and capacity to convey flood flows.

Required Mitigation measures

The construction contract document should include requirements that spoil disposal sites should be officially proposed by the contractor at areas designated by the relevant local administrative organ and permission is obtained accordingly by the contractor. The selected disposal site shall be in unproductive land, with preference being given to backfilling quarry and borrow sites developed and abandoned by the contractor, provided that the requirements of the clause which follows are met.

Prior to the commencement of disposal at any site, the contractor shall prepare a site-specific Site Environmental Plan (SEP) for the approval of the Engineer and the local supervising official. The plan should include statements on the following:

- The location, maximum area to be used for spoil disposal, current land use, names of landholders, and individual landholding boundaries.
- Measures to be adopted to ensure stability of the spoil and to minimize erosion both during and after completion of placement, including temporary and permanent drainage works where these are necessary;
- A specification shall also be prepared which clearly defines the restoration measures, which will be taken to reinstate the site for its previous use. At a minimum, spoil disposal sites must be stable and permanently reinstated to minimize erosion; and
- The landscaping must be graded/contoured to match local contours as much as possible and it must be covered with topsoil and vegetated.

f) Rehabilitation of base camp and other worksite areas

Contractors will make their own arrangements to use land for camp construction in consultation with ERA and local administration.. When the construction works have been completed, base camps and other areas used temporarily by contractors are often left in a deplorable condition. Scrap metal, other wastes and large masses of concrete can pose problems on the nearby communities who may suffer the consequences (like contaminated land) unless removed and disposed properly.

Required mitigation measures

- A clause has to be included in the construction contract requiring, on completion of construction and maintenance period activities, to reinstate base camp and other areas, leaving them in a clean and tidy condition;
- Effective mitigation is possible through requiring the contractor to avoid as much as possible privately owned lands, reinstate all sites, and imposing a financial penalty for failure to do so, which can be used by a third party to carry out necessary clean-up works;
- A clause has to be included in the construction contracts which require the contractor to prepare a plan for the approval of the Engineer, prior to abandonment of base camps, which indicates what facilities are to remain at the request of the landowner, and what activities are to be carried out to clean up the site. These activities should include removal and disposal of all wastes, demolition and removal of unwanted structures, removal and disposal of any earth which has been contaminated by the spillage of diesel, bitumen or any other polluting material, and any others necessary to restore the site, as far as possible, to its initial state; and
- Separate nominated lump sum items should be included in the Bill of Quantities for the reinstatement of base camps and other temporary construction sites.

7.5.3 Operation phase impacts& mitigation measures

a) *General*

The objective of the project will be achieved through sustainable transport service rendered by the road project to realize the intended objective, improving economy and livelihood at local regional & country level. There are also some adverse impact that are likely to occur during the project operation phase such as soil erosion, air pollution, disruption to natural drainage, effect on water quality, barrier effect to people and animals. The mitigation measure to these adverse impacts need to be established in the project design such as various bioengineering measure to prevent erosion, silt tarp ponds, various drainage structures, underpass structures etc Mitigation activities in this phase mainly focus on maintaining and ensuring proper functioning of these structures, undertaking routine maintenance activities, provision of the necessary education and awareness program.

b) *Soil erosion sedimentation*

The proposed new road pavements act as barriers to the natural runoff flow direction, it concentrate flows to specific locations and increase flow velocity of the storm water. Running water destabilizes the soil structure following the changes in natural flow regimes and the concentrated flows created by diversion structures like culverts and drainage ditches. These changes can contribute to flooding, soil erosion and channel modification. The soil erosion effect is more pronounced in the road route section that traverse in rugged topography and change in velocity of runoff due to embankment and other structures can lead to soil erosion.

Crop cultivation in steep slope erosion prone areas and poor vegetation cover will also facilitate soil erosion and sedimentation in the stream channel and the lakes. The road embankments interfere with the natural run off flow direction and impact on recharge rates of surface and ground water sources. Concentrated flows to specific locations also generate soil erosion and flooding of downstream sides contributing to increased sediment load carried to rivers and lakes.

The mitigation and management activities during project operation are mainly related to maintenance and ensuring proper functioning of the installed physical engineering and biological measures through undertaking routine and periodic maintenance activity.

Required Mitigation Measures

- Maintain storm drains and ditches regularly;
- Regular clearing of silts in pipe and drainage structures;
- Regular dredging of sediment retention pond structures;
- Maintain & improve vegetative grass cover especially in slopes and graded grounds along the road route & structures;
- Prevent & control livestock grazing in the road embankment area;
- Promote proper land use in the proposed road micro-catchment area;
- There needs to be a maintenance plan that deals with soil/sediment measures

c) *Impact on water resource and quality*

Water resource in the project area can be affected due to residual chemicals (oil, fuel and other chemicals) from operating traffic, and also accidental spillage during occurrence of incidence due reasons such as lack of periodic & timely maintenance of the new road, poor management of traffic & drivers' behavior. Impact on water pollution and deterioration due to contamination by residual chemicals and increased sedimentation of water sources (streams, swamp, lakes) would be the main water pollution concern during the project operation phase.

Required Mitigation Measures

- The concerned transport authority shall provide relevant training and awareness raising to prevent potential accident, especially to transport operators that transport hazardous material (petroleum)
- undertake periodic maintenance of implemented physical & biological measures (grasses, riprap, and other devices in water channels, as well as dispersal structures in main drains) that are installed to reduce speed of runoff and erosive effect;
- management of roadside trees, and leaving buffer zones of undisturbed vegetation (width increases in proportion to slope) between road sites and watercourses;

d) *Road safety & hazards*

In Ethiopia, road accidents are recorded to be among the highest in the world and this is mainly associated to poor road conditions, lack of road signs, lack of awareness on road safety by users & pedestrian. The proposed Arsi Negelle – Hawassa new dual carriageway project has high standard and quality to ensure traffic safety and accident can be minimized with implementation of proper traffic operation and regulation.

During operation the project road traffic levels are likely to increase and with high speed vehicles having potential risk of accident. Potential accident risk is expected to be high, particularly in the proposed new road route until people adjust to the changed conditions.

Required Mitigation Measure

- Ensure proper operation & use of underpasses by community & livestock;
- Contractor shall provide training to students (both male & female) at least twice a year on traffic safety & proper use of the existing road infrastructure. The students must be selected from schools that are located along or near the proposed new road route;
- Ensure timely & regular road maintenance of the road alignment, traffic sign and the likes;
- Contractor in collaboration with the local public relation offices and media provide the necessary information & awareness on basic principles of safe transport regulations & management through different media;

8. ENVIRONMENTAL & SOCIAL MANAGEMENT AND MONITORING PLAN

8.1 Environmental& Social Management Plan (ESMP)

8.1.1 General

Environmental and social mitigation and management measures are necessary to minimize or offset adverse impacts or enhance beneficial aspects so as to achieve the objectives of the proposed road project and ESIA. The purpose of Environmental and Social Management Plan (ESMP) is to set out how the adverse environmental and social impacts identified in the environmental study will be controlled during project implementation phases. Environmental management plan specifies mitigation and monitoring actions with time frames, specific responsibilities assigned and follow-up actions defined. Therefore, these measures need to be integrated with the overall project implementation during the various development phases of the project.

Environmental impacts mitigation and enhancement measures for the proposed Arsi Negele - Hawassa Road Project have been out-lined in the previous section (Chapter 7). This chapter discusses environmental and social management activities to be carried out in different phases of the proposed new road project development (pre-construction, construction & operation phases) as well as institutional responsibility and capacity building requirements for the same. Table 8-1 shows ESMP consisting project activity, anticipated impact, proposed mitigation and enhancement measure, responsible organ and required cost.

8.1.2 Institutional arrangement for ESMP

The overall road project and environmental management responsibilities are to be shared between several governmental and non-governmental organizations, each with specific executive responsibilities for particular aspects, which are exercised during the various stages of project preparation, implementation and subsequent operation and maintenance. The main organizations that are involved in the project design planning & implementation are ERA, EPA, MoT, MoFED, World Bank, EWCA, Design Consultant, Construction Contractor, Supervision Consultant, regional environmental agency (BoLEP of ONRS, and EPLAUA of SNNPRS), regional sector offices (BoA, BoH, etc). Figure 8.1 shows the major organizations involved in the environmental management activities in relation to the Project at National level.

Figure 8-1: Organizational Relationship for Environmental Management at National Level

Key
ERA- Ethiopian Roads Authority
EWCA-Ethiopian Wildlife Conservation Authority
MoFE/EPA- Ministry of Forest and Environment Environmental Protection Authority
MoLSA-Ministry of Labor and Social Affairs
MoT- Ministry of Transport
WB-World Bank

The principal agency concerned with the environmental management is the project owner, the Ethiopian Road Authority (ERA), and specifically the ESMT of ERA. 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 Environmental and Social Management Team (ESMT) within ERA is expected to play an overall advisory role during this phase. The relationship between the principal firms at project level regarding environmental management and asset management is depicted in Figure 8.2.

Figure 8-2 Organizational Relationship for Environmental Management at Project Level

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 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) on intermittent input basis who will be responsible for undertaking routine monitoring & supervision of proposed environmental mitigation measures, other environmental issues during the project construction phase. The EMU should consist of environmental and social experts who will be actively engaged

to integrate environmental supervision work with the overall project construction supervision activity and the Resident Engineer (RE). Once the construction contractor has completed work, including site rehabilitation and other restoration works, the ESMT of ERA and the district offices will take over the management aspect in collaboration with other concerned development and regulatory agencies at regional and federal level.

The contractor's obligations shall include the assignment of at least two of his senior staff, well experienced in their respective assignments, as Environmental Officer and Safety/Health Officer, to be monitored by the supervising consultant in his day to day activity and the independent environmentalist will do periodic checking. Contractor's staff is also required to attend training and briefing on the negative social impacts and on its mitigation and avoidance measures.

Owner's environmental and monitoring consultant
Appointment of Independent environmental consultant (auditor)
The independent environmental consultant (auditor) shall have the following responsibility:-

- Review and approve induction and training program for all persons involved in the construction activities and monitor implementation.
- audit the environmental activities to evaluate the implementation, effectiveness and level of compliance of on-site construction activities with the EMP and associated plans and procedures.
- Review and approve erosion control plan and other management plans prepared by the contractor.
- Record and provide a written report of non-conformances with the EMP and require mitigation measures to avoid or minimize any adverse impacts on the environment or report required changes to the EMP.
- Direct the contractor to stop work immediately where considered necessary, if in the view of the EMP an unacceptable impact on the environment is likely to occur, or require other reasonable steps to be taken to avoid or minimize any adverse impacts.
- Review corrective and preventative actions to ensure the implementation of recommendations made from the audits and site inspections.
- Review and approve minor revisions to the EMP.
- Provide information for community consultation, liaison with regulators, and respond to customer environmental complaints as required.
- Prepare and submit monthly report.

The contractor's obligations shall include the assignment of at least two of his senior staff, well experienced in their respective assignments, as Environmental Officer and Safety/Health Officer, to be monitored by the supervising engineer. Contractor's staff is also recommended to attend training and briefing on the negative social impacts and on its mitigation and avoidance measures.

8.1.3 Main environmental & social management (ESM)activities

Pre-Construction Phase ESM

The main environmental & social management activity during the pre-construction phase are related to Engineering design & Tender document preparation that respond to the environmental study through incorporating proposed mitigation measures in the design and tender documents. Therefore, the design consultant should incorporate the proposed mitigation measures in the new dual carriage highway design and tender documents preparation. The contractual agreement should include articles oriented to enforcing the environmental issues.

a) **Engineering Design:** Based on the recommendations/requirements presented in the environmental study the engineering design needs to consider the following aspects;
   - Drainage measures and features
   - Wildlife crossings
   - People crossings
   - Existing road crossings
   - Routing to avoid ASNLP

b) Bridge design to minimize disruption to rivers **Preparation of Tender Documents:** To ensure the proper implementation of environmental and social avoidance/mitigation measures as well as all safety/health issues, sufficiently detailed environmental and social articles and clauses have to be formulated and become an integral part of the works contract, thus providing a contractual basis for an effective supervision and control of the proposed measures.

c) **Implementation of RAP and Compensation for PAPs:** During the construction phase, a prior notice, not less than six months is to be given to local authorities and Project Affected Persons if they are going to be relocated or lose part of their assets.

Mitigation measures proposed for socio-economic issues like compensation to damaged properties, crops, trees, houses, and other affected properties located on permanently and temporarily dispossessed farm land will be handled by a committee, composing of representatives of all stakeholders, including ERA, other local government administrative organs, NGOs, and the affected group as per the RAP. ERA's ESMT will be a member of the compensation committee.

ERA's Design and Build RoW support Team shall be the responsible body to conduct the final valuation of compensation of all affected properties. The compensation committee to be established at woreda level will finalize/approve the relocation, compensation amount(s) to be paid for each PAP as presented in the RAP document.

Prior to contractor mobilization and the commencement of construction, ERA's ESMT will be concerned with the following principal groups of activities:

- Ensuring that all government and funding agency requirements and procedures relating to ESIA are complied with.
- Implementation of the RAP including the payment of compensation.
- Relocation & compensation for Utility services in the ROW, especially in urban centers, to avoid service disruptions and complaints from user community.
- Preparation of monitoring action plan and get it approved by the engineer.
- Identification and approval for Camps and Garage sites spoil soils disposal sites, etc.

As the project promoter, ERA will be responsible for submitting the ESIAto the MoEF/ EPA for evaluation according to internal procedures.

Construction Phase ESM

Most of the project environmental management activities will be carried out during the construction phase, since this is when most impacts can be expected to arise. ERA's ESMT will very largely be concerned with controlling impacts which may result from the actions of the Contractor, through enforcement of the construction contract clauses related to protection of the

environment as a whole and of the components within it. In this respect, it is important to recognize that successful mitigation of construction impacts can only be achieved if the environmental protection measures, as set out in the construction contract, are properly enforced.

Overall primary responsibility for construction supervision and contract management, and, therefore, for environmental management during construction, will lie with the Engineer and independent environmental consultant as defined in the construction contract. The Resident Engineer will have executive responsibility for ensuring that all site environmental management and monitoring aspects are dealt with promptly and properly. The environmentalist assigned as a site supervision staff will be responsible for environmental management and monitoring.

The RE will be responsible for establishing procedures and mechanisms for effective environmental management and monitoring and will ensure that these are fully incorporated in, and integrated with, the overall construction supervision and monitoring framework. This aspect will cover matters such as the development of checklists of key points which will be monitored on a routine basis during construction, and reporting mechanisms for ensuring that appropriate remedial action is taken should monitoring reveal that this is necessary.

Particular attention will be paid to establishing procedures whereby emergency action can be taken by the site environmentalist staff in the event of the contractor acting in a manner which may cause immediate and significant environmental damage, for example problems associated with interruptions to water supply, or contamination of land, groundwater or surface water through inappropriate handling of contaminating substances, cause forest fire or poach in the sensitive forest and wildlife areas.

The EMU of the supervision consultant will comprise senior environmentalist, social expert and safety officer. The EMU would be responsible for reviewing and commenting on environmental aspects of work plans prepared by the contractor during the mobilization period, as well as in developing site environmental management procedures etc. in collaboration with the RE. During the actual construction period, the EMU would provide advice and assistance to the RE, as and when required, on all aspects of environmental management. EMU would also be responsible for day to day environmental monitoring during the construction period and would report directly to the RE.

ESMT of ERA, and most importantly the EMU of the supervision consultant specifically established for the project, is required to make periodic inspections of the performances and give advice on issues requiring rectifications as the construction progresses. ESMT & EMU shall supervise all issues contained in the Environmental and Social Management Plan and will address stakeholders concern. In addition, the ESMT & EMU will be check for implementation of the stakeholders grievance issues. The ESMT and EMU will undertake the tasks listed below but not limited to the following:

- Implementation of mitigation measures to avoid or reduce negative impacts;
- Safety and health requirements;
- HIV/AIDS and STD control measures;
- Temporary land requirements and reinstatement;
- Reinstatement / reforestation of abandoned road sections after the construction of a respective section is completed;
- Compensation of crops and other assets located on permanently dispossessed land (replacement of land) as determined during the Implementation Preparation Phase;
- Implementation of reinforcement measures for the positive impacts;
- Implementation of pre-construction and construction requirements.

stakeholders concern implementing the stakeholders grievance issues

The contractor's obligations shall include the assignment of at least two of his senior staff, well experienced in their respective assignments, as Environmental Officer and Safety/Health Officer, to be monitored by the supervising engineer. Contractor's staff are also required to attend training and briefing on the negative social impacts and on its mitigation and avoidance measures.

Operation phase ESM

Following the finishing of the construction work and start of the road operation, awareness and education activities should be provided on road safety and other negative social impacts. ERA's EMST, transport authorities, police, NGOs and the contractor (assigned by ERA) will be responsible for the introduction and implementation of the awareness and educational activities.
ESMT in this respect, will be responsible for verification and implementation being carried out duing the operation phase. Provision of training to improve knowledge of environmental management activities will be required to effectively assume the responsibility.

The potential environmental & social impact/issues of the proposed New expressway during the project operation/service phase include road & traffic safety, vehicular traffic accident, erosion sedimentation flooding, potential risk of water & air pollution, interference effect on existing community livestock route, and wildlife crossing. The ESM aspect during the project operation phase will focus on ensuring safety/sustainability/ proper functioning of the installed or implemented mitigation measures, mainly through routine monitoring & maintenance activity & provision of training and awareness programs.

Replanting may be required for those perished trees & vegetation species planted to prevent erosion & strengthen structure safety. Vegetative growth in the road pavement structures should be prevented, livestock grazing in the road structures embankment should not be allowed.

Training and awareness program play key role for proper implementation of proposed mitigation measure, maintaining safety & durability of the road structure, and ensure vehicular traffic operation as per the design speed and transport regulation. The awareness may extend to promote existing road users (depending on the user traffic count) to divert traffic to the new highway road so as to reduce traffic congestion and associated adverse environmental & socio economic impact on the existing road. Vehicles that use the road have to be well maintained and serviced, and the designated speed limit by the road standard has to be maintained.

8.1.4 Capacity build training and resource requirements

Environmental & Social Management activities in the various phases of the project development can be implemented properly if the implementing organs have the required capacity resource and knowledge. Therefore, the necessary resources capacity build training requirements have to be met so as to realize the objective of EMP and contribute to the project sustainability. In this regard the following resources capacity build and training programs are recommended for the project.

Since 1998, the ERA has established the Environmental and Social Management Team (ESMT) under the Planning and Program Management Directorate; to coordinate, organize and review the whole process of the Environmental and Social Impact Assessment studies, Resettlement Action plan, other related Social and Environmental Safeguard issues and also to Monitor and Evaluate

the Implementation of safeguard requirements in compliance with the contract agreement and financers credit agreements.

Currently the Team has (8) professionals composed of different disciplines; hence this does not mean that, it's enough to implement the safeguard requirements. The number of staffs is in comparable with the number of projects administered by ERA. Therefore, ERA is planned and working to upgrade the Team in to a Directorate Level composing of three Teams namely: **Environmental Management and Road Safety Team, Social and Cultural Heritage Protection Team and HIV/AIDS Prevention and Control Team**. This will be undertaken three months before commencement of the works. The proposed Directorate, (All Teams) shall be capacitated both in **Human Resource, Logistics and Short and long Term Trainings.**

Capacity Building

It is the intention of ERA to strengthen its in-house capacity in such a way that the whole project road Modjo-Hawassa and other road development projects will be adequately monitored and stakeholders be aware of the tasks the authority is undertaking from time to time to safeguarded the environment and address the social concerns.

According, ERA require a resource and capacity building of its staff by virtue this project to make sure that the WB safeguard polices and Ethiopian environmental regulations are implements adequately. Moreover, the training will include other sector offices like the Oromia environmental bureau, SNNPRS environmental bureau, ministry of agriculture and contractors.

Training requirement

ERA will envisage to offer

- Short term training on environmental monitoring tools, environmental auditing and reporting procedures;
- Short term training on safeguard polices and procedures of financing institutions;
- Organize workshop and experience sharing at wereda level with local administration and agricultural, health, women and related offices
- Training on equipment management and operation for selected groups to make them aware of the impacts they may bring on the environment

Resource / equipment requirement

- Equipment that will be required to measure emissions and water quality like infrared absorption units or ecolysers for measurement of CO, Flame photoconisation units for measurement & monitoring of Hydrocarbons, Chemiluminescence for NOx, Dust and particulate matter by Beta Gauge, by aspiration, and by gravity
- Equipment that will be used during filed inspections like hand held GPS, digital cameras, laptop, etc
- Equipment for noise measurement like Noise Meter/ measurements for pollutant/and others
- For supervision of environmental activities periodically, transport vehicle
- Desk top computers for head office use by ESMT

Human Resource for the ESMT

As part of the restructuring plan to establish the Environmental and Social Management Directorate, it is envisaged that the Directorate will have around 20 staff in short period of time to actively engage in environmental auditing.

Estimated budged for capacity building

- The transport office has to be equipped with the necessary material & equipment to handle traffic safety incidence and emergency situation to respond to accident during the new road

Table 8-1: Estimated budget for capacity building of ESMT

S/N	Item	Type	Estimated Unit Price ETB	No	Total Price
1.	Car	Double Pick-Up	1,200,000	6	7,200,000
2.	Computers	Desk Top	15,000	20	300,000
3.	Soft wares	Auto CAD,ARC-GIS, Global Mapper etc.	10,000	5	50,000
3.	Lap tops	Toshiba	17,000	5	85,000
4.	Digital Cameras	-	6000	5	30,000
4.	GPS	-	5,000	5	25,000
5.	Noise Meter/ hand instruments for measuring turbidity or other water pollutants/ instruments or cards for monitoring dust or other air emissions	-	-	-	200,000
Total					**7,890,000**
Contingency 10%					**879,000**
Grand Total					**8,669,000**

Human Resource (personnel)

- Additional Staffs from Relevant Disciplines, at least 20 in number
- Short and long term trainings on (environment, social and safety)

Table 8-2: **Trainings (Short and Long term) to ESMT**

S/N	Item	Per dime		Place	No. of Trainees	Estimated Cost ETB	Total
1.	Short term training average for 2-months	Hotel Food Air fair others	3000 2000 40,000 1000	Abroad	5	46,000	230,000
2.	Short Term Training 1 Month	-	-	Local	20	100,000	100,000
Sub- Total							330,000
Contingency 10%							33,000
Grand Total							363,000

Environmental Training & Awareness to Construction Employees

- Environmental training & awareness to construction employees (including sub-contractor) involved in construction work to make them aware of the requirements of the EMP and to ensure the implementation of environmental management measures.
- The Senior Environmental Officer will coordinate the environmental training in conjunction with other training and development activities (eg safety), and maintain record of all training, and may authorize amendments to the induction at any time.
- The environmental component for training & awareness include Key environmental issues, Conditions of environmental licenses, permits and approvals, Specific environmental management requirements and responsibilities, Mitigation measures for the control of environmental issues, Incident response and reporting requirements, Information relating to the location of environmental constraints.
- Training and awareness shall be provided on specific environmental issues such as Erosion and sedimentation control, Spill response, Dust control, working near protected area/sensitive environment etc
- The environmentalist of the supervision consultant will review and approve the induction program and monitor implementation.

Training & awareness on traffic operation & safety

- Following the operation of the project road, awareness and education activities must be provided for track drivers and local community on road safety and other negative social impacts.
- ERA's EMST, transport authorities, Police men, NGOs and the contractor shall be responsible for the introduction and implementation of the awareness and educational activities. The training & awareness must be provided to user drivers, transport operators and other known user of the new highway from ESMT budget.

Table 8-3: Environmental and Social Management Plan for Lot 4: Arsi Negele – Hawassa Road Project

Project activities	*Impact description*	*Proposed Mitigation & enhancement Measures*	*Responsible agency/organization*	*Cost*
Opening & establishing pavement for new dual carriageway pavement ROW, bridge & other structures construction, construction of access roads & development of material sites (quarries, borrow)	*Soil compaction/ impairment and loss of agricultural land productivity*	*Keeping vehicles on defined tracks (access roads).*	*Contractor RE & EMU*	*Environmental Monitoring Cost*
		Restricting operating heavy equipment into agricultural fields without authorization.	*Contractor RE & EMU*	*Environmental Monitoring Cost*
		Reinstate disrupted area & access roads by removal of existing pavement material, loosening of compacted soils, and spreading of topsoil preserved from road cuts and through vegetation	*Contractor RE & EMU ESMT*	*Part of Contractor's cost*
	Disruption of drainage flooding & adverse effect on agricultural land rural settlement, and also creation of conducive habitat for disease vectors (malaria)	*Provide adequate energy dissipaters like check dam, dumped rocks, riprap, etc to avoid excessive concentrated flow in ditches*	*Consultant Contractor RE & EMU ESMT*	*Construction Cost*
		Provide adequate drainage line to intercept flows and to protect from entering erosion susceptible areas and to reduce gulley formation and avoid standing water by landscaping the area after use	*Consultant Contractor RE & EMU ESMT*	*Construction Cost*
Excavation for the new Dual Carriage Highway pavement especially in rugged topography, cut & fill to maintain the required gradient, installing drainage ditches & construction of bridges, development of material sites, vegetation clearing for various construction activities of the new highway road	*Soil erosion and land degradation, due to road construction, camp sites, borrow pits, quarries*	*Slope shapes and steepness shall be designed in terraced, stepped or edge rounding fashion at cut location, fill sites and other areas where land is disturbed based on the soil type.*	*Consultant Contractor Agr. Office RE & EMU ESMT*	*Construction cost*
		Embankment sides are grass covered immediately and watering is done until grass growth.	*Contractor Agr. Office RE & EMU ESMT*	*Environmental Cost*
		Top soil shall be stockpiled at designated location for re-use & surplus excavated earth material shall be piled stored and used to rehabilitate degraded grounds	*Contractor Agr. office RE & EMU ESMT*	*Contractor's cost*
		Place drain outlets to avoid cascade effect	*Consultant Contractor RE & EMU ESMT*	*Construction cost*

Project activities	*Impact description*	*Proposed Mitigation & enhancement Measures*	*Responsible agency/organization*	*Cost*
		Line receiving surfaces or ditches with stone ripraps or concrete or grass	*Consultant* *Contractor* *RE & EMU* *ESMT*	*Construction Cost*
		Re-habilitate (like regarded/ re-contour to stable configuration, cover with topsoil, vegetate, etc) and re- plant disfigured and excavated land for quarry and borrow pit,	*Contractor* *Agr. office* *RE & EMU* *ESMT*	*Contractor's Cost*
		Tree planting in the roadside & degraded areas in the road micro catchments	*Contractor* *Agr. Office* *RE & EMU* *ESMT*	*Environmental Cost*
Quarrying operation	*Material extraction from quarry site will change the natural scenery and landscape and initiate soil erosion in the site*	*To the extent possible, avoid creating vertical cliffs during quarrying;* *Reinstate the quarry area in such a way to avoid standing water or provide ditch to drain water, after us and make the slope safe or gentle for both people (especially children) and animals* *Vegetate the site with appropriate plant (mostly grass) species* Remove roads and reinstate land as described (break up compacted land, cover with topsoil, vegetate)	*Contractor* *Consultant* *ERA/ESMT*	*Environmental Cost*
Borrow pit operation	*Material extraction from borrow pits will change the natural scenery and landscape, takes farm land and/ or initiate soil erosion in the site*	*Recover topsoil from roads and all other disturbed land* *Stockpile the top soil in close proximity to the borrow pit sites* *To the extent possible, avoid creating vertical cliffs during borrow pit utilization* *Reinstate (provide safe and stable slope, avoid water pounding, arrange drainage facility) borrow area, after use, with slope safe for both people (especially children) and animals* *Vegetate the site with appropriate plant (mostly grass) species*	*Contractor* *Consultant* *ERA/ESMT*	*Environmental Cost*

Project activities	*Impact description*	*Proposed Mitigation & enhancement Measures*	*Responsible agency/organization*	*Cost*
Use of hazardous substances, accidental spill & contamination (oil, fuel, detergents, cement), development of campsites & garages	*Potential risk of water or soil pollution*	*Preventing leakages of vehicles and construction equipment by regular and effective maintenance.*	*Contractor RE & EMU ESMT*	*Part of Contractor's cost*
		Avoiding water pollution by spillages of hazardous substances through proper handling of oil, fuel, cement etc.	*Contractor RE & EMU ESMT*	*Part of Contractor's cost*
		Notify the Environmental supervisor Consultant & ERA ESMT of any suspected or potentially spill & contamination of ground; and in such cases surface water must be diverted away from contaminated area, and must be contained & treated properly prior to disposal	*Contractor RE & EMU ESMT*	*Part of the Contractor's cost*
		Avoid & strictly control disposal of used oils and other hazardous wastes	*Contractor RE & EMU ESMT*	*Contractor's Cost*
		Locating site facilities at sufficient distance far away from streams, rivers, or community water supply sources. *No fueling near water sources. Fueling must be done at designated areas with paved/impermeable surface.* *Storage of fuel and materials in designated areas with secondary containment that can hold 110% of volume*	*Contractor RE & EMU ESMT REA/EPA*	*Environmental Monitoring Cost*
		Establish waste disposal site, and locate waste disposal sites away from water supply sources, settlement, and approved by region/wereda environmental office *Segregate different types of wastes, recycle or reuse wherever possible, otherwise dispose according to law*	*Contractor RE & EMU ESMT REA/EPA*	*Environmental Cost*
		Establish sanitary facility in camp sites toilets, safe water supply	*Contractor RE & EMU ESMT REA/EPA*	*Environmental Cost*
Construction	*Air pollution*	*implementation of dust suppression measures like regular water spraying on paved and excavated grounds, especially while working in or near settlement area and ASLNP*	*Contractor RE & EMU ESMT REA/EPA*	*Contractor's Cost*

Project activities	*Impact description*	*Proposed Mitigation & enhancement Measures*	*Responsible agency/organization*	*Cost*
		Locate machineries and crushers far away from densely populated settlement areas, and away from ASLNP surrounding area	*Contractor* *RE & EMU* *ESMT* *REA/EPA*	*Contractor's Cost*
		Suppress dust from crusher either by spraying water or install dust absorbent accessory *Suppress dust from Asphalt plant either by installing dust absorbent accessory*		
		Restrict operation hours of construction machineries while operating in sensitive areas like settlement, ASLNP surrounding area, schools etc	*Contractor* *RE & EMU* *ESMT* *REA/EPA*	*Contractor's Cost*
		Ensure regular and periodic maintenance of vehicles and machineries.	*Contractor* *RE & EMU*	
		Implement occupational health safety measures	*Contractor* *RE & EMU* *ESMT* *REA/EPA*	*Contractor's Cost*
		Cover truck that transport earthen material to prevent dust,	*Contractor* *RE & EMU* *ESMT* *REA/EPA*	*Contractor's Cost*

Project activities	*Impact description*	*Proposed Mitigation & enhancement Measures*	*Responsible agency/organization*	*Cost*
Opening of the dual carriage highway route corridor ROW, opening of road access, development of material sites, and camp, other construction related activities	*Clearing of the natural vegetation (acacia woodland & scattered tree Montana Forest)*	*Try to retain remnant indigenous tree species, especially the remnant Montana forest trees, found in the route corridor as far as possible unless they conflict with the road construction* *Undertake preconstruction survey to identify and mark off areas that will be affected (including marking trees that are not to be cut, indigenous plant that are to be protected, etc)* *Allow the PAPs and local community to use or salvage the wood*	*Contractor* *RE & EMU* *ESMT* *Agr. Office* *REA/EPA*	*Environmental Monitoring Cost*
		Tree cutting for access road construction should be strictly prohibited unless conditions force to do otherwise, route selection for access to material sites, camp site should try to avoid dense vegetation covered areas.	*Contractor* *RE & EMU* *ESMT* *Agr. Office* *REA/EPA*	*Environmental Monitoring Cost*
		Prohibit project workers from using fire for clearing, illegal cutting & deforestation	*Contractor* *RE & EMU* *ESMT* *Agr. Office* *REA/EPA*	*Environmental Monitoring Cost*
		Provide awareness and education training , especially to Dozer and other construction machinery operators	*Contractor* *RE & EMU* *ESMT* *REA/EPA*	*Environmental Cost*
		Replanting 10 seedlings for every tree lost by the project construction including re-vegetation of uncovered and graded grounds excavated and abandoned material sites.	*Contractor* *RE & EMU* *ESMT* *Agr. Office* *REA/EPA*	*Environmental Cost*

Project activities	*Impact description*	*Proposed Mitigation & enhancement Measures*	*Responsible agency/organization*	*Cost*
		As much as possible, and technically feasible utilize area of previous material sites & camp sites so as to minimize clearing of natural vegetation	*Contractor* *RE & EMU* *ESMT* *REA/EPA*	*Environmental Monitoring Cost*
	Adverse impact on wildlife biodiversity due indirect effect from various construction related activities like noise, increased sedimentation, water pollution risk etc and also wild animals hunting, pouching etc	*Majority of the measures proposed to prevent deforestation, and prevent water pollution also apply maintain important wildlife habitat & fauna.*		
		Material sites, camp sites, crasher plants and garages should not be located in & around sensitive environment especially away from ASLNP boundary,	*Contractor* *RE & EMU* *ESMT* *Agr. Office* *REA/EPA*	*Environmental Monitoring Cost*
		Awareness creation programs on the precautions to be taken to minimize adverse impact on flora fauna & important habitat provided to employees	*Contractor* *RE & EMU* *ESMT* *REA/EPA*	*Part of Contractor's cost*
		The contractor shall instruct and supervise his work force not to be involved in illegal hunting, poaching and encroaching in to wildlife habitat and killing of wild animals). *It is not allowed to hunt or engage in the park by workers or anyone from the construction team.*	*Contractor* *RE & EMU* *ESMT* *Agr. Office* *REA/EPA*	*Part of Contractor's cost*
		Implement measure to prevent accident on wild animals, especially in the road section along the ASLNP boundary, through installing underpasses and traffic signs.	*Consultant* *ESMT*	*Design and Construction Cost*
Compliance with the RAP	*Compliance with the RAP*	*Make aware and provide sufficient information to PAPs on the usage of farmland either temporarily or permanently for the construction works.*	*Consultant* *ESMT* *REA/EPA*	
		Allow enough time for PAPs to remove their crops (perennial or annual) and trees.	*Consultant* *ESMT*	*RAP cost*

Project activities	*Impact description*	*Proposed Mitigation & enhancement Measures*	*Responsible agency/organization*	*Cost*
		Proper implementation of the RAP to compensation of affected households and institutions for their loss.	*ESMT* *REA/EPA*	*Environmental Monitoring Cost*
		Give priority in the employment of casual workers for household members of PAPs that have lost their land for the road construction works.	*Contractor* *RE & EMU* *ESMT* *REA/EPA*	*Environmental Monitoring Cost*
		Locate camp sites, storage sites, spoil dumping sites, etc on degraded & less productive land, avoid sitting in productive agriculture land as much as possible.	*Contractor* *RE & EMU* *ESMT* *Agr. Office* *REA/EPA*	*Environmental Monitoring Cost*
		On the completion of the work clean properly and restore the temporarily occupied land, support losing compacted land by machinery	*Contractor* *RE & EMU* *ESMT* *Agr. Office* *REA/EPA*	*Contractor's cost*
Competing of project road construction & employees water requirement with existing water sources providing water to local community purposes	*Reduction in local water supply sources to local community/livestock due to abstraction for road construction requirement*	*Water for the road works or campsite requirements shall not be withdrawn from the streams or other sources being used by the local population unless its sufficiency is approved by the local (district) water offices or the regional water bureau.* *Issue detail water usage and water management plan not to undermine or compromise the water resources around the project area*	*Contractor* *RE & EMU* *ESMT* *Water Office* *REA/EPA*	*Environmental Monitoring Cost*
		Install water facilities for the project construction and labor force purpose as appropriate, through constructing water harvesting ponds or drilling	*Contractor* *RE & EMU* *ESMT* *Water Office* *REA/EPA*	*Contractor's Cost*
Construction activities for opening of new dual carriageway pavement &	*Disruption to services*	*Undertake detailed investigation inventory of affected services*	*Consultant* *ESMT* *REA/EPA*	*RAP Cost (ERA)*

Project activities	*Impact description*	*Proposed Mitigation & enhancement Measures*	*Responsible agency/organization*	*Cost*
associated structures		*Notify the concerned service authority*		*Contractor's cost*
		Undertake proper & timely relocation of affected services facilities		
	Interference with existing roads & paths, and disrupt movement of local people animals & transportation	*Include underpass structures to provide passage to local communities*	*Consultant* *Contractor* *RE & EMU* *ESMT* *REA/EPA*	*Design and Construction cost*
Haulage of construction materials, excavation and filling operations, earthmoving, detour and aggregate production, especially operating insensitive area	*Health impact on employees/community due to air pollution(generated dust & gaseous emission, noise), especially in urban & rural settlement areas, and also increase malaria & water borne & related diseases*	*Limit construction traffic speeds and apply water regularly on dusty roads and other open ground to suppress dust levels, especially in densely populated rural settlement area.*	*Contractor* *RE & EMU* *ESMT* *REA/EPA*	*Part of Contractor's cost*
		Service the exhaust systems of all vehicles and equipment on regular basis to ensure that noise and exhaust emissions are kept to appropriate levels.	*Contractor* *RE & EMU* *ERA* *REA/EPA*	*Part of Contractor's cost*
		Restrict construction activities working hours during night time near sensitive receptors (residential areas, schools, etc.), especially with heavy machinery and equipment	*Contractor* *RE & EMU* *ERA* *REA/EPA*	*Environmental Monitoring Cost*
		Avoid stagnant water through restoration & rehabilitation of disturbed & borrow sites *Avoid trash and other management to reduce standing water*	*Contractor* *RE & EMU* *ERA* *REA/EPA*	*Environmental Monitoring Cost*

Project activities	*Impact description*	*Proposed Mitigation & enhancement Measures*	*Responsible agency/organization*	*Cost*
		Implement measures to prevent adverse effect on local water source, as indicated above in measures to prevent pollution	*Contractor* *RE & EMU* *ESMT* *REA/EPA*	*Part of the Contractor's cost*
haulage of construction materials, exploitation of material sources, and deep cut & high fill works in hilly areas	*Safety hazards to local communities, animals & road users*	*Provision of traffic management plan and necessary information install speed limits, direction, hazard locations, and sensitive sites by putting appropriate signals.*	*Contractor* *RE & EMU* *ERA* *REA/EPA*	*Part of Contractor's cost*
		Awareness training of operators of equipment and construction vehicles in traffic safety measures.	*Contractor* *RE & EMU* *ERA* *REA/EPA*	*Part of the Contractor's cost*
Influx of workforce for various construction activities by the project	*Increased public health problem, especially transmittable diseases such as HIV/AIDS and STD*	*Issue workers code of conduct, training and awareness creation campaigns on the spread and transmission of STDs and HIV/AIDS for construction workers and local communities living close to the construction camp sites.*	*Sub-contractor specialist in HIV/AIDS & STD program* *RE & EMU* *Health Office* *REA/EPA*	*Environmental cost*
		Provide free distribution and provision of condoms to construction workers by the Contractor to avoid the spread of STDs and HIV/AIDS.	*Same as above*	*Environmental cost*
		Put educational posters and flyers on HIV/AIDS, using local languages at public gathering locations, bus terminals, schools and by road sides to minimize the spread of HIV/AIDS.	*Same as above*	*Environmental cost*
		Adopt FDRE and ERA's Policy on HIV/AIDs, and provide special care and support to HIV/AIDs positive staff and AIDs patients.	*Same as above*	*Environmental cost*

Project activities	*Impact description*	*Proposed Mitigation & enhancement Measures*	*Responsible agency/organization*	*Cost*
		Strengthen existing health facilities with professionals and necessary drugs *establish proper camping sites and secure proper disposal of human wastes to avoid pollution of water sources*	*Same as above*	*Environmental cost*
		During the project construction period, avid potential breeding sites for mosquito in the lowlands by draining stagnant & vegetated water bodies and refilling borrow and quarries	*Same as above*	*Environmental cost*
		Promote use of mosquito net by the labor force and local people, especially in the lowland area.	*Same as above*	*Environmental cost*
Operation Phase				
Establishing the new dual carriageway embankment & associated structures, poor land use management in micro-catchement	*Soil erosion contamination sedimentation, degradation of land, effect on the new highway structures sustainability & result in increased maintenance cost*	*Provide a maintenance plan for maintaining storm drains and ditches regularly di-silt and maintenance activities*	*ERA maintenance crew* *Transport Authorities* *Agr. Office* *REA/EPA*	*O & M Cost*
		Maintain grass cover in all open grounds and due attention shall be given for steep slope section of the new road embankment and graded grounds, and protect livestock grazing in drainage ditches embankment structures	*Same as above*	*O & M Cost*
			Same as above	*O & M cost*
		Promote proper land use and conservation based cultivation in micro-catchments	*Same as above*	*Environmental Monitoring Cost*
	Flooding and damage to cropland , settlement &	*Careful location & maintenance of roadside ditches and drainages*	*Same as above*	*O & M Cost*

Project activities	*Impact description*	*Proposed Mitigation & enhancement Measures*	*Responsible agency/organization*	*Cost*
	facilities due to the new road intercepting drainage on roadside ditches	*Provide adequate drain pipes to avoid excessive concentrated flow in ditches*	*Same as above*	*O & M Cost*
		In consultation with the EMU and local administration, design the borrow pits to serve as water source for livestock drinking and other social purpose,	*Same as above*	
		Provide adequate drainage line to intercept flows and to protect from entering erosion susceptible areas and to reduce gulley formation	*Same as above*	*O & M Cost*
New dual carriageway road transport operation, incidence/accident of trucks/equipment transporting environmentally dangerous substances such as gas, petroleum, oil etc	*Risk of water pollution from residual chemicals & potential release of oil, grease, and fuel that may cause contamination of water resource and adverse impact to local people livestock and wildlife*			
		Minimized vehicular accidents through implementation of traffic and transport regulations, and ensure stability of protection structures	*Transport & Traffic Police office* *Training Consultant*	*O & M Cost*
		Establish incident & emergency management procedure	*Transport, Environmental Office*	*O & M Cost*
Laying of the new highway structures, transport operation	*Impact on wildlife around ASLNP area*	*Ensure proper functioning of the inistalled underpass structures to wild animals crossing from ASLNP to Lake Langano area*	*Transport & Traffic Police Office*	*O & M Cost*
		Enforce traffic operation according to traffic signs to prevent wildlife accidents		*O & M Cost*
Overall transport operation, incidence	*Road safety issues and accident effect on people/resource during project operation*	*Traffic sign and enforce traffic & transport operation regulations*	*Transport & Traffic Police Office*	*O & M Cost*
		Timely maintenance of pot holes in the road alignment	*ERA Operation Division*	*O & M Cost*

Project activities	*Impact description*	*Proposed Mitigation & enhancement Measures*	*Responsible agency/organization*	*Cost*
		Control the proper use (avoid activities in the underpass) of constructed underpasses by local community & livestock	*Transport & Traffic Police Office*	*Environmental management Cost*
		Through distribution of pamphlets or other printed materials for awareness to user drivers and transport operators	*Transport & Traffic Police Office*	*environmental management Cost*
		Prevent encroachment in to the road reserve area (90m)	*ERA Operation Division*	*O & M Cost*
		Management of vegetation growth in the ROW (90m) not to affect traffic view	*Transport & Traffic Police Office*	*O & M Cost*
Congestion, Jamming of traffic, especially in the link roads due to encroachment in to the road area (90m ROW)	*Air pollution (GHG) from increased vehicular gaseous emission, and effect on public health*	*Proper operation of the interchange & link-roads to communicate the new dual carriageway with major towns*	*Agr. Office REA/EPA*	
		Proper traffic management in link roads through installing signs and arranging for parking stations etc	*Transport & traffic police office*	*O & M Cost*
		Training and awareness on proper use of the road both to traffic operators drivers and local communities	*Transport & Traffic Police Office*	*O & M Cost*

8.2 Environmental Monitoring Plan

8.2.1 General

The environmental monitoring program is essentially formulated based on proposed mitigation measures to arrest/control encountered environmental and social impacts with the proposed new dual carriage highway project implementation. Monitoring indicators are used to verify accomplishment and realization of a given proposed mitigation measure to control or reduce adverse impacts. The very objective of EIA study and project sustainability cannot be met unless the proposed mitigation measures are implemented and realized and to this effect preparation and implementation of environmental monitoring program plays an irreplaceable role.

Environmental monitoring is an essential tool in relation to environmental management as it provides the basis for rational management decisions regarding impact control. The very purpose of constructing the new dual carriage highway project is to contribute to the current and upcoming fast economic development of the country and also to reduce present and potential traffic congestion and associated adverse impact along the existing Modjo-Hawassa road. In this regard the main objectives of environmental monitoring program are:-

- To check whether the proposed mitigation and benefit enhancement measures have actually been adopted and are effective;
- To check the contribution for reduction of present and potential traffic congestion along the existing Modjo-Hawassa asphalt road, and associated adverse impact on the economy and the environment;
- To provide means throughout which any impact are subject to uncertainty at the time of preparation of the EIA or was unforeseen, can be identified and to provide a basis for formulating appropriate additional impact control measures;
- To provide information on the actual nature and extent of key impacts and the effectiveness of mitigation and benefit enhancement measures which, through a feedback mechanism, can improve the planning and execution of future, similar projects implementation in the country.

8.2.2 Monitoring type/forms and institutional responsibility

There are two basic forms of monitoring:-

Compliance monitoring: it checks whether prescribed actions have been carried out and usually conducted by means of inspection or enquiries.

Effects monitoring: it records the consequences of activities on one or more environmental components and usually involves physical measurement of selected parameters or the execution of surveys to establish the nature and extent of induced changes.

In the case of the proposed road project, compliance monitoring is given more emphasis since most of the impact controls take the form of measures incorporated in project designs and contract documents, and the extent to which recommendations on these matters, as set out in the EIA are complied with. It plays a major part in determining the overall environmental performance of the project.

Internal and External Monitoring can be recognized in relation to monitoring mechanism and responsible body executing monitoring task.

Internal Monitoring: Internal monitoring process shall begin early at the pre – construction stage and proceeds throughout different phases of the project. The internal monitoring will be

conducted mainly by the contractor on duty, EMU as part of the overall construction supervision consultant, and the ESMT of ERA.

The Emu as part of the overall supervision will carry out day to day environmental monitoring activities, in line with the ESIA requirements. The Resident Engineer (RE) and the environmental supervisor will prepare monthly progress reports which also highlight environmental performances of the project work and submit it to ERA. The Environmental reports will be transmitted through ERA to the Regional and Federal EPAs, who are the overall supervising environmental institutions.

The Environmental and Social Management Team (ESMT) of ERA will accomplish periodical monitoring by monthly or quarterly as the need may be depending on the type of activities and impact to be monitored. The environmental monitoring will be conducted onsite in all major construction activities, onsite checking of the actual implementation of proposed mitigation & enhancement measure, as well as checking the overall construction & supervision work.

External Monitoring: An overall supervision and monitoring of the environmental conditions and performances of the project will be made by the Environmental Protection Authorities both at federal and regional level .i.e. OBoLEP & EPLAUA of SNNPRS and their respective office at wereda level. The monitoring reports submitted by ERA will be assessed and evaluated by EPA and comments and recommendations given as required, enabling or rectifying mis- treatment and malpractices in the project implementation processes. EPA experts can require arrangements for site visits and supervision of the environmental conditions whenever it is felt necessary.

External monitoring can be conducted with government financing institutions like the, Ministry of Finance and Economic Development (MOFED), and the project financing in this case World Bank who require to check the project performances against their funding policy & environmental guidelines.

8.2.3 Environmental Monitoring activities & responsibility of the different units in ERA

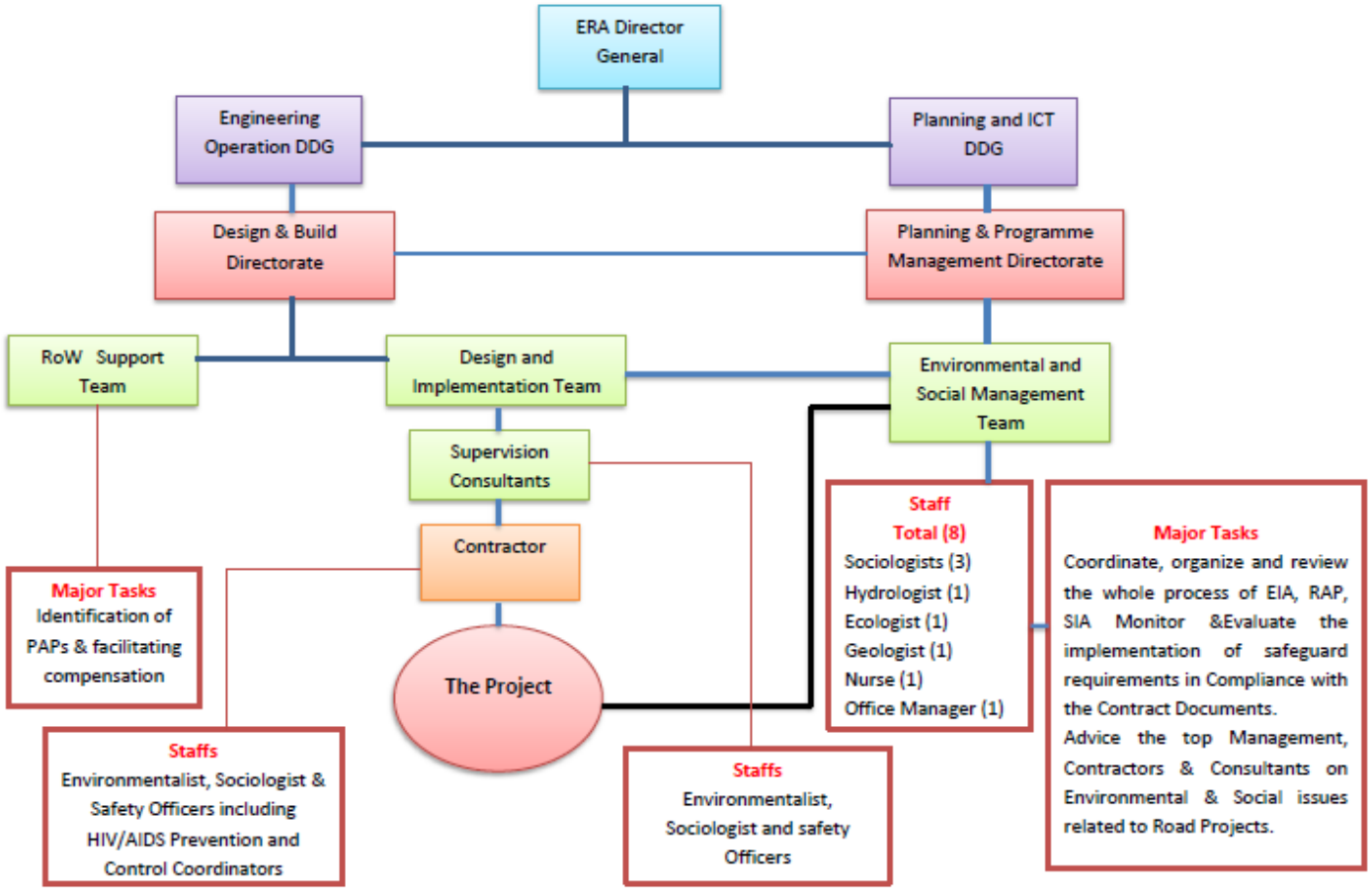


Figure 8-3**: Organizational Relationship for Environmental, Social and Safety Management during Pre and Construction**

Table 8-4 shows monitoring activities for each proposed mitigation measure and impact, method of monitoring, indicators and responsible body.

Pre-construction phase monitoring

Monitoring during the pre-construction phase of the project will be concerned with two aspects:

- Checking that the project designs and specifications incorporate appropriate measures to minimize negative impacts and to enhance beneficial impacts
- Checking that the appropriate environmental protection clauses have been included in the contract documents to allow control of actions by the contractor.

These activities are to be carried out as part of the preparation of designs and tender documents for the project and responsibility fall on study and design consultant and ERA ESMT. External monitoring expected from the regional (OBoLEPA) federal (EPA) environmental authorities and for the purpose they have to be provided with ESIA and EMP document.

Construction Phase Monitoring

Construction Phase Monitoring

Environmental monitoring during the construction phase will comprise two principal groups of activities:

- Review of the Contractor's plans, method statements, temporary works designs, and arrangements relating to obtaining necessary approvals from the Engineer, so as to ensure that environmental protection measures specified in the contract documents are adopted, and that the Contractor's proposals provide an acceptable level of impact control.
- Systematic observation on a day-to-day basis of all site activities and the Contractor's offsite facilities including quarry and borrow areas, as a check that the contract requirements relating to environmental matters are in fact being complied with, and that no impacts foreseen and unforeseen are occurring.

These activities need to be fully integrated with other construction supervision and monitoring activities carried out by the construction supervision consultant. Primary responsibility for ensuring that an adequate level of environmental monitoring is carried out will lie with the RE, as part of his duties connected with general site supervision. Actual monitoring on a day-to-day basis will be carried out by the EMU consisting environmentalist, social expert and Occupational Health& Safety expert assigned by the construction supervision consultant hired to provide advice to the contactor & supervise environmental performance of the project. Contractor is required to submit his monitoring plan for the EMU approval and he must undertake the task in line with the monitoring plan.

The majority of monitoring will comprise visual observations, carried out at the same time as the engineering monitoring activities. Site inspections will take place with emphasis on early identification of any environmental problems and the initiation of suitable remedial action. Where remedial actions have been required on the part of the Contractor, further checks will need to be made to ensure that these are actually being implemented to the agreed schedule and in the required form. Each part of the site where construction is taking place needs to be formally inspected from an environmental viewpoint on a regular basis and therefore the need for fulltime supervision environmentalist during the project construction phase which is assumed to take four years.

The RE will decide on the appropriate course of action to be taken in cases where unsatisfactory reports are received from his field staff regarding environmental matters. In the case of relatively minor matters, advice to the Contractor on the need for remedial action may suffice, but in all serious cases, the RE should either recommend an appropriate course of action to the Engineer, or should issue a formal instruction to the Contractor to take remedial action, depending on the extent of his delegated powers.

Monthly reports prepared by the RE should contain a brief section referring to environmental matters, which summarizes the results of site monitoring, remedial actions, which have been initiated and whether or not the resultant action is having the desired result. The report will also identify any unforeseen environmental problems and will recommend suitable additional actions. Progress meetings with the Contractor will also include a review of environmental aspects.

In addition to visual observation, it is particularly important that monitoring should also include limited informal questioning of people and local community leaders who live near to and use the project road and any diversions, since they may be aware of matters which are unsatisfactory, but which may not be readily apparent or recognized during normal site inspection visits.

Prior to the commencement of construction, the RE and the Environmentalist/Sociologist specialist of supervision consultant should develop environmental inspection checklists for site use and it will facilitate systematic monitoring and recording. The consent and approval of the checklist by the EMST of ERA shall be obtained so as to get the proper guidance and facilitate for subsequent follow ups. The checklist shall provide attention to mitigation measures included in the new highway design such as underpass, bridges, material sites, bio-engineering measures to prevent erosion etc. There could be modification to the activities in the light of site experience, and it is recommended that a review of their adequacy and ease of use should be carried out approximately 3 months after the commencement of works.

The EMU should undertake day to day monitoring to check the actual implementation of proposed mitigation & enhancement measures. ERA's Environmental and social Management Team should participate in site visits as required.

Up on completion of the work and handing over of the project, the rehabilitation of abandoned material sites, especially borrow pits and sites used for the quarry extraction should be ensured. The pits dug for material production should either be transferred for other uses like for water harvesting ponds or should be backfilled, compacted and leveled, to avoid stagnating water and accidental risk for animal and herders in the area.

Operation Phase Monitoring

Post-construction phase monitoring will be concerned with identification of the need for routine and periodic maintenance various components and structures of the project such as pavement, interchanges, drains and drainage structures, together with checking that the maintenance works are being carried out properly and are not resulting in environmental damage; ERA Maintenance Department, ESMT and the regional environmental protection offices will be responsible for monitoring. Traffic police and transport authorities will be responsible to monitor implementation of traffic safety and regulation.

8.2.4 Environmental monitoring program & indicators

Table 8-4 shows the list of Environmental Monitoring Indicators and the Schedule of Monitoring. The key aspects or areas of environmental indicators include the following:-

- Checking of design documents for inclusion of environmental issues in the design, checking of environmental clauses in the construction contract documents;

- Construction methodology and ROW observance in dense forest cover, precautionary measures taken to minimize forest clearance;
- The implementation and effectiveness of soil erosion and sedimentation control measures;
- Underpass structured implemented, their status and effectiveness;
- Slide and slop instability issues, measures to protect slide prone steep slopped embankments and fill sites;
- Interchanges at grade & ROW in the link roads;
- Fencing around pits dug for material production in the grazing areas to protect animal and children from entering;
- Rehabilitation and management of excavated and graded sites at quarries, borrow pits, steep slopes;
- Removal of spoil soils, disposal of debris and wastes, and materials & oil products handling both at storage sites and at work places;
- Dust suppression measures to minimize air pollution and traffic accidents during construction phase of the project;
- Resettlement and compensation for displaced people and for lost properties should also be given attention for their proper implementation;
- Supervision of poaching in the forest and wildlife reserves by construction workers, supervision and control of illegal timber cutting and illegal hunting in the forests;
- Implementation of mitigation measures like air quality, soil contamination, water pollution and their trend during the project life;
- Public health effects, changes as compared to pre- project implementation in the project area;
- Traffic safety & regulations implemented;
- Proper and timely vehicle and machinery maintenance;
- Management of wastes in camp, garages and at spoil soil disposal sites.
- Especial attention to surveillance of construction activities of the road route near the ASLNP boundary, and also in the last section at Tikur Wuha river& surrounding seasonal inundated land.

The monitoring program should also maintain assessment data and records of pre-construction situation of the project area. This would serve as a reference to follow up the changes and developments in the process of project implementation and to ensure the proper rehabilitation and restoration of the previous situation as far as possible chisel.

8.2.5 Institutional responsibility capacity building & training requirements

Both project management and environmental management responsibilities are normally shared between several government and non-government organizations, each with specific executive responsibilities for particular aspects, which are exercised during the various stages of project preparation, implementation and subsequent operation and maintenances.

The various institutions/organs that will take part and are responsible for environmental monitoring have been described. Training & capacity building would be required to support and ensure implementation of the proposed environmental and social mitigation management and monitoring measures.

8.2.6 Reporting

Environmental reports have to be prepared and communicated with concerned authorized organ in various phases of the project road implementation. The very purpose of environmental reporting is to get an early detection of critical environmental and social conditions and to provide information on the mitigation progress and results. The key environmental reports to be prepared before the start of the project construction are ESIA and RAP. These reports have been prepared & updated as per the ERA &World Bank funding procedure. EPA has delegated ESIA review and approval authority to sector ministries however the Ministry of Transport has not commenced in establishing an Environmental Unit, staffing and implementation of delegated duties. Therefore, once the ESIA and RAP for the proposed project is finalized by ERA, it should be forwarded through the Ministry of Transport to EPA for review and clearance. EPA will undertake a verification of the study findings and send the reports to key stakeholders such as the Ethiopian Wildlife Conservation Authority (ECWA) on the impact of the project to the ASLNP and the Ministry of Water and Energy on the potential impacts on the water resources. The reports need also to be communicated with regional environmental offices (OBoLEP, EPLAUA of SNNPRS).

EMP is another important environmental report prepared in accordance to the World Bank's comments & funding procedure. It's prepared based on the updated ESIA report, and lay down main environmental & social mitigation & enhancement measure, and monitoring activities to be implemented in different phase of the project development.

Implementation and performance of the EMP in the different phase of the project development should be reported and documented. During the pre-construction phase, the tender document & project design should be reviewed & reported in conformation to incorporation of environmental & social consideration measures proposed in the ESIA study. During the project road construction period, the EMU of the environmental supervision consultant should prepare and a monthly EMP implementation progress report to EMST based on their strict and daily follow up activities. The environmental report shall include summary of monitoring result, as a minimum:-

- Statistical record of non-compliance observed during the monitoring period;
- Records of mitigation measures taken or pending;
- Record of social complaints;
- Record of Change Management

ERA shall arrange a meeting once a month to discuss on conduct of EMP, result of monitoring, gaps and problems encountered etc. EMST of ERA should discuss and consult ASLNP, EWCA, regional environment office of ONRS and SNNPRS on changes identified and reported on EMP.

8.2.7 Institutions Involved

GoE and Other Financiers • Financing (budget for) works • Monitor and Evaluate progress	Ethiopian Roads Authority (ERA)	**MoFE/ EPA and Regional Bureaus** • Technical Assistance • Environmental Surveillance and Audit
Bureaus of Agriculture • Erosion gully control • Upstream watershed managemnt • Grassing • Tree planting		**Bureaus of Health** • HIV/AIDS prevention and control • STIs and STDs prevention and control • Awareness on sanitation (for project workers) • Trauma management (road safety)
Transport Bureaus Issuing traffic regulations to contribute to enhancement of road safety		**Bureaus of Labour and Social Affairs** Workplace occupational health and safety (during construction)
Water Bureaus • Potable water supply (during construction) • After project completiuon, handing over developed water sources to the communities for future use		**ERA/DEDs** • Sustainable maintenance and supervision • Follow-up on implemented measures
		Contractor and Consultant • Implementing proposed mitigation measures; • Supervising implementation of mitigation measures
Media Publicity and awareness/educational works		**Police** • Road safety enforcement • Systematic accident recording
NGOs Strengthening activities (like awareness) related to: HIV/AIDS, STIs/STDs and road safety		**Academics** • Resarch on problem areas • Industry-related education (a strong tie between the industry and academic institutions)
EWCA Surveilance of the ASLNP during Project implementation and operation		**Local Admin/Communities** • For organizing and pursuading communities on affirmative issues and measures (such as against theft and vandalism) to protect road sector assets • Protection of measures implemented as part of project sustainability

Figure 8.3 describes the roles and responsibilities of the firms/entities involved in project-related activities including: environment, social safety and health.

Figure 8-4 Roles and Responsibilities of Organizations and Entities at Construction and Operation Phases

Table 8-4: Environmental & Social Monitoring Program for Lot 4: Arsi Negele-Hawassa Road Project

Proposed Mitigation Measures	*Monitoring Indicator*	*Method*	*Location*	*Frequency*
Construction phase monitoring program				
Avoiding operation of construction vehicles out of defined tracks or road asccess	*Operation of machineries on defined tracks/areas*	*Observation*	*Access roads and construction sites*	*Throughout construction period*
Restricting operating heavy equipment in essential agricultural areas.	*Agricultural field not compacted*	*Observation*	*Access road*	*Throughout construction period*
Reinstating access roads by removal of existing pavement material, loosening of compacted soils, and spreading of topsoil preserved from road cuts, and revegetation .	*Reinstated land*	*Observation*	*Excavated disturbed land, material sites*	*Once, following completion of specific works*
Construction of roadside ditches and drainages	*Constructed drainage structures & ditches where needed*	*Observation*	*Road ROW, construction sites, access roads*	*Throughout construction, especially during/after major rainfall events*
Constructing adequate drain pipes to avoid excessive concentrated flow in ditches	*Constructed drainage pipes where needed*	*Observation*	*Road ROW*	*Throughout construction, especially during/after major rainfall events*
Constructing adequate drainage line to intercept flows and to protect from entering erosion susceptible areas and to reduce gulley formation	*Constructed drainages to intercept flow*	*Observation*	*ROAD ROW intercept drains*	*While construction of drainage structures, especially during/after major rainfall events*
Terracing and constructing stepped or edge rounding fashion at fill sites based on the soil type. Re-grading to establish stable contours	*Terraced or steeped land formed*	*Observation*	*Cut fill embankments*	*Regularly during the construction phase*

Proposed Mitigation Measures	*Monitoring Indicator*	*Method*	*Location*	*Frequency*
Grassing of embankment sides and ensuring grass growth	*Grasseed embankments*	*Observation*	*Sloppy Embankment sides*	*Regularly during the construction phase*
Salvage and storage of top soil & surplus excavated earth material	*stored top soil near all disturbed areas, stored excess spoil near excavation sites*	*Observation*	*Excavated grounds, material sites*	*While starting excavation & development of material sites*
Placing of drain outlets to avoid cascade effect	*Drain outlets arrangements*	*Observation*	*Road ROW*	*Regularly during the construction phase, especially during/after major rainfall events*
Stone ripraping or concrete making of drains receiving surfaces or ditches	*Stable drains with no erosion*	*Observation*	*Road ROW*	*Regularly during the construction phase, especially during/after major rainfall events*
Re-grading, topsoil spreading, and re-planting disfigured and excavated land for quarry ,borrow pit and roads	*Planted material sites*	*Observation*	*Disturbed sites*	*Right after work completed and until vegetation is self-sustaining*
Planting of tree in the roadsides and degraded area in the road micro catchment	*Planted trees*	*Observation Count*	*Planting sites*	*While completion of construction work,*
Preventing leakages of vehicles and construction equipment by regular and effective maintenance.	*No stained soil where vehicles/equipment is used*	*Observation*	*Camp garage sites*	*Regularly During construction period*
Avoiding water pollution by spillages of hazardous substances through proper handling of oil, fuel, cement etc.	*Hazardous substance handling & storage and disposal*	*Observation*	*Storage sites*	*Throughout the construction period*
Spill cleanup and residual contamination	*Minimal evidence of spill after cleanup*	*Observation measurement*	*All construction sites*	*Whenever accidental spill occurs*

Proposed Mitigation Measures	*Monitoring Indicator*	*Method*	*Location*	*Frequency*
Avoid & strictly control disposal of used oils and other hazardous wastes	*Proper management and disposal of oil & hazardous waste*	*Observation*	*Use and disposal sites*	*Regularly during the construction phase*
Locating site facilities at sufficient distance far away from streams, rivers, or community water supply sources.	*Location of such construction facilities*	*Observation*	*Location of facilities*	*At the start of construction while site selection & establishment for camp, waste disposal*
Establish waste disposal site, and locate waste disposal sites away from water supply sources, settlement, and approved by region/wereda environmental office	*Location of installed waste disposal facilities*	*Observation*	*Waste disposal sites*	*At the start of construction while site selection & establishment for camp, waste disposal*
Establish sanitary facility in camp sites toilets, safe water supply	*Installed sanitary facilities (toilet)*	*Observation*	*Camp sites*	*At the start of construction while site selection & establishment for camp, waste disposal*
implementation of dust suppression measures like regular water spraying on paved and excavated grounds	*Minimal visible dust*	*Observation*	*Access road & excavated grounds*	*Throughout the construction phase*
Locate machineries and crushers far away from densely populated settlement areas	*Location of crushers*	*Observation*	*Crashers Site*	*Once while establishing crasher site*
Checking regular and periodic maintenance of vehicles and machineries.	*Status of machineries & vehicle maintenance records*	*Observation*	*Machineries garage sites*	*Regularly throughout the construction phase*
Using of occupational safety measures	*Zero or minimal serious accidents*	*Observation*	*Employees at working at risky area*	*Weekly*

Proposed Mitigation Measures	*Monitoring Indicator*	*Method*	*Location*	*Frequency*
Covering track that transport earthen material to prevent dust, especially while traversing through densely populated urban centers	*Material trucks that are covered*	*Observation*	*Access & detour roads*	*Daily*
Retaining remnant indigenous tree species found in the route corridor as far as possible unless they conflict with the new dual carriageway & ROW	*Maintained ruminant trees*	*Observation*	*New road route corridor sides,*	*Regularly during the construction phase*
Prohibiting project workers from using fire for clearing, illegal cutting & deforestation	*No fires used*	*Observation*	*All Constriction sites*	*Regularly during the construction phase*
Prohibiting tree cutting for access road construction unless conditions force to do otherwise, route selection for access to material sites, camp site should try to avoid dense vegetation covered areas.	*excess tree cutting and removal of vegetation only in marked areas*	*Observation*	*Access road& detours*	*Regularly during the construction phase*
Provision of awareness and education, especially to Dozer and other construction machinery operators	*Executed awareness raising program& trained employees*	*Observation Reports/records*	*Construction sites*	*At the start of construction, and biannually during the construction phase*
Replanting appropriate seedling for every tree lost by the project construction including re-vegetation of uncovered and graded grounds excavated and abandoned material sites.	*Replanted tree in number and area planted*	*Observation Count*	*Planting sites*	*Regularly during the construction phase as soon as site work ends*
Utilizing area of previous material sites & camp sites so as to minimize clearing of natural vegetation	*Previous sites used*	*Observation*	*Previous materials sites*	
Provision of awareness creation programs on the precautions to be taken to minimize adverse impact on flora fauna & important habitat provided to employees	*Training provided, and no of employees trained*	*Observation Report*	*Construction site*	*Periodically during the construction phase*
Preventing illegal hunting, poaching and encroaching in to wildlife habitat and killing of wild animals in the park area (ASLNP) by construction employees.	*No illegal hunting done by employees in ASLNP*	*Reports from ASLNP*	*ASLNP surrounding area*	*As reports are received, and periodic checks with ASLNP*

Proposed Mitigation Measures	*Monitoring Indicator*	*Method*	*Location*	*Frequency*
Provision of sufficient information to PAPs on the usage of farmland either temporarily or permanently for the construction works.	*PAPs awareness complain consultation conducted*	*Observation Reports/records*		*before construction begin*
Undertake RAP to study compensation for farmers/private investors for loss of crops (perennial or annual), trees & property .	*As required by RAP*			
Locating of camp sites, storage sites, spoil dumping sites, etc on degraded & less productive land, avoid sitting in productive agriculture land	*Location of ancillary sites*	*Observation*	*Ancillary work sites*	*During selection of sites before construction begin*
Rehabilitation of temporarily occupied land, support losing compacted land by machinery	*Restored area*	*Observation*	*Ancillary work sites*	*At completion of construction work*
Watering for the road works or campsite requirements shall not be withdrawn from the streams or other sources being used by the local population unless its sufficiency is approved by the local (district) water offices or the regional water bureau.	*No reports or complaints of water shortages due to project water use*	*Observation Reports/records*		*Right before construction begins, and as construction proceed as appropriate*
Installing water facilities for the project construction and labor force purpose as appropriate, through constructing water harvesting ponds or drilling	*Constructed or installed water schemes by the project for construction*	*Observation Reports/records*		*Right before construction begins*
Undertaking detail investigation inventory of affected services	*Completion of inventory*	*Observation/ records*	*Affected sites*	*Prior to construction*
Notifying the concerned service authority	*Notified service giving institutions*	*Report/record*		*Before construction*
Relocation of affected services facilities	*Relocated services*	*Observation*	*Affected services*	*Before construction begins*

Proposed Mitigation Measures	*Monitoring Indicator*	*Method*	*Location*	*Frequency*
Construction of underpass structures to provide passage for cattle, pedestrian and animals	*Designed & constructed underpass/overpass structures*	*Review* *Observation*	*Design doc* *Underpass/overpass*	*Detail design* *Construction*
Limit traffic speeds and apply water regularly on dusty roads to suppress dust levels, especially in densely populated rural settlement area.	*Minimal dust, no complaints about dust*	*Observation*	*Access & detours*	*daily*
Servicing the exhaust systems of all vehicles and equipment on regular basis to ensure that noise and exhaust emissions are kept to appropriate levels.	*Construction vehicles & equipment status, no complaints on noise*	*Observation*	*Garages Construction machineries*	*Throughout the construction period*
No burning or incinerating permitted of vegetation or material on site unless approved by concerned environmental authority.	*No cleared land using fire except as authorized*	*Observation Reports/records*	*Construction sites*	*Throughout the construction period*
Restrict construction activities working hours near sensitive receptors (residential areas, schools, etc.), especially with heavy machinery and equipments	*Limited working hrs in sensitive areas*	*Observation Reports/records*	*Construction sites*	*Throughout construction period*
Periodic and timely machinery maintenance	*Status of machineries & equipments*	*Observation Reports/records*	*Garages*	*Throughout construction period*
Provision of necessary information install speed limits, direction, hazard locations, sensitive sites by putting appropriate signals.	*Installed signs*	*Observation*	*Construction sites*	*Throughout construction period*
Awareness training of operators of equipment and construction vehicles in traffic safety measures.	*Number of trained employees*	*Observation Reports/records*	*Construction sites*	*Throughout construction period*
Conduct education and awareness creation campaigns on the spread and transmission of STDs and HIV/AIDS for construction workers and local communities living close to the construction camp sites.	*Conducted training and awareness*	*Observation Reports/records*	*Construction sites*	*Prior to beginning of construction and during construction*

Proposed Mitigation Measures	*Monitoring Indicator*	*Method*	*Location*	*Frequency*
Provide free distribution and provision of condoms to construction workers by the Contractor to avoid the spread of STDs and HIV/AIDS.	*Condoms*	*Observation Reports/records*	*Construction sites*	*Same as above*
Put educational posters and flyers on HIV/AIDS, using local languages at public gathering locations, bus terminals, schools and by road sides to minimize the spread of HIV/AIDS.	*Educational posters*	*Observation Reports/records*	*Construction sites*	*Same as above*
Adopt FDRE and ERA's Policy on HIV/AIDs, and provide special care and support to HIV/AIDs positive staff and AIDs patients.	*Support given to HIV/AIDS positive*	*Observation Reports/records*	*Construction sites*	*Same as above*
Strengthen existing health facilities with professionals and necessary drugs, establish proper camping sites and secure proper disposal of human wastes to avoid pollution of water sources	*Support given*	*Observation Reports/records*	*Project weredas health facilities*	*Same as above*
During the project construction period, avid potential breeding sites for mosquito in the lowlands by draining stagnant & vegetated water bodies and refilling borrow and quarries	*Potential mosquito breeding sites*	*Observation Reports/records*	*Construction sites*	*Same as above*
Promote use of mosquito net by the labor force and local people, especially in the lowland area.	*Mosquito net provided*	*Observation Reports/records*	*Construction sites*	*Same as above*
Operation phase monitoring program				
Maintaining storm drains and ditches regularly dislting and maintenance activities	*Occurrence of erosion Gullies, siliation in structures*	*Observation Reports/records*	*Drainage structures*	*Bi-annually, including at least once during/afer major rainfall event*
Maintain grass cover in steep slope section of the new road embankment and graded grounds, and protect livestock grazing in drainage ditches embankment structures	*Grass cover*	*Observation*	*Embankments roadsides*	*Annually at the start of rainy season*
Control traffic accidents and transportation of hazardous chemicals	*Accident & spill of hazardous chemicals*	*Observation Report*	*New road*	*Annually*

Proposed Mitigation Measures	*Monitoring Indicator*	*Method*	*Location*	*Frequency*
Promote proper land use and conservation based cultivation in micro-catchments	*Micro catchment Land use & management*	*Observation Reports/records*	*New road micro-catchment*	*Annually*
Undertaking maintenance of the roadside ditches, drainages, intercept flow	*Flood affected people or land, Status & effectiveness of drains & ditches*	*Observation/ complaints*	*Drainage structures*	*As it appears during the project operation*
Monitoring for traffic sign and enforce traffic & transport operation regulations	*Accidents, Installed traffic signs, enforcement of regulation*	*Reports/records*		*All time of the year*
Timely maintenance of pot holes in the road carriageway	*Maintained hot spots*	*Reports/records*		*All time of the year when maintenance needed*
Maintaining road reserve in the interchange (at grade with roundabout), the new & link-roads to communicate the new road with towns & roads	*Encroachment in to the new & link roads*	*Observation*	*New & Link road ROW*	*All time of the year*
Proper traffic management in the new & link roads through installing signs and arranging for parking stations etc	*Installed signs &effectiveness of traffic management*	*Observation Reports/records*	*New & link roads ROW*	*All time of the year*
Provision od training and awareness on proper use of the road both to traffic operators drivers and local communities	*Training provided &No of trainees*	*Reports/records*		*Once Annually*
Functioning and status of Installed underpass to avoid interference/obstruction existing link roads, community & livestock access	*Status of underpass &users community & livestock*	*Observation Count*	*Constructed underpass structures*	*Annually during major market days*
Functioning& status of underpasses and traffic signs installed to prevent accident on wildlife especially in the road section along the ASLNP boundary.	*Wild animals using underpasses*	*Report from ASLNP*	*Installed underpasses*	*Annually*

8.2.8 Environmental mitigation management & monitoring cost

The total social mitigation, management and monitoring cost required for the Lot 4 Road Project including 15% contingency is ETB 95,541,181 (Table 8.5). The highest proportion of the cost before contingency goes to the implementation of Resettlement Action Plan (RAP) (95%). The lion's share of the RAP cost shall be effected prior to the commencement of the road construction. The remaining 4.76% of the cost is divided between public health and gender program, cost for social monitoring management activities and safety training (0.24%). Most of the physical mitigation measures will be considered in the engineering design and will be implemented as part of the construction items; thus, these will not require separate costs as they are considered as part of the engineering item and good engineering practices. They shall be specified in the tender document, technical specifications and construction contract documents and shall be incorporated in the engineering design and included in the bill of quantities (BOQ) and contract documents for the Contractor. Table 8.5 shows details of social cost in various categories.

Table 8-5 Social mitigation management & monitoring cost breakdown

No	Proposed Social Mitigation/Monitoring Activity items	Unit	Amount	Unit Cost	Total cost
I	**Physical Mitigation Enhancement Measures**				
	install physical erosion prevention measures such as terraced graded embankments, check dams, etc	Engineering Cost			
	Sediment basin/silt tarp construction, in drains/stream downstream of new access road opening or material sites	Engineering Cost			
	Treatment tank construction for residual chemicals	Engineering Cost			
	Water harvesting ponds d/s of diverted roadside ditches flow	Engineering Cost			
	Construction of underpass to avoid interference with existing link roads, community & livestock route, and also wildlife crossing	Engineering Cost			
	Establishing waste disposal sites & waste management	Engineering Cost			
II	**Compensation to affected cropland, household property , services & infrastructures**	RAP Cost			**79,293,288**
	Sub-Total-1				**79,293,288**
III	**Public health and gender**				
	Malaria prevention and treatment	Ls			80,000
	HIV/AIDS program implementation	Ls			2,000,000
	Gender Program Implementation	Ls			500,000

No	Proposed Social Mitigation/Monitoring Activity items	Unit	Amount	Unit Cost	Total cost
	Avail first aid kit	Ls			200,000
	Sub-Total-2				**2,780,000**
IV	**Training on Safety**				
	Safety training to relevant sector offices (weredas environment, health, water resource, agriculture bureaus)	Ls			80000
	Safety awareness and education program to local community members and contractor staff	Ls			120000
	Sub-Total-3				**200,000**
V	**Social Monitoring & Management**				
	Establish Environmental and Social Management Unit consisting Environmentalist & Sociologist for Environmental Monitoring & Supervision during the project construction phase	MM	72	8000	576000
	Internal Monitoring (ESMT of ERA)	Ls			90,000
	External Monitoring (EPA, Environmental authorities of ONRS & SNNPRS)	Ls			140,000
	Sub-Total-4				**806,000**
	Total				**83,079,288**
	Contingency (15%)				**12,461,893**
	Grand Total				**95,541,181**

Note:
As it is difficult to estimate the total cost of each component at this stage[6], it is proposed that they should be bid items that the contractor shall be expected to quote the respective unit prices or the Client may reserve a certain proportion of the project cost for implementing environmental mitigation measures.

[6] For instance, it is difficult to estimate the total area of borrow pits and quarry sites to be reinstated, the amount (volume) of material required for physical structures, the total length of access roads to the resort areas, etc.

9. ESIA DISCLOSURE PLAN

9.1 General

The primary objective of the disclosure is to inform and continually update about the project and to engage seek and maintain active participation and support of PAPS, project-affected communities and their representatives throughout the various stages (appraisal, planning, implementation, follow up, monitoring and evaluation) of the project. Specific objectives include the following:

- To inform PAPs about and discuss the nature and scale of adverse and beneficial socio-economic impacts of the project on their livelihoods in a more transparent and direct manner and seek their active participation in the project cycle.
- To give PAPs and other members of affected communities a chance to have a say and express their views in the planning and implementation of the Project that affect them directly.
- To gather qualitative as well as quantitative information on viable income generation and livelihood schemes including assessment of needs, constraints and opportunities which PAPs could engage themselves in order to restore their income and livelihoods in a self-sustaining manner.
- To discuss PAPs needs constraints and preferences in the identification and selection of potential sites for resettlement, rehabilitation and sustainable community development in the future.

9.2 Safeguards Instruments Preparation and Implementation

The Modjo-Hawassa expressway will be financed by the Government of Ethiopia and four external financiers, the African Development Bank, China EXIM Bank, the Korea EXIM Bank and the World Bank, each supporting a discrete section of the road. While the Government is responsible for the safeguard compliance of all lots each financier has also obligations of monitoring the implementation of agreed safeguard policies in each respective lot, and hence China EXIM Bank will be responsible for Arsi Negele to Hawassa. The ESIA, and RAP prepared for the section to be financed by China EXIM Bank were reviewed by ERA safeguards team to confirm consistency with its safeguards policy.

The safeguard instruments for the section will be disclosed before appraisal. ERA has reviewed the ESIA and RAP prepared for the section and found them to be consistent with its safeguards policies.. ERA will ensure that all financiers will adopt and implement the reviewed safeguard instruments prepared for the respective sections of the road.

9.3 The safeguards status

On the basis of the above objectives, the stages of development of the Project Road Project need to be disclosed (with the target of reaching the stakeholders listed above) at different levels through different media including: TV Broadcastings, Radio and National Newspapers issued in Amharic and English as well as local languages. That is, the ESIA will be officially disclosed through the Local and National media by ERA. Later on, copies of the final ESIA report will be distributed to local councils, and regional environmental authorities as they have the opportunity to inform all concerned government & NGOs. The safeguards status for all Lots are shown in Table 9.1.

Table 9-1: Safeguards Status

Item	Lot 1	Lot 2	Lot 3	Lot 4
Section	Modjo-Meki	Meki-Zeway	Zeway-Arsi Negele	Arsi Negele-Hawassa
Financier	AfDB & GoE	Korea EXIM & GoE	WB	China EXIM & GoE
Safeguard Documents reviewed by:	AfDB	AfDB	WB & AfDB	AfDB
EIA disclosed Locally/ Internationally	18/12/2014 27/06/2013	18/12/2014 27/06/2013	18/12/2014 -	18/12/2014 -
RAP disclosed Locally / Internationally	18/12/2014 27/06/2013	18/12/2014 27/06/2013	18/12/2014 -	18/12/2014 -
Procurement Status	Prequalification complete - bidders to be invited 22	Post qualification is under evaluation	Bidding document under review by WB	Post qualification is under evaluation
Final Design to comply with:	Ethiopian EIA Proclamation ERA; Environmental & Social Management Manual; AfDB Policy on Environment & ESA Procedure	Ethiopian EIA Proclamation ERA; Environmental & Social Management Manual; AfDB Policy on Environment & ESA Procedure	Ethiopian EIA Proclamation ERA; Environmental & Social Management Manual; WB Environmental & Social Policies	Ethiopian EIA Proclamation ERA; Environmental & Social Management Manual
EMP reviewed by:	Project Manager & ERA & Supervision Consultant	Project Manager & ERA & Supervision Consultant	Project Manager & ERA & Supervision Consultant	Project Manager & ERA & Supervision Consultant

10. ENVIRONMENTAL CLAUSES FOR TENDER DOCUMENTS

The major adverse impact by the project occurs during the project construction phase, and the principal responsible organ would be the project construction contractor. Therefore, the construction contract document should include legally binding environmental clauses to minimize adverse impacts and to enhance the positive ones. It should be noted that a separate tender document which includes the ESIA and other contractual requirements will be provided to the contractor as part of the works requirements.

This Chapter present specific items as found out to be very crucial based on the environmental & social assessment finding, and therefore should be included in the construction contract agreement for the proposed Lot 3 Zeway – Arsi Negelle expressway Road Project for Modjo-Hawassa Road Project.

Clause for preparation and submission of site environmental management plan

- The contractor should prepare site environmental plan prior to commencing any construction activity. The site environmental plan has to be approved by the Resident engineer EMU and ESMT of ERA.
- Environmental Management and monitoring action plan and checklist for monitoring indicators shall be prepared and submitted to the engineer for approval and for later use.

Clause to prevent impacts on Abijata Shala Lakes National Park (ASLNP)

- Construction materials sites, heavy duty machinery that can create noise & vibration impact etc shall not be located nowhere near the park boundary & surrounding influence area.
- Prohibit poaching by construction workers under terms of contract especially while working in the three lakes area, and potential wildlife area in ASLNP surrounding area.
- Prohibit fire setting to the woodland and/or any activity that can cause fire risks in the area.
- Careful construction not to disturb wildlife & their habitat, especially along identified wild animals crossing route through installing warning signs, restricting construction work & machinery operation etc
- Provision of the necessary precaution measures & training to employees avoid so as to avoid impact on wildlife habitat & species
- No access road, no camp or garage is to be constructed in protected areas of ASLNP influence area

Clause to minimize adverse impact on flora (Remnant trees in acacia woodland & Montana forest)

- Save and store topsoil from all disturbed areas, including access roads and quarries/borrow pits
- Minimize damage and destruction of flora outside marked construction areas.

- retain remnant indigenous remnant trees found in the acacia woodland & evergreen montna forest in the route corridor as far as possible unless they conflict with the new dual carriageway & ROW. Do not cut trees outside the marked construction area
- Prohibit project workers from using fire for clearing, illegal cutting & deforestation
- Tree cutting for access road construction should be strictly prohibited unless conditions force to do otherwise, route selection for access to material sites, camp site should try to avoid dense vegetation covered areas.
- Awareness and education should be provided, especially to Dozer and other construction machinery operators not to remove trees, especially the remnant evergreen trees in Montana Forest, without proper care, and cutting/removing only when required by the project
- Restoration of disturbed grounds, grading of sloppy section of the route, excavated & abandoned material sites etc so as to prepare for replanting with appropriate seedling for the lost vegetation
- As much as possible, and technically feasible utilize area of previous material sites & camp sites so as to minimize clearing of natural vegetation

Clauses to mitigate Impacts from development of material sites

- Selection for quarry and borrow development sites should avoid as far as possible sensitive ecological sites; animal grazing grounds, crop land, dense forest covers and settlement areas.
- Careful location & planning for material site, and not to be located close to river, quarries & crashers not to be located near settlement & near locally important wildlife habitat like the dense woodland
- The contractor shall keep records of the original site condition by registering and photographs for later stage comparisons and references
- The contractor in the presence of the supervising environmentalist, who is member of the supervising consultant team, shall take list of all major tree species and their number; identify those that would be affected by the project work. Representative expert from the woredas BoLEP shall be also invited to attend the inventory process and to keep his own record.
- The top soil in selected material sites and access roads shall be carefully scraped and put aside for back fill material during reinstatement of the site.
- The contractor shall reinstate all quarries and borrow material sites and access roads upon commissioning of the project work. Excavated grounds shall not be left open unless it is agreed upon with the client and consultant, also the local administration and community representatives, with the intention of using the pits for other development objectives like rain water harvesting facility. In such cases the community may request to keep the abandoned quarry site for future use. But it has to be confirmed by the health and environment office for the necessary follow ups and sustainable maintenances.
- Reinstatement of quarries and borrow pits shall be done by dumping spoil soil left over, spreading the reserved top soil uniformly on the finished surface, landscaping by leveling and shaping to the surrounding condition, provide drainage and overflows for runoff, and spillages for steep slopes and depressed ground. Provide fencing and

barriers around the site to avoid accidents to animal and damages to the plantation seedlings until the ground consolidates.

- Plant indigenous tree and grass cover on the reinstated ground. Tree species should be indigenous and of the type similar to the surrounding plants and trees. The plantation should be able to recover the site to its original condition and its landscape aesthetics.

Clauses for impacts due to Location of Camp

- Carefully select location of camp sites in consultation with local authorities, RE and with ESMT of ERA, and community representative of the area.
- Camps shall be located outside and away from environmentally sensitive areas such as the relatively dense acacia woodland, near Chelekl ka swamp & Tikur Wuha river& other water sources and community water points, and away from main towns along the existing road, rural village centers, and most importantly away from ASLNP influence area.
- Camp site sanitary conditions should be maintained on regular bases. Toilet facilities with appropriate liquid waste storage (Septic tanks, VIPs etc.), and solid waste collection bins should be provided in the camp as appropriate.
- Adequate potable water supply should be provided at the site both for the workers' consumption and for the upkeep of the sanitation at the camp sites.

Clauses for embankment Slope Instability and Soil Erosion Flood

- Avoid deep excavations of thick layered silt soil susceptible to erosion and gulley formation.
- Construction around water sources; river crossings, ground water sources, should be programmed during dry weather to minimize silt deposits and water quality deterioration.
- Provide adequate run off flow dispersal structures to avoid/minimize concentrated flows at certain points, and to decrease flow velocity.
- For protection of embankment banks and slopes against erosion, use slope-retaining and soil conservation techniques. Excavation and bank slopes shall be cut to the design angle of slope.
- Minimize area of ground clearance as far as possible, throughout the road stretch, and prohibit soil disturbance beyond the prescribed limits
- Excessively raised embankments and unstable slopes are protected by retaining structures like gabion, masonry retaining wall or wire basketry, as permanent structures on risky slopes.
- The contractor shall implement bio-engineering techniques to protect and stabilize unstable slop surfaces. Preference is given to local grass species and soil conservation measures like bench terracing, cutch dams, cut off drains and water ways provision and other energy dissipating structures.
- Protection of the embankment slopes by re-planting shall use native plant species like approved acacia species.

- Excess excavated soil shall be used to rehabilitate abandoned quarry and borrow material sites as far as possible

Clauses to protect employees and community health, safety and properties in ROW

- Safety of the workers at the work place and in camps should be ensured by the contractor, including the preparation of an OHS plan and OHS supervisor/expert on site at all times.
- Contractor to provide PPE for all workers
- Train all workers in the hazards of their jobs and in how to minimize the risk of accidents and injury. Conduct special training for specific hazards, including working at heights, working in and near excavations, operating or working near heavy equipment/machinery, working with hazardous materials, etc.
- Maintain records of hours worked, the number of hours lost due to accidents or injuries, serious accidents and fatalities, and health and safety training,
- Traffic signals should be posted at locations where construction is on-going, at intersection roads, settlement areas, schools, etc
- Provision of sanitary facilities like pit-latrine & waste handling disciplines at work places, camps and at garages should be observed.
- Crushers and garages should be located away from settlement sites and from sensitive ecosystems.
- Dust suppression measures like regular spraying of water, installation of accessories to machinery exhausts etc.
- Do not allow open trenches near areas of settlements and in urban premises.
- Do not dump spoil soil down hillsides, or on vegetation-covered land. Approved and designated dumping sites should be used as per arrangements made with local administration.
- Awareness creation programs on HIV/AIDs and other STD and malaria epidemics should be given

Clauses to minimize soil and water sources pollution

- The contractor is required to develop his own water source for the project employee and construction work water requirements.
- Contactor must ensure no one suffers from water shortage due to contractor’s water use
- Transportation of oil, fuel and chemical products should be made with care and in an approved containers to prevent potential risk of pollution
- Avoid spillages of hazardous material while transporting, storing, transferring and refilling of vehicles and machineries.
- Properly store and dispose used oil at designated places and away from sensitive sites, and follow safe transportation and disposal procedures.
- Regularly maintain leaking vehicle and machinery parts

- Avoid fuel refilling of vehicles and machineries at river crossings and close to water sources
- Used oils in garages and at work sites should be properly collected, stored and disposed.
- The contractor should provide toilet facilities and solid waste collection and storage facilities.
- Direct discharge and disposal of waste in to the natural environment soil and water bodies must be prohibited and monitored.
- Waste management at camps, garages and at workplaces should be strictly supervised.
- Surplus excavated material and spoils should be carted away to designated locations, properly spread to the landscape and covered with vegetation

Clauses to avoid or minimize disruption of services

- While working in urban centers and at settlement areas, the contractor should liaison and make arrangements with utility owners prior to commencing construction activities.
- The contractor will collect the site plan of each utility service line (electric line and telecommunication cables) to locate the existing facilities and identify those that require relocation in the new road route ROW & construction sites.
- Relocation and or protection of utility service lines should be made in consultation and arrangements made with the utility owners like; EEPCO, Water & sewerage Authorities, road and drainage Authorities and telecommunication Authorities. Make sure that appropriate compensation and replacement costs are made to the utility owner's prior to deployment for the construction work.
- The contractor will pay the relocation fee to the utility owners and have it relocated or relocate by own forces as the case may be prior to construction.
- Any unforeseen damages to the service lines will be immediately reported to the service provider and have it repaired as soon as possible.
- As much as possible, access road to the new dual carriageway & construction sites shall follow the existing rural community roads so as to avoid impact on infrastructure & reduce loss of productive agricultural land

Clauses for air pollution control

- Undertake maximum precaution not to induce firing by project employees, and prohibit firing as means of clearing vegetation.
- The contractor should make the necessary arrangements and effort to minimize the effect of air pollution due to his activities.
- Dust suppression measures will be taken while excavating in settlement sites and at high traffic loaded sections; by periodical spraying of water on paved and excavated grounds
- Install dust suppression accessories for crushers and asphalt smelting plants.
- Regularly maintain vehicles and equipment to minimize smoke from motor exhausts.

- Crushers and asphalt plants should be located away from settlement sites.
- As much as possible, construction trucks transporting earth materials shall utilize available community roads, otherwise should be well covered to prevent air pollution effect on major towns along the existing road.

11. CONCLUSIONS AND RECOMMENDATIONS

11.1 Conclusion

The existing Modjo-Hawassa road is providing service for mixed motorized and 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 requires an efficient road network and implementation of the proposed Arsi Negelle – Hawassa new dual carriageway project is essential in this regard.

- 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 dual carriageway road pavement and material sites development. This will result in loss of productive agriculture land, loss of settlement house, loss of scattered trees in the acacia woodland and remnant Montana forest. Other adverse impact by the project includes erosion and sedimentation, water pollution risk, public health, HIV/AIDS. With implementation of the proposed mitigation measures and proper compensation the adverse impact can be controlled to acceptable level.

11.2 Recommendations

- Implement the proposed environmental mitigation management and monitoring plan, and based on site specific condition update the plan.
- Include the necessary environmental clauses in the project tender and construction contract document so as to ensure the implementation of the proposed mitigation measures to minimize/avoid adverse impacts;
- Insure an independent environmental supervision through establishment of Environmental Management Unit (EMU) as part of the supervision consulting service. The EMU shall be staffed with qualified professionals (environmentalist and sociologist) to the effective implementation of proposed mitigation management and monitoring measures;
- Integrate the project road with all concerned regional and national government development plan, among others are municipality and weredas in the project road area as well as the ASLNP national development strategy and management plan by the EWCA etc;
- Implement RAP through detailed investigation of adverse impacts on the socio economic and human environment;
- Strengthen the capacity of ERA ESMT to inspect proper implementation of EMP during construction and to carry out routine inspections during the road service period;
- Support the new road route micro catchment treatment and management through promoting and implementing conservation measures.
- Lot 4 Arsi Negelle-Hawassa Road Project should be implemented in parallel with the other Lots of the Modjo– Hawassa Road Project for the overall improvement of road transport and efficiency of Modjo – Hawassa road and possibly integrate environmental management and monitoring activities.