FOLDER: 2

FEASIBILITY REPORT
FOR
AWASH-KOMBOLCHA-HARAGEBEYA STANDART GAUGE RAILWAY PROJECT

ETHIOPIAN RAILWAYS CORPORATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORTS

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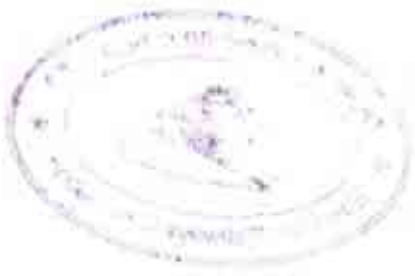

4. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORTS

The employer, Ethiopian Railways Corporation (ERC), has commissioned consulting firms to undertake SEIA (Social-Envinronmental Impact Assessment) Reports. To accomplish the objective of this task, field surveys were conducted to collect the appropriate data to prepare the SEIA Report. The main approach used to undertake the detail studies were to administer different types of questionnaires, carry out public consultations and collect relevant information. For the four seperate segments/lots of the project, the following consultants prepared the subject studies and prepared the reports:

- LOT 10 – Core Consulting Engineers PLC. (JULY 2011)
- LOT 11 – Engineering Consult Eng. Zewdie Eskinder & Co. PLC (APRIL 2012)
- LOT 12 – CWCE Civil Works Consulting Engineers (MARCH 2012)
- LOT 13 – Associated Engineering Consultants (MAY 2012)

The subject ESIA Reports are attached as the appendices of this report. In the following sections, brief summaries of the reports were made for quick reference and summary.

4.1 Scope and Purpose

The fundamental objective of the environmental impact assessment is to ensure that the proposed railway project is environmentally sound and contributes to the socio - economic development of the country. It is also expected to provide a means whereby the overall environmental performance of this project can be enhanced through:

- Identification of sensitive environmental components likely to be affected by the railway project.
- Identification and evaluation of the potential impacts associated with project implementation and subsequent operation, and

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- Preparation of plans and mitigation measures that will minimize adverse impacts and enhance beneficial impacts.

For further information, please refer to the ESIA Reports listed under the Appendices.

4.2 Physical Environment

Topography, climate, geology, water resources, land resources and soil erosion, air quality and ambient noise are physical environmental issues to be investigated and evaluated along the Project corridor. The alignment is 389 km long and is divided into four lots. A brief summary of the physical environmental along these four lots is given below:

LOT 10 (Awash - Armenia)

The railway project falls in the Great Rift Valley System of Ethiopia. The terrain characteristics are flat for major lengths and flat to rolling towards the destination of the project. The altitude ranges from 700 masl at the origin near Awash Arba to 1255 masl at the end of the rail line segment near Kure Beret village of Qewetworeda.

The Climate of the railway route corridor is mainly semi arid (Qola; Qola climatic zone has been classified as those areas receiving annual rainfall between 400mm and 700mm) type of ecological zone, and has relatively hot climate.

The proposed railway project line crosses mainly Alluvial, lacustrine & beach Sediments, ignimbrites, unwelded tuff, rhyolite flow, domes and trachite of the nazreth series, and transitional subalkaline basalts with minor rhyolite & trachite eruptives of Alagae formations.

Water is scarce in the project area in general. Awash River which is the major fresh water source is at far distance from the project alignment. Kessem River is the other major surface water source, but it is also diverted for irrigated farm development in the area. Perennial rivers traversed by the rail line are Qebena and Bulga Rivers from the Afar side, while Awadi River is found from the Amhara region side. There are several seasonal flood routes and seasonal streams crossed by the line.

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Land is communally used by the pastoralists on the Afar side, while land on the Amhara side is individual land holding system for crop cultivation. Due to its physiographic nature, Afar region is one of the regions in the country where relatively less soil erosion takes place.

The land resource of the project area is well protected by the vegetation cover, and no significant erosion problem is observed at the moment. This is mainly due to the flat terrain and also the area being protected as conservation site. The dense forest and grass cover of the area has assisted the soil loss.

LOT 11(Armenia - Kemise)

The Armenia – Kemise rail way project is situated in North Shewa and Oromia special zones of Amhara regional state. The project starts from Kewot woreda which is fall below 1500 m a.s.l and traverses Jile Tumuga which 80% of the woreda land mass is found below 1500 m a.s.l. The topography along the Armenia - Kemise railway project section can be described as predominantly rolling with some undulating and mountainous sections.

The climate in the project area lies predominantly within the hot lowlands. Hence, the annual temperature range of the railway Project route has similar trend throughout the seasons and varies between 20 °C and 27 °C. Most of the railway project areas have bimodal rainy season.

The geological structure through which the Armenia - Kemise rail way project passes belongs to the Mesozoic Sediments and the Precambrian Metamorphic.

Soil erosion has been observed to be severe along the rail way alignment, due to the nearly completely deforested landscape of the woredas that the rail way traverses.

The Armenia - Kemise rail way project is located in the North East upper catchment areas of Awash basins. The rivers crossing the rail way project, namely Jewa, Robit, and Borkena are drain to Awash River. Robit River and Borkena River around Shewa Robit and in Dewa Chefa are used for irrigation respectively. Borkenna river forms swampy wetland nearby Kemise, which is used for grazing and irrigation. Surface water sources are scarce along the rail way route. Though there are some streams and small river courses

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encountered along the route, most of them are seasonally flowing (only during the rainy period)

Competing water uses may encounter during the constriction period, with the local community and other development activities. The contractor is expected to investigate other sources to augment its requirements and to avoid interferences with the community's demand so as to keep their usual uses uninterrupted.

Wetlands have got several important functions to the local environment, to the community and to the wild life. There are two wetland areas on the rail way project route at around Karra Koree village and which is formed by Borkena River nearby Kemise. These wet lands are seasonally flooded during rainy period and gradually get drier/shrink during the dry season. They are the major grazing and irrigation grounds during the dry season.

The Armenia – Kemise rail way project corridor shows agricultural activities with about 31% crop cultivation, 15% grassland, 19% bush & shrub land. Main land use activities are based on rain fed subsistent peasant cultivation of grains, oil seeds, pulses. Livestock rearing cows, camels, goats and donkeys is relatively high, especially in the vicinity of the villages/towns.

Air quality record is none existent and is not common practice nationwide, Similarly data regarding ambient noise levels is also not available to indicate numerically the situation in the project area. However, in view of the low level of traffic load in the area and with the rural character of the railway project route corridor, it can reasonably be assumed that ambient noise levels in the project areas are below the widely accepted guideline level (Leq) of 65 dB, above which significant noise nuisance may be experienced.

LOT 12 (Kemise - Hayik)

The topography of the land in the project areas is rugged, and major parts of the land is bare and exposed to direct actions of erosive factors like rainfall and winds. Erosion effects are already observed at steep slopes and downside of the existing track roads due to discharges from culverts and drainage ditches. This impact is expected to be aggravated with the railway construction and improvement in runoff collection/runoff concentration along the rail line sides. Unless proper protection and mitigation measures are

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incorporated in the design and construction of the drainage discharges, the impact can be significant

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The steep sloped mountain sides have been severely damaged by runoff removing the top soil. At most locations, rock material including big boulders are being removed from the hills and mountains and deposited at down side water courses or plain grounds. For most of its length, the railway line follows mountain sides and at some locations there might be a need for tunnel crossings.

There are several rivers and streams that are crossed by the railway route and others that fall in the influence areas. Some seasonal marshlands in the flood plains of Borkena, Dirma and Mille Rivers are habitat and feeding grounds for variety of flora and fauna species including livestock grazing, crop production etc. The water sources are used for all purposes including domestic water supply, animal watering and irrigation. The upkeep of the water resources is, therefore, very crucial both to the health and economic wellbeing of the community.

LOT 13 (Hayik - Robit)

The chosen corridor is aligned inside a marginal graben which is favourable for a rail line since it is situated mainly in flat and rolling terrain. However, outside the graben, both to the east and west, it is mountainous terrain, which is relatively difficult and rugged topography.

The project alignment traverses predominantly rolling terrain, which approximately counts about 70% of the total project length. The remaining section of the project runs through flat and mountainous terrain, which comprises about 23% and 7% respectively.

Geologically, the route corridor is dominantly covered with sand, silty gravel covered without crops of boulders, alkaline basalt and silicics around river-banks. Weathered to decomposed rock observed intermittently and silty sand. The subgrade soil extension of the route corridor is dominantly silty clay with gravel in small-size.

Soil erosion is not a major problem in most parts of the flatter and gently sloping parts of the project area. However, erosion of fragile riverbanks and expansion of river courses is a major problem for most of the rivers and streams crossed by the project alignment. In addition, land-sliding problem is

observed at some spots along Mille River. Not only soil erosion and land-sliding, heavy siltation and accumulation of stones and boulders at the foot of some degraded hills and mountain ranges or along riverbanks is also a significant problem.

The climate of the project area is classified as Weyna Dega. The effective temperature of the whole stretch of the project route is mild temperature, which varies between 14°C and 20°C. The mean annual rainfall of Hayik and Robit areas is 1200mm and 1000mm respectively.

The corridor of the Hayik – Robit railway line is drained by four major perennial rivers and numerous streams and minor drainage channels. The major rivers are Mille, Gelana, Chireti, and Ala Wuha rivers, which are crossed by the railway line at station (chainages km 1+300, 15+200 & 21+800), 34+000, 59+400 and 74+800 respectively. The route corridor particularly the graben/flat plains at the foot-slopes of the mountain ranges is also rich in groundwater resources. During the field survey, it was observed that deep wells (boreholes) were under development in the Girana and Kobo valleys to exploit the groundwater resources for irrigation development and some of the boreholes are located within a few hundred meters from the proposed railway line. Almost all the rivers and streams are used for livestock water supply and some used for domestic water supply. I n addition, most of the perennial rivers and streams are utilized for irrigation development.

Ambient air quality in the project area is generally good. Most part of the project route corridor is rural in nature, absent of any industrial pollution sources, major traffic and transportation emissions. Similarly, ambient noise levels in most part of the project area are relatively low.

Nevertheless, the corridor crossed by the Woldiya – Mille Road has some air and noise pollution problem caused by dust and exhaust emissions as well as noise generated by vehicular traffic especially heavy trucks using this road.

The land use pattern in the project route corridor is very intensive, resulting in deforestation of natural vegetation and serious land degradation particularly in the hilly and mountainous areas. The entire proposed railway alignment traverses intensively farmed lands except a few relatively short stretches that run through areas covered by natural vegetation.

In addition, there are some patches of highly disturbed bush lands and shrub lands along km 0.00 – 1.20 and km 15.00 – 25.00. Moreover, there are

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numerous remnant trees and bushes within farmlands and around homesteads.

Annual crops particularly cereals are predominantly cultivated in the project area. The crops dominantly cultivated in the project corridor are sorghum and teff. Other significant crops include maize, wheat, barley, and pulses (field pea, faba bean and chickpea). Moreover, fruits (mainly bananas and papaya), sugarcane and vegetables (onion, tomatoes, red pepper etc.) are grown by irrigation at some spots along the project route or within its corridor. The intensity of land use reflects the land cover. The predominant land cover along about 90% of the project route is cultivated lands.

For further information, please refer to the ESIA Reports listed under the Appendices.

4.3 Natural Environment

Within the railway corridor the impact of the system on the habitat is an important topic to be investigated and evaluated. As the habitat in the four segmens have different characteristics, each lot is reviewed separetley. A brief summary of the ESIA studies is summarized below:

LOT 10 (Awash - Armenia)

The area is habitat for verity of flora and fauna resources, and is one of the forest conservation sites in Ethiopia. The project route corridor is dominantly covered by acacia forest and grassland. Both wildlife and livestock inhabit the forest and grassland areas of the route corridor.

The Awash Conservation area is located where the Ethiopian Rift Valley Joins with the Afar Triangle. The Awash National Park (ANP) which constitutes the major part of the conservation area is found at the project origin and is crossed by the rail line for substantial length.

LOT 11 (Armenia – Kemise)

There is no considerable forest on the Armenia – Kemise rail way project route. Scattered shrubs and bushes have been observed in the woredas of the project traverses. Most of the flora along the rail way project corridor has been destructed and transformed into cultivated farmland and grazing areas

for livestock. The hill sides and mountains ridges are seen bare without vegetation cover.

The wildlife population and native wildlife habitat have been significantly impacted by both natural and man-made causes and this has resulted in low wildlife diversity in the areas and along the rail way project influence areas. Different types of wildlife and birds are found in the woredas in which the railway project will traverse. According to the data collected from woredas of the project area reveales there are some wildlife common in the project woredas. This list include; like hyena, Monkey, Rabbit, Hedgehog, Chameleon, Spring bok, Wolf, Ape, warthog, and duiker.

LOT 12 (Kemise - Hayik)

The vegetation cover of the area is severely degraded by intensive crop cultivation, animal grazing and use as fire wood. No significant natural forest is found in the area; though, plantation forest is seen along the route corridor. Impacts on vegetation cover that may be caused for the road will be due to:

- the widths of the railway,
- quarry and borrow pit development for material extraction,
- camp site and garage construction,
- access to material production sites and
- detour roads.

Major impacts to the vegetation cover would be caused during the construction phase of the project. There is no major wild life habitat like parks and sanctuaries that fall in the right-of-way of the road project. However, smaller wildlife species common to the sparse vegetation covered areas are found in all of the Woredas.

LOT 13 (Hayik - Robit)

The primary natural vegetation of the project area has been severely modified by human activities. Presumably, the main causes of the degradation of natural vegetation are extensive land clearing/deforestation for agricultural activities and human settlements and overexploitation for construction materials and fuel wood purposes. Consequently, now only some patches of highly degraded natural vegetation and solitary trees have remained in the area. Of the existing natural vegetation areas, the protected forest, which is designated as Faji Protected State Forest (FPF) is an important vegetation area. The proposed railway directly crosses through the forestland

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at station 29+400 – 31+350 for about 2 km stretch. The FPF is not as such a high forest, but it comprises mainly woodland and bush land vegetation. The trees in the forestland are dominated by Acacia species.

The other relatively important vegetation cover is found in the corridor of km 15 to km 25 and km 54 to km 58. Most of these areas are characterized by steep and rugged topography/hilly and mountainous terrain that are considered as marginal lands not suitable for agricultural activities or human settlements. Therefore, some parts of these areas are designated as protected areas to allow for environmental rehabilitation in general and for regeneration of natural vegetation in particular. They contain shrub land, bush land and woodland vegetation, which is open to relatively dense in cover. In addition, the steep slopping hilly and mountainous areas on both or either side of the alignment are mostly covered by bushy and shrubbery vegetation. Most of these vegetation areas are highly disturbed and degraded while some areas are well-protected and have relatively good vegetation cover.

As the project area is intensively used for agricultural activities, livestock grazing and human settlements, it has little undisturbed habitats that could support diverse wildlife. As a result, the project corridor contains only some wildlife species most of which are with low population size. Most of the mammalian fauna found in the area are those adapted to disturbed or degraded habitats. Most of the fauna are confined to the patches of 'protected habitats' found in some parts of the project corridor.

For further information, please refer to the ESIA Reports listed under the Appendices.

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4.4 Socio-Economic Environment

LOT 10 (Awash - Armenia)

Most part of the project is located in Afar regional state, Zone 3 crossing two weredas called Awashfentale and Dulecha weredas. The major part of the project traverses in the north shewa zone of amhara regional state. There are total of three (3) Woredas affected by the project namely, Awashfentale & Dulecha in Afar and Kewet in Amhara.

The density is characterized by sparsely populated settlement. The settlement becomes relatively dense at the destination of the route. The major part of the Project area is rural and undeveloped.

The settlement pattern in the Afar region is mainly organized on a clan basis. In the case of the Amhara regional population, almost all part of the project area thattraverses in one woreda which is rural where the main stay(95%) of the settlers is mixed agriculture. There is no major permanent settlement site falling within the Right of Way of the rail line. The rail line corridor is dominated by pastoralist and agro pastoralist community.

The livelihood of the population in the project area can be divided into two as it lies in two geographically different regional states. The livelihood of the Afar regional population is dependent on pastoral nomadism, people are forced to move from place to place in search of grazing land and water for their livestock. Because of the continuous movement of the population, there are not many villages or settlements that last for long periods except for the urban settlement mostly occupied by non-Afar people. The settlement pattern in the Afar region is mainly organized on a clan basis. In the case of the Amhara regional population, almost all part of the project area that traverses in one woreda which is rural where the main stay (95%) of the settlers is mixed agriculture.

In Awash Fentalle woreda, there are some large plantations; which ones used to be State plantations to grow Sugarcane and other crops like maize. Major modern development activity within the project influence area is the Sabure Sugar Cane irrigated farm. This farm is found at about 40km along the rail way line and would be one of the beneficiaries of the project.

As the term food security refers, it is to mean that either producing sufficient food or make access to the society to obtain food crops. The project area is

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one of food insecure area. Therefore, it is expected that the current railway project will contribute to reduction of food insecurity problem by increasing the woredas' infrastructure and facilitating the development of other services in the area.

LOT 11 (Armenia – Kemise)

Agriculture sector is the main livelihood base of population of the project area. However, it is characterized by lack of access to modern technology, market, low productivity, dependency on rainfall and lack of advanced irrigation practice, etc. As a result the sector has remained subsistence in its nature.

According to the data extracted from the socio- economic profile of the woredas in which the railway project traverses the major types of crops that are produced include sorghum, maize, teff, and wheat from cereals and horse beans from pulses and Niger seed from Oilseeds. Sorghum occupies the largest cultivated land area and production that accounts for 42.5 % and 48.5 % of the project area land under crops respectively and used as the most staple crops of the area. Sorghum is the leading crop followed by Teff. Rain fed agriculture is the dominant crop production system of the project area during Meher season under private peasant holdings.

LOT 12 (Kemise - Hayik)

The population within the vicinity of the proposed railway line and peoples of the Woredas which the railway line traverses through will be the project direct beneficiaries. These people would have access and opportunities to share both possible benefits and adverse impacts of the project that would be caused during construction and operation.

For further information, please refer to the ESIA Reports listed under the Appendices.

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4.5 Determination of General Possible Environmental and Social Impacts

The main potential environmental impacts of the construction and operation of the envisaged railway project are identified and described briefly below:

Transportation is a major use of energy, and burns most of the world's petroleum. This creates air pollution through emission of pollutant gases and particulates, and is a significant contributor to global warming through emission of carbon dioxide. Studies indicate that, by subsector, road transport is the largest contributor to global warming. Since energy use and emissions vary largely between modes, there is a strong recommendation for a transition from air and road transport to rail and human-powered transport, and increase transport electrification and energy efficiency.

In this aspect rail is the most energy efficient land transportation mode and studies indicate that it is about three times more energy efficient than road transport. With the growth in oil demand, which is mainly attributed to the growth in transportation demand, and the growing energy prices, use of rail transportation that depends on electrical power is more efficient and environmentally friendly. Use of rail transport that depends on electricity means minimal release of pollutant gases. Therefore, implementation of the proposed railway project will contribute in reducing air pollution by using rail transport instead of road transport particularly in supporting the increasing mobility demands for passengers and freight.

However, some possible positive socioeconomic impacts of the project are indicated below based on the expectations of the consulted stakeholders and the Environmental Expert's views. The main positive socio-economic impacts of rail transportation emanate from supporting the increasing mobility demands for passengers and freight at more efficient and economical way. The main potential socio-economic effects of the railway project include the following:

- Rail transport system is faster, cheaper and more efficient compared to road transport; therefore, it is more economical. is the most energy efficient land transportation mode as it is about three times more energy efficient than trucking. With the growing energy prices, use of rail transportation esp. with electric power as source of energy, would be more efficient and economical.
- The project will create job opportunities and income generation for the unemployed local people during the construction phase. In addition, it

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will create some employment opportunities during the operation phase particularly at the train stations.

- Operation of rail transport will create easy outlet for agricultural products to market centres at lower transportation costs. The route corridor is agriculturally highly productive and surplus producing area, dominantly cereal crops, but also vegetables and fruits.
- Rail transport may boost trade activities since commercial goods are easily and cheaply transported or imported to the area.

For further information, please refer to the ESIA Reports listed under the Appendices.

4.6 Environmental Approval Certificate

APPENDIX NO. 4 : LOT 10 – ESIA Report
(JULY 2011)

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ACCRONYMS

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ACCRONYMS

ADLI	Agricultural Development-Led Industrialization
BOFED	Bureau of Finance and Economic Development
CSA	Central Statistical Authority
CSE	Conservation Strategy of Ethiopia
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management and Monitoring program
EPA	Environmental Protection Authority
EPE	Environmental Policy of Ethiopia
ERA	Ethiopian Roads Authority
ERC	**Ethiopian Railway Corporation**
ERTTP	**Ethiopian Rural Travel and Transport Programme**
ESDP	Education Sector Development Program
ETP	Education and Training Policy
FDRE	Federal Democratic Republic of Ethiopia
FGD	Focus Group Discussion
FHH	Female Headed Households
ha	hectare
HAPCO	HIV/AIDS Prevention and Control Office
HH	House Hold
HIV/AIDS	Human Immuno Virus/Acquired Immuno Deficiency Syndrome
HSDP	Health Sector Development Program
IMT	Intermediate means of Transport
IEC	Information, Education and Communication
kms	Kilometers
masl	Meters Above Sea level
MDGs	Millinium Development Goals
MEDAC	Ministry of Economic Development and Cooperation
MOA	Ministry of Agriculture
MOE	Ministry Of Education
MoFED	Ministry of Finance and Economic Development
MOH	Ministry Of Health
NAP-GE	National Plan of Action for Gender Equality
NGO	Non Governmental Organization
NMT	Non Motorized Transport
NPA	National Plan of Action
oC	Degree Centigrade
OD	Operational Directive
PAP	Project Affected People
PASDEP	Plan for Accelerated Sustainable development to End Poverty
RAP	Re-settlement Action Plan

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PRSP	Poverty Reduction Strategy Program
ROW	Right – of – Way
RSDP	Road Sector Development Programme
RDCO	Regional Agriculture and Rural Development Coordination Office
SIA	Social Impact Assessment
SMP	Social Management Plan
SDPRP	Sustainable Development and Poverty Reduction Program
STD	Sexually Transmitted Disease
STI	sexually transmitted infections
TB	Tuberculosis
TOR	Terms of Reference
VEC	Valued Environmental Components
WB	World Bank

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1 INTRODUCTION

1.1 BACK GROUND AND OBJECTIVES OF THE EIA STUDY

Environmental impact assessment (EIA) is a planning tool used in project appraisal and design, in view of ensuring sustainability. Accordingly the fundamental objective of the environmental assessment for the current project is to ensure that the proposed Railway project is environmentally sound and contributes to the development of environmental assets.

The Terms of Reference (TOR) prepared by the client, Ethiopian Railway Corporation (ERC) calls for the assessment of impacts of the Railway Project on physical and cultural resources (PCRs) of the project area; and to examine the potential sources of environmental impacts. It also requires the consultant to forward mitigation measures for adverse impacts; to undertake public consultation and to prepare Environmental Management and Monitoring Plan.

To assess the potential impacts of the project on the environmental resources, it is necessary to identify and analyze the potential impact areas of the project. Accordingly, the EIA-study dealt with the identification, prediction and evaluation of the impacts of the proposed railway project. Following the identification and evaluation of impacts, it also identifies and proposes measures aimed at avoiding or minimizing adverse impacts on the one hand, and enhancement measures of the beneficial ones on the other hand.

The EIA process followed the guidelines prepared by Environmental Protection Authority (EPA) of Ethiopia and that of the regional level EPAs, and Environmental Procedure manual of the Ethiopian Roads Authority (ERA).

The consultant has also made use of specific methods and tools to accomplish the Environmental Impact Assessment including desktop document review, field visits and stakeholders' consultation.

The EIA study process covers: environmental scoping; description of the proposed railway project works, assessment of baseline environmental conditions; analysis of potential environmental impacts; analyses of alternatives; development of mitigation and compensation measures; preparing an environmental management and monitoring plans.

Accordingly brief description of the methodology and procedure followed for the EIA study is presented as here under.

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1.2 Methodology of the EIA study

The EIA study was carried out at two levels as Scoping and detail EIA study. The scoping stage has produced preliminary findings as to the area of influence, valued environmental components and activities to be undertaken. The detail stage work has made assessments of the likely impacts and proposed mitigation management plans.

The EIA study began by environmental scoping process in which the limits and project influence areas are defined; activities to be undertaken are listed, and valued environmental components are identified and impacts to be studied during the assessment are preliminarily defined.

The scoping process involved consultation with stakeholders; including regional government institutions, NGOs, community representatives and the would be Project Affected People (PAPs). Meetings and discussions were held at different levels of the local administration; zonal and woreda levels.

Direct observations on site during fieldwork helped the consultant team to identify sensitive environmental components in the route corridor and influence areas, and preliminary observations of potential negative and positive impacts of the proposed projects were made.

Questionnaires and site inventory forms had been developed and used to gather baseline environmental information as well as information regarding impacts. Possible changes to earlier proposed alignments for the route was discussed and evaluated together with the relevant Interested or Affected Persons (IAPs) as well as with the engineering design team of the consultant.

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1.3 Report Structure

The EIA report is structured under 8 chapters as follows;

Chapter 1	Gives background and introduction of the Railway project.
Chapter 2	Briefly discusses the environmental scoping process
Chapter 3	Presents the policy, legal and institutional framework within which the EIA study shall operate and also for the project implementation;
Chapter 4	Provides a summary of the project description, indicating location of the project and project ROW conditions.
Chapter 5	Describes existing environmental conditions of the project area
Chapter 6	Outlines the Potential Environmental and Social Impacts of the railway project and proposed mitigation measures for the adverse impacts.
Chapter 7	presents Environmental Management & monitoring Plan and Schedule mitigation management plan
Chapter 8	Present brief conclusion and Recommendation of the EIA study

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2 ENVIRONMENTAL SCOPING

2.1 Consultation with Stake holders

The Constitution of the FDRE also reaffirms the participation of the public in policies and projects that affect their livelihood.

Article 43 No.2 of the constitution states that:

"Nationals have the right to participate in national development and, in particular, to be consulted with respect to policies and projects affecting their community".

Public and Stakeholders' consultation aims to increase the participation of all the stakeholders, including people residing in the project area, local government officials, Kebele administrations and Woreda experts; and professionals from every sector in almost all locations where the road traverses. Stakeholders' consultation was held with the objective of influencing the identified stakeholders to participate at each key stage of the project road construction works, and that the concerns of stakeholders are reflected in the road design and construction works. Accordingly;

- Pre-designed questionnaires were distributed to relevant government and non- government Organizations (NGOs) in the project area. Formats used include; Site reconnaissance survey form to record existing environmental conditions of the road corridor, questionnaire format for collection of base line data on the physical as well as socio-economic profile of the woredas traversed by the railway alignment.

Local administrations and relevant institutions were contacted and involved in data collection, for coordination of Focus Group Discussions and during discussion sessions. Discussions and briefings on the project objective, the possible impacts that can result during the project implementation, cooperation needed from the woreda administrations and from the community were raised and discussed at different stages; with council members of each woreda administration in the three woredas.

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2.2 Study Area Descriptions

The study area comprise the railway route corridors and all surrounding areas that will be under significant influence, i.e where the environmental impacts of the railway can be felt. Influence area or Zone of Influence (ZOI) refers to the area in which the project will cause an impact either in the form of a direct impact or an indirect impact. It encompasses the proposed railway lines as well as offsite and/or ancillary works such as borrow pits, quarries, construction water sources, access roads and detours etc.

The precise boundaries of the study area have been determined during the initial scoping exercise of the EIA study. Valued Environmental Components (VECs)

Categories of environmentally sensitive areas outlined by Ethiopian environmental regulations include:

- Land prone to erosion
- Land prone to desertification
- Areas which harbor protected, threatened, or endangered species
- Areas of particular scientific interest (e.g, fossil deposit)
- Areas of Outstanding natural beauty such as national parks
- Areas of Particular historic or archaeological interest
- Primary forest
- Wetlands of national or international importance
- Urban settlements

Normally, any area having the above listed characteristics can be considered environmentally sensitive. However, Environmentally Critical Areas (ECAs) in the influence area of the project roads should be ranked based on their relative sensitivity to disturbance or their value to the economic-environmental health of Ethiopia.

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3 POLICY, LEGISLATIVE AND INSTITUTIONAL FRAME WORKS

3.1 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.

Environmental management objectives in many countries, especially the developing countries, is achieved not only through environmental legislation, i.e. laws, regulations and rules which are enforceable in a court of law, but also through administrative provisions such as administrative orders, technical standards etc. which are applied through various administrative mechanisms

The discussion in here concerns the National Development and Environmental Policies and Sectoral Strategies, legislations and guidelines, Institutional arrangements, land accusation, tenure rights and expropriation procedures are also indicated in the discussion.

Understanding of available policies and administrative structures, under which the project implementation and the environmental assessment and management study operates, would assist in the efforts made for sustainable development and natural resource conservation measures.

3.2 Policy Issues

The economic policy of the Federal Democratic Republic of Ethiopia (EFDRE) is a market – based, agricultural led industrialization mode of economic development. The administrative structure is at federal as well as regional level with duties and responsibilities shared among them.

Responsibilities of development activities are clearly demarcated between Federal and Regional Governments based on the scale, characteristics and magnitude of

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the investment to be undertaken. Accordingly, construction of highways and major roads crossing more than one regional government boundaries is the responsibility of the Ethiopian Road Authority (ERA), while the construction of roads, rural and urban roads, within a region is the duty of the respective regional governments.

3.2.1 Plan for Accelerated and Sustained Development to End Poverty

Plan for Accelerated and Sustained Development to End Poverty (PASDEP) has been guiding strategic framework for the last five year period from 2005 - 2010. Currently it is under revision to serve for the coming fiscal years. The PASDEP represents the second phase of the Poverty Reduction Strategy Program (PRSP) process which begun under the Sustainable Development and Poverty Reduction Program (SDPRP).

PASDEP forms the overall framework for development planning within Ethiopia. However, individual sectoral policies and annual programs are developed by each sector.

The main strategic elements of PASDEP are;

a) A massive push to accelerate growth,
b) A geographically differentiated strategy,
c) Addressing the population challenge,
d) Unleashing the potential of Ethiopia's women,
e) Strengthening the infrastructure backbone,
f) Managing risk and volatility,
g) Scaling up to reach the MDGs,
h) Creating jobs.

PASDEP builds on aims set out in the SDPRP relating to human development, rural development, food security and capacity-building. However, increased emphasis is given to commercialization of agriculture and the role of the private sector.

Environment and Development

There are 17 - Sectoral Policies, Strategies, and Programs that PASDEP considers in the document. Among those sectors is Environment and Development that has been discussed in depth.

PASDEP underpins the linkages between Environment and Poverty and discusses that achieving MDGs of poverty reduction, calls for an accelerated and equitable economic development in the country. The plan highlights that; environmental

resources are the foundation of social and economic development as they are the sources of goods and services needed for poverty reduction and economic growth; and that their mismanagement coupled with their underutilization has so far reduced their contribution to Ethiopia's overall development. It, therefore, calls for the need of Environmentally Sound Development plans and describes its vision as follows.

The "Environmentally Sound development Vision of Ethiopia is to create a self-reliant Ethiopian population with a high quality of life in a productive environment, which assures equity between genders and among generations".

It is also re-iterated that Environmentally Sound Development Vision of Ethiopia can be achieved by ensuring social, economic and environmental sustainability in development. Overall, this is to be guided by the Environmental Policy of Ethiopia; that was issued in 1997.

The plan then sets Strategic Goals towards the Realization of the Environmentally Sound Development Vision of Ethiopia. Accordingly the following are listed among others;

- **GOAL A:** Ensure community-led environmental protection and the sustainable use of environmental resources for gender equity and improved livelihood;
- **GOAL B**: Rehabilitate affected ecosystems;
- **GOAL C**: Enhance capacity of ecosystems to deliver goods and services, particularly Biomass for food, feed and household energy;
- **GOAL D:** Remove the adverse impacts of municipal waste;
- **GOAL E**: Prevent environmental pollution; and,
- **GOAL F**: Ensure proactively the integration of environmental and ethical dictates especially mainstreaming gender equity in development

In PASDEP, the financing of health, education, infrastructure and other services, is also seen as essential to enable the MDGs to be realized. PASDEP states that "Ensuring sustained growth and tackling growth variability therefore needs to be a central element in the growth strategy of Ethiopia." The sectors that are seen as important for stimulating growth include: agriculture, the private sector, niche markets, exports, and market links, tapping into the unused potential of women and facilitating slower population growth. The commercialization of agriculture and non-farm private sector growth is seen highly crucial to boost the development effort.

According to the PASDEP, the country is divided into different zones and intends tailored approaches and responses for each. In summary these zones are:

Areas that have significant potential for commercialization and diversification of agriculture;

- Regions with adequate rainfall;
- Drought-prone areas;
- Pastoral areas.

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Under PASDEP, there will be a major expansion of the road network, and targets to construct almost 20,000 km of new roads by 2010, (90% of them in rural areas) and improved maintenance so that 84 % of the network is in good condition.

3.2.2 Conservation Strategy of Ethiopia

Countrywide study of the existing natural resource base and environmental conservation and protection strategies have been conducted in the early 1990's and conservation strategy of Ethiopia (CSE) has been approved.

The CSE emphasizes the importance of incorporating environmental issues in to development activities right at the initial stage of development.

3.2.3 Environmental Policy of Ethiopia (EPE)

The overall policy goals of the Environmental Policy of Ethiopia is described as "...to improve and enhance the health and quality of life of all Ethiopians and to promote sustainable social and economic development through the sound management and use of natural, human made and cultural resources and the environment as a whole so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs".

The guiding principles of the EPE are:

- Every person has the right to live in a healthy environment;
- Sustainable environmental conditions and economic production systems are impossible in the absence of peace and personal security. This shall be assured through the acquisition of power by communities to make their own decisions on matters that affect their life and environment;
- The development, use and management of renewable resources shall be based on sustainability;
- The use of non-renewable resources shall be minimized and where possible their availability extended (e.g. through recycling);
- Appropriate and affordable technologies which use renewable and non-renewable resources efficiently shall be adopted, adapted, developed and disseminated;

- When a compromise between short-term economic growth and long-term environmental protection is necessary, then development activities shall minimize degrading and polluting impacts on ecological and life support systems. When working out a compromise, it is better to err on the side of caution to the extent possible, as rehabilitating a degraded environment is very expensive, and bringing back a species that has gone extinct is impossible;
- Full environmental and social costs (or benefits foregone or lost) that may result through damage to resources or the environment as a result of degradation or pollution shall be incorporated into public and private sector planning and accounting, and decisions shall be based on minimizing and covering these costs;
- Market failures with regard to the pricing of natural, human-made and cultural resources, and failures in regulatory measures shall be corrected through the assessment and establishment of user fees, taxes, tax reductions or incentives;
- Conditions shall be created that will support community and individual resources to sustainably manage their own environment and resources;
- As key actors in natural resource use and management, women shall be treated equally with men and empowered to be totally involved in policy, programme and project design, decision-making and implementation;
- The existence of a system which ensures uninterrupted continuing access to the same piece(s) of land and resource creates conducive conditions for sustainable natural resource management;
- Social equity shall be assured particularly in resource use;
- Regular and accurate assessment and monitoring of environmental conditions shall be undertaken and the information widely disseminated within the population;
- Increased awareness and understanding of environmental and resource issues shall be promoted, by government officials and by the population, and

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the adoption of a "conservation culture" in environmental matters among all levels of society shall be encouraged;

- Local, regional and international environmental interdependence shall be recognized;
- Natural resource and environmental management activities shall be integrated laterally across all sectors and vertically among all levels of organization;
- The wealth of crop and domestic animal as well as micro-organism and wild plant and animal germplasm is an invaluable and inalienable asset that shall be cared for;
- Species and their variants have the right to continue existing, and are, or may be, useful now and/or for generations to come; and
- The integrated implementation of cross-sectoral and sectoral, federal, regional and local policies shall be seen as a prerequisite to achieving the objectives of this Policy on the Environment.
- The Policy further outlines both sectoral and cross-sectoral environmental policies. Sectoral environmental policies include:
- It further points out that; Preliminary and full EIA are undertaken by the relevant sectoral ministries or department if in the public sector and by the developer if in the private sector.
- Need for public consultation
- Environmental impact assessments consider not only physical and bio-logical impacts but also address social, socio-economic, political and cultural conditions;
- Need for environmental audit at specified intervals during the project implementation.

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3.2.4 Wildlife policy

It is developed by the Ministry of Agriculture 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 document covers a wide range of policies and strategies relating, amongst others, to wildlife conservation and protected areas.

Wildlife Management Policy of Ethiopia, PMGSE 197

The policy states that," The government is committed to conservation, and that the development and utilization of wildlife as a renewable natural resource should be under taken within the frame work of social and economic planning processes".

Based on international criteria, the protected areas of Ethiopia have been divided into 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 11 National Parks, 11 Game Reserves and 3 Sanctuaries. In addition 18 areas have been designated as controlled hunting areas.

3.2.5 Water Resource Policy

The 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 to establish and institutionalize environment conservation and protection requirements as integral parts of water resources planning and project development.

3.2.6 Biodiversity Policy

The biodiversity policy, which was approved in 1998, provides guidance towards the effective conservation, rational development and sustainable utilization of the

country's biodiversity. In general, the policy consists of comprehensive policy provisions on the conservation and sustainable utilization of biodiversity.

3.2.7 Awash National Park Management Plan

The management plan was developed with the objectives of identifying problems facing the Awash nature conservation areas and the wildlife habitat; and to establish workable plan and guidelines to be followed for the management of the national park.

The guidelines and plans set propose realistic methods to address both ecological issues and issues of land use by the local pastoralists and others developers.

3.2.8 Amhara Regional Conservation Strategies and Policies

Following the approval of the 1994 conservation strategy of Ethiopia, the Amhara Regional Government has prepared & endorsed 'The Amhara Regional Conservation Strategy' in July 1999.

The regional conservation strategy has formulated thirteen regional sectoral strategies and twelve cross-sectoral strategies. Environmental Impact Assessment of the application of policies, programs and projects are discussed in the document as cross-sectoral strategy.

3.2.9 Amhara Regional Environmental Impacts Assessment Guideline, 2009.

The regional Environmental Protection, Land administration & Use Authority (EPLAUA) has developed general EIA guideline based on the federal EIA guideline in February 2009, as an overall framework to integrate environmental concerns in its Regional Development Strategies.

The document outlines the guiding principles underlying the objectives of EIA studies.

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3.2.10 Cross Sectoral policies

3.2.10.1 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".

The general objectives of the population policy are:

- Closing the gap between high population growth and low economic productivity through planned reduction of population growth and increasing economic returns,
- Expediting economic and social development processes through holistic integrated development programmes designed to expedite the structural differentiation of the economy and employment,
- Reducing the rate of rural to urban migration,
- Maintaining/improving the carrying capacity of the environment by taking appropriate environmental protection/conservation measures,
- Raising the economic and social status of women by freeing them from the restrictions and drudgeries of traditional life and making it possible for them to participate productively in the larger community,
- Significantly improving the social and economic status of vulnerable groups (women, youth, children and the elderly).
- The economic, social and political status of women is seen to have a direct bearing on the level of fertility in society. Early marriage for girls is seen as one of the factors that contribute not only to high fertility rates but also to high maternal, infant and child morbidity and mortality.
- Implementation of the Policy is seen as dependent on the functions of other ministries and departments as on the Population Department and the responsibilities of key ministries are given in this policy document.

3.2.10.2 National Policy on Women

The constitution FDRE recognizes equal rights of 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 work load 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 contrary, women among the pastoral communities could only own property if they could only have a male guardian.

The National Policy on Women was formulated in 1993, aimed to create appropriate structures within government offices and institutions to establish equitable and gender-sensitive public policies. The policy goals are: ensure women's right, create favorable environment for women, ensure the supply of basic services to women, and eliminate gender based discriminations.

The policy has four major objectives;

- Laws, regulations, systems, policies and development plans that are issued by the Government should ensure the equality of men and women. special emphasis should be given to the participation of rural women.
- Economic, social and political policies and programmes, as well as cultural and traditional practices and activities should ensure equal access of men and women to the country's resources and the decision making process.

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- The central government and regional administrations should ensure that women participate in and benefit fully from all activities carried out by central and regional institutions.
- Development institutions, programs and projects should ensure women's access to and involvement in all interventions and activities.

In 2005, Women's Affairs Ministry was established to coordinate women's activities and translate the policy objectives.

In 2006, the Ministry of Women's Affairs issued the National Plan of Action for Gender Equality (NAP-GE) for the period 2006 – 2010. Its goal is "to contribute to the attainment of equality between men and women, in social, political and economic development".

The general objectives are:

- Enhanced rapid economic growth
- Improved human development
- Democratization and good governance
- Improved public institutional performance

3.2.10.3 Railway and Road Sector Policies and Guidelines

Road and Rail way sector Environmental Assessment Guideline, Federal EPA, 2004: The guideline describes major environmental issues related to a road or railway Projects. The guideline highlights major issues and potential impacts that should be taken into account during the preparation and assessment phases. It emphasizes that appropriate enhancement and mitigation measures should be integrated as early as possible, preferably in the project design.

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3.2.10.4 Health Policy of Ethiopia

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 manmade 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, the development of environmental health, rehabilitation of health infrastructures, appropriate health service management system, attention to traditional medicines, carrying out applied health research, provision of essential medicines, and expansion of frontline and middle level health professionals.

The Government in its PASDEP document has reaffirmed its commitment to accelerate progress on maternal and child health and to reduce child and maternal mortality rates by expanding the provision of essential health and nutrition services to the poor. It is planned, that by 2010, infant mortality rate will be 45 per 1000, maternal mortality rate 600 per 100,000 and primary health coverage within 10 km radius will reach 100%.

To translate the health policy into action, the Ministry of Health has developed a five year Health Sector Development Program (HSDP). Currently it is implementing HSDP III for the period from 2005/06 – 2009/10. HSDP lays an emphasis on service delivery and the quality of service, health facility rehabilitation and expansion, human resource development, pharmaceutical services; Information, Education and Communication (IEC), strengthening health sector management and management information system, monitoring, evaluation and research.

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3.2.10.5 National Policy on HIV/AIDS

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

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 affected. HIV/AIDS has now become a major social and economic problem of a country. Having understood the magnitude of the problem, the Government issued 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 introduces and outlines the large social, psychological, demographic and economic impact that HIV/AIDS will be having and introduces a number of issues relating to HIV/AIDS.

These are:

- That HIV/AIDS is not only a health problem but also a developmental problem,
- That gender inequality contributes to the further spread of HIV/AIDS,
- That women, including women 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,
- That the magnitude of the problem will need considerable resources and a multi-sectoral effort to control the HIV/AIDS epidemic,
- That there is a need for a holistic approach in the provision of care to people living with HIV/AIDS,

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- That the human rights of people living with HIV/AIDS needs to be recognized,
- That HIV/AIDS has the potential for catastrophic impact.
- In 2000 National AIDS Council was established under the Chairmanship of the FDRE President; and in 2002 HIV/AIDS Prevention and Control Office (HAPCO) was established to address the problem.

3.2.10.6 Sector Policy for HIV/AIDs Prevention & Control in the Work Places of ERA

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, and may have detrimental effects on the goals and objectives of the Authority. The policy is prepared with the objective of developing and implementing an effective workplace program.

Therefore, the authority:

- Commits itself to create a supportive and non discriminatory working environment through dispelling of myths and stereotypes and by ensuring that infected employees are treated in the same manner as other employees,
- Seeks to minimize the social, economic and developmental consequences to the authority and its staff,
- Undertakes that management will provide resources and leadership to implement program for the prevention and control of the HIV/AIDS and sexually transmitted infections (STI),
- Commits itself to offering support, counseling and education services to infected & affected employees;

- Commits itself to establish and maintain an employee assistance program, and
- Insures sustainable resources for the prevention and control of HIV/AIDS.
- The ERA task force is responsible and accountable for all programs for prevention and control of HIV/ AIDS in the authority.
- The ERA's environmental monitoring and safety branch through the HIV/AIDS program coordinators is responsible for coordinating, implementing, monitoring and evaluating the policy provisions.

3.2.10.7 Education Policy of Ethiopia

The Government's desire to improve the provision of quality education resulted in the formulation of the Education and Training Policy (ETP). In 1997 the Government of Ethiopia launched the first five year Education Sector Development Program (ESDP-I) within the framework of ETP as part of a twenty-year plan for the education sector. The main thrust of ESDP is to improve quality and efficiency and to expand access with special emphasis on primary education in rural and underserved areas, as well as the promotion of education for girls in an attempt to achieve universal primary education by 2015.

3.2.11 World Bank policies

The World Bank provides guidance on requirements in the Environmental Assessment Sourcebook, which includes recent versions of the World Bank Operational Policies as well as the updates. The World Bank has ten "Safeguard Policies" whose primary objective is to ensure that Bank operations do not cause adverse impacts and that they "do no harm". The ten safeguard policies are grouped into Environment, Rural Development, Social Development and International Law.

Of these ten safeguard policies, three (OP 4.01 Environmental Assessment, OP 4.04 Natural Habitats, OP 4.12 Involuntary Resettlement, OP/BP 4.36 Forests and OP 4.11 Physical Cultural Resources) are applicable to the subject project.

The remaining six (OP 4.09 Pest Management, OP/BP 4.37 Safety of Dams, OP 7.50 Projects on International Waterways, OP 4.10 Indigenous Peoples, and OP 7.60 Projects in Disputed Areas, are not triggered by the project activities.

3.3 Legal Framework

3.3.1 Environment related proclamations

There are several proclamations provided by the FDRE related to Environmental protection issues. Among these are:

THE FEDERAL CONSTITUTION

The Federal Constitution of 1995 sets out important articles related to Development and Environmental rights; Article 43 discusses the right to development.

The Constitution under Article 44 highlights about environmental rights as follows:

- All persons have the right to a clean environment.
- All persons who have been displaced or whose livelihoods have been adversely affected as a result of state programs have the right to commensurate monetary or alternative means of compensation, including relocation with adequate state assistance.
- Under Article 92 the constitution discusses about environmental objectives as:
- Government shall endeavor to ensure that all Ethiopians live in a clean and healthy environment.
- The design and implementation of Programs and Projects of development shall not damage or destroy the environment.
- People have the right to full consultation and to the expression of views in the planning and implementation of environmental Policies and Projects that affect them directly.
- Governments and citizens have the duty to protect the environment.

Proclamation No.4/1995 which defines powers and duties of the executive organs of the Federal Democratic Republic of Ethiopia.

Proclamation No. 9/1995 establishes the Federal Environmental Protection Authority (EPA). EPA prepares environmental protection proclamations and does the federal government approve it.

- Environmental Protection Organs Establishment proclamation No. 295/ 2002 was provided in October 2002. The proclamation differentiated responsibilities among environmental agencies at Federal and Regional states. By this proclamation the EPA is Re-established as an autonomous public institution at the Federal Government. EPA has among others powers and duties to coordinate measures to ensure that the environmental objectives provided under the constitution and the basic principles set out in the Environmental policy of Ethiopia and the conservation strategy of Ethiopia are realized.

- Article-15 of the proclamation states the power & duties of the Regional Environment Agencies. Powers and duties are also proposed in relation to Zonal, Woreda and community Environmental Coordinating Committees.

Proclamation on Conservation, Development and Utilization of Forests, Proclamation No. 94/1994, was issued in 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 proclamation, however, has not been enforced and did not help for the sustained utilization of the remaining forest resources. Policies such as Bio-diversity conservation and development, EPE, Energy policy and population policy are in place but could not bring significant change in forest development and use.

3.3.2 Ethiopian Railway establishment Regulation No. 141/2007).

Through this regulation the Ethiopian Railway Corporation (ERC) is established as a new organization .The primary objective of ERC is realizing modern nationwide railway development to achieve an integrated and efficient, high speed, high capacity railway transport system with the aim to ensure competitive and affordable transport for freight and passengers in the FDRE at an affordable tariff structure.. This regulation defines objectives, powers and duties of the corporation and its organization.

Environmental pollution control proclamations NO. 300/2002 sets rules on control of pollution, management of hazardous waste, chemical and radioactive substances, management of municipal wastes etc. Outlines sectors that require environmental standard, environmental inspectors, and incentives, rights to appeal, Offences and penalty.

Environmental impact assessment Proclamation No. 299/2002 is promulgated in December 2002. The primary objectives of this proclamation are to make EIA mandatory for defined Categories of activities undertaken either by the public or private sector. The proclamation under its General provision Article –3, sub article-1 states that without authorization from the Authority (EPA), or from the relevant regional environmental agency, no person shall commence implementation of any project that requires environmental impact assessment as determined in a directive issued pursuant to Article-5 of the proclamation. Article – 5 describes projects requiring Environmental Impact Assessment as follows:

- Every project, which falls in any category listed in any directive issued pursuant to this proclamation, shall be subject to Environmental Impact Assessment.
- Any directive provided under sub- article-1 of Article –5 should among other things, determine categories of; a) Projects not likely to have negative impacts and so do not require EIA, b) Projects likely have negative impacts and thus require environmental impact assessment.

- EIA-Guide lines have been prepared both at federal & regional level. These guidelines follow the conventional procedures adopted elsewhere in the world.

Proclamations NO.52/1993 which deals with the development of mineral resources

Proclamation No.209/2000, a proclamation to provide for research and conservation of cultural heritage

Proclamation NO.197/2000 deals with Ethiopian water resources management.

Proclamation NO200/2000 refers to public health issues.

3.3.3 Rural Land Administration & Tenure Rights

Regarding land tenure issues; proclamations No. 31/1975 and 47/1975 State that land in Ethiopia is state owned. The constitution of 1995 also retained land ownership under the people. It is stated in the constitution that the right to ownership of rural and urban land as well as all natural resources, is exclusively vested in the state and in people of Ethiopia. Buying, selling or exchanging to other means is prohibited, however, tenure rights and leasing of use rights to or from others is ensured.

Rural land use and administration proclamation NO.456/2005 describes; the right to hold and use rural land, acquisition and use of rural land, transfer and duration of rural land use right, obligation of rural land users. Restrictions on rural land use (land use planning and proper use of sloppy, galley and wetland/marshlands.

Proclamation NO/455/2005: Proclamation to provide for expropriation of land holding for public purposes and payment of compensation; discusses on expropriation of land holding, determination of compensation, base and amount of compensation, displacement compensation, valuation of property,

Civil Code, Proclamation NO/65/1960

In Ethiopia, involuntary displacement due to expropriation is governed mainly by the Civil Code, proclamation No. 65/1960. In this code reasons and objectives of expropriation are clearly specified. According to articles 1460-1488 of the Civil

Code, expropriation is possible only for projects of public utility and only immovable assets could be expropriated. These regulations of the Civil Code are designed to protect private property and in the case of expropriation necessitated by public utility are unavoidable to make sure that it is co-ordinate with payment of legally sufficient compensation and proper communication with those whose immovable assets are to be dispossessed.

According to this Civil Code, anyone that can legally prove existence of real right over the immovable assets to be expropriated, qualifies or is eligible to receive legally sufficient compensation. Article 1474 of the Civil Code provides that compensation payment could be either in cash or in kind. Therefore, if any compensation is required in the processes of this project, it should be handled according to the above Civil Code and principles of compensation.

Proclamation No. 80/1997 Article 6.18 states that Ethiopian roads Authority (ERA), use free of charge, land and such other resources and quarry substances required for the construction of highways, however, it has to pay compensations for the properties on the land it uses. The Authority pays compensation for the property on the land.

- Dislocated farmers will be paid equivalent amount to the benefits they are supposed to get from their land had they where not displaced from their original.
- Compensation is paid for the property lost if new lands are occupied in places where no road has existed before or if the upgrading of the existing road requires new land out of the right of way. Compensation is paid for properties lost temporarily or permanently.
- When somebody builds residential houses for business within the right of way, these houses are considered to be illegal and no compensation will be paid when demolished during road construction. The owners of the illegally built houses are allowed to remove their property before road construction starts and usually the owner is informed about one or two months before construction commences.

- The cost that may result due to the removal of transmission lines, distribution lines and related facilities of water supply, electric power, telecommunication and sewerage systems are compensated to the owner of these facilities. Trees of commercial values are considered valuable property and are compensated accordingly to their market prices.
- The crops that will be lost incase of detour or other temporary occupations of agricultural land will be compensated according to the price of the crop in market. Incase where agricultural land is to be lost permanently compensation will be decided by the committee established by road authority for this purpose.
- The people who are displaced due to road upgrade or re-aligned sections of the existing road outside of the right of way, as well as those residing illegally inside it must be resettled.

Regional level land administration & use proclamations

- **Proclamation No 133/2006; the revised Amhara National Regional State Rural** Land Administration and Use Proclamation. The proclamation discusses the following major issues: Right to hold land; Transfer and Obligation of land holding and use rights; Measuring, registering and holding certificate of land; the responsible bodies.
- The revised Proclamation issued by the council of Amhara National Regional State, Proclamation No.91/2003.

3.4 Institutional and Administrative Framework

The Federal Democratic Republic of Ethiopia (FDRE) has two levels of administrative structures, Federal level Government and regional governments. There are nine regional governments under the Federal Government. Roles and responsibilities of governments at different levels (Federal, Regional, Zonal & Woreda) have been defined by the constitution and proclamations Nos. 33 of 1992, 41 of 1993 and No. 41 of 1995. Under these proclamations, duties and responsibilities of regional states are included.

The current road project shall be implemented in the Afar and Amhara National Regional States. The regional statse are structured as regional administration, zonal, Woreda (Distict) and Kebele (sub district) / Peasant Associations (PAs), administrative organs.

3.4.1 The Environmental Protection Authority (The Competent Agency)

The Environmental Protection Authority (EPA) was established in August 1995, in response to the requirements of the Constitution (Proclamation No 9/1995).

The objective of the EPA is to:

"...ensure that all matters pertaining to the country's social and economic development activities are carried out in a manner that will protect the welfare of human beings as well as sustainability of the protect, to develop and utilize the resource bases on which they depend for survival" (Federal Negarit Gazeta of the Federal Democratic Republic of Ethiopia - Proclamation No 9/1995)

In addition to the EPA, the Investment Authority has responsibilities towards the environment. These are captured in the Federal Negarit Gazeta - Proclamation No 37/1996) which states that "...the intended investment activity would not be convening the operational laws of the country and that, in particular, it complies with conditions stipulated in environmental protection laws..."

Roles and responsibilities of the EPA

The Environmental Protection Authority (EPA) is the Competent Agency at the Federal level in Ethiopia. It is, therefore, the responsibility of this authority in the EIA process to:

Ensure that the proponent complies with requirements of the EIA process;

Maintain co-operation and consultation between the different sectoral agencies throughout the EIA process;

Maintain a close relationship with the proponent and to provide guidance on the process; and Evaluate and take decisions on the documents that arise from the EIA process.

At the regional level, the Federal EPA has devolved responsibility to the Regional equivalent of the EPA. The regional authorities should ideally establish an EPA-type institution to deal with environmental issues at the regional level. This is, however, a long-term objective for most of the regions while few have already embarked in establishing their own EPAs.

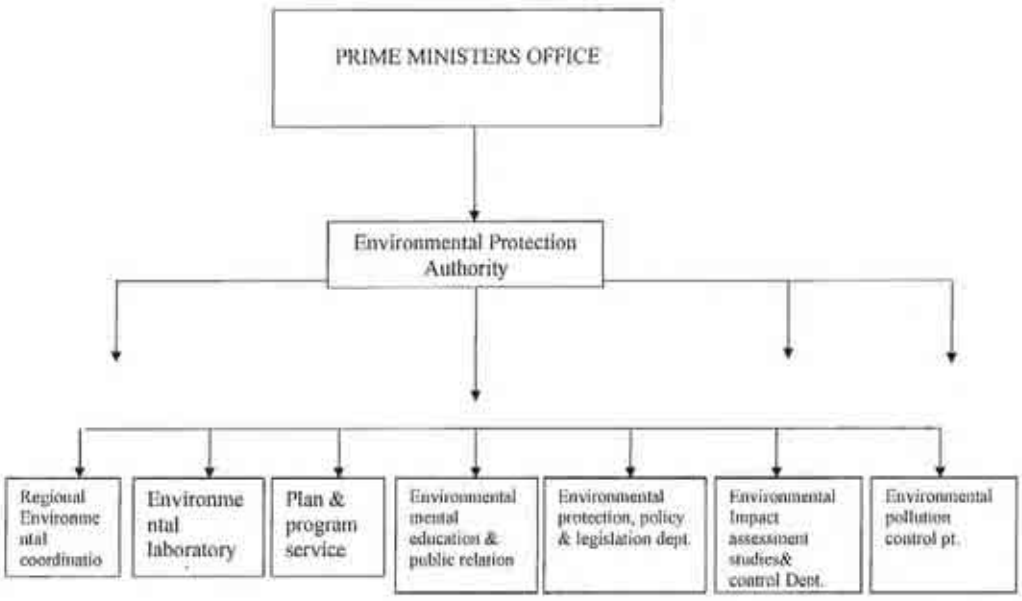
In the interim period, however, the Regional Environmental Co-ordination Committee (RECC), which comprises responsible officers from different sectoral Bureaus, must take the responsibility at the Regional level. Seeing as that the RECC's are not sectoral based they can be viewed as being independent of the outcome of a specific EIA. Due to competence and capacity limitations, the RECC may choose to designate a specific sectoral Bureau to take responsibility for an EIA process. The sectoral Bureau must not, however, have a vested interest in the outcome of the EIA process. This is particularly important where a sectoral agency houses the secretariat of the RECC. The Federal EPA should act in an advisory capacity to the Regional EPA-type organizations.

It is the responsibility of the regional EPA bodies to inform the Federal EPA of projects that may be of national significance. Therefore the Federal authority should only be involved in EIA processes where a proposed activity may:

- have an environmental effect across the international boundaries of Ethiopia;
- have an environmental effect across regional boundaries within Ethiopia;
- Have an effect on an environment of national or international significance, including but not limited to natural forests, wetlands/marshlands, national parks, cultural heritage sites etc.
- have a Federal government department, the relevant regional authority or another statutory body as the proponent;
- Have the Federal Investment Authority as the investment approval body.

Alternatively Federal EPA may have an EIA referred if agreed to /between the Federal authority and the regional authority. This would typically happen in complicated EIA's where the Regional authority feels that it does not have the capacity or competency to deal with the application.

Fig-3.4.1: ORGANIZATIONAL STRUCTURE OF EPA



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3.4.2 Amhara Environmental Protection, Land Administration and Use Authority (AEPLAUA

Its responsibilities include;

- Formulate policies and strategies, programs or guidelines pertinent to environmental protection and follow up its implementation up on approval.
- Implementation of the land administration and use proclamation.
- Collection, making analysis and keeping record of data on natural resources and rural lands including social and economic situation of the region.
- Regulate and follow up that any development activity is planned and implemented without damaging the environment and disturbing its balance,
- Initiates laws and guidelines pertinent to the environmental protection for the government, and up on approval regulate, follow up and evaluate their implementation,
- Monitors any damaging effects on habitat and divers living organisms.
- Conducts capacity building and awareness creation programs as regards to environmental and natural resources conservation, development and protection.

3.4.3 Ethiopian Railway Corporation (ERC)

The Ethiopian Railway Corporation (ERC) was established through regulation Number 141/2007 of the council of Ministers of FDRE. The corporation reports to the ministry of transport and communications. The regulation mandates the corporation (ERC) to develop railway infrastructure and provide passenger and cargo rail transport services.

3.4.4 Ethiopian Wildlife Conservation Organization (EWCO),

EWCO was established in year 1970 through Negarit Gazeta No 4, 1970. EWCO is responsible for the conservation, utilization, development and management of Ethiopia's flora and fauna and its conservation areas.

4 PROJECT DESCRIPTION

4.1 Project location

The Awash – Armenia railway line is one of the segments of the major Awash – Mekele – Shire Railway route, connecting the south eastern part to the northern part of the country. The rail line falls within two regional states; the Amhara and Afar Regional states, while the main route extends up to Shire town of the Tigray region.

It follows new and unpaved alignment and falls mainly in dense vegetation covered land. The track alignment is hardly accessible for vehicle. The site investigation was carried out following foot paths and trails at offset distances from the centreline.

The project origin is at out skirt of Awash Arba town (capital of Awash Fentale woreda in the Afar regional state), while the end of the project is at Kure Beret Kebele of Qewet woreda in the Amhara regional state. The length of the project rail line segment is estimated at 99 km. Moreover, the line traverses in the premises of the Awash National Park in the first section for about 100.4km length.

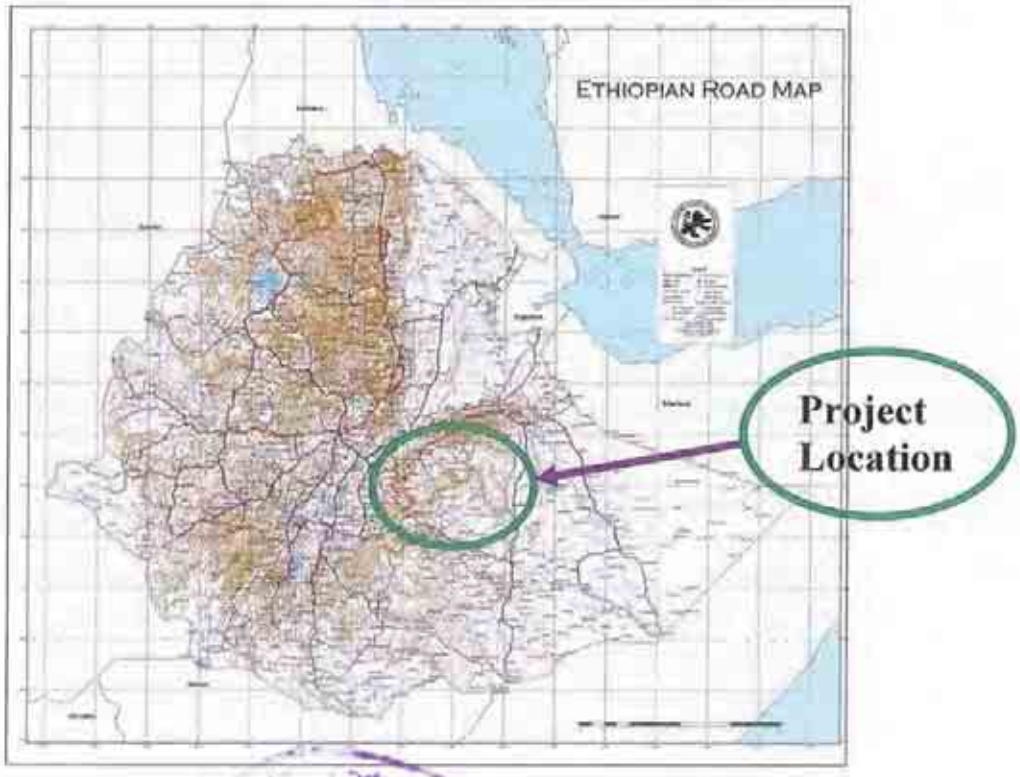

Figure 4.1 Location Map of the Project Area

4.2 PROJECT RIGHT – OF- WAY ENVIRONMENTAL CONDITION

Environmentally sensitive areas of the project rail route include:

- Land prone to desertification
- Areas which harbor protected, threatened, or endangered species
- Areas of particular scientific interest
- Areas of Outstanding natural beauty such as the Awash Nation parks
- Areas of Particular historic or archaeological interest (ex. fossil deposits)
- Primary forest

The land cover /land use of the route corridor for the project can be broadly categorized in to three as; i) Dense forest and wildlife Habitat sites of the Awash National Park in the first section, ii) the mixed acacia forest and animal grazing lands in the middle section of the route and in the surroundings of the National Park; and iii) the cultivated crop fields towards the end of the project.

There is no densely settled site that encounters along the route length, while some pastoralist houses are found dispersed within the acacia dominated grazing land and forest land, at some locations.

The Awash National Park falls within the influence of the project; and is partly traversed by the line in the first section of the project. The dense forest cover, the wildlife habitat and wildlife species of the park, the hot spring within the park, the rivers crossed by the rail line and water ponds falling within the influence area of the rail line project are among environmental components that are suspected to experience adverse impacts of the project in the first and middle sections of the line. Towards the end of the project the line falls in an intensively cultivated crop fields. The land in Qeuet woreda of North Shoa zone is dominantly covered with annual crops, and the line traverses the woreda up to Kure Beret kebele.

There is hot spring and marshland area LHS of the alignment at offset distances. The premises of the Hot spring are rich in biodiversity; both terrestrial and aquatic plants are found in the area. These resources are also among the tourist attraction of the Awash N. Park.

5 BASELINE ENVIRONMENTAL CONDITIONS

5.1 Topography and climate

The railway project falls in the Great Rift Valley System of Ethiopia. The terrain characteristics are flat for major lengths and flat to rolling towards the destination of the project. The altitude ranges from 700masl at the origin near Awash Arba to 1255masl at the end of the rail line segment near Kure Beret village of Qewet woreda.

The Climate of the railway route corridor is mainly semi arid (Qola) type of ecological zone, and has relatively hot climate.

The Qola climatic zone has been classified as those areas receiving annual rainfall between 400mm and 700mm. In those areas, rainfall occurs during two seasons; small rains during February – April, and main rain occurs during July to September.

5.2 Geology and soils

According to Woody Biomass Inventory and strategic planning project map (WBISPP 2002), the soil in Afar region comprises 6 major types. These are: Litho sols /20.60%/, Regosols /18.88%/, Solonchaks /18.72%/, Fluvisols 12.57%/, Rock surface /9.29%/ and Cambisols /8.06%. The soil from the Amhara side in kure Beret keble has more or less similar characteristics.

The proposed railway project line crosses mainly Alluvial, lacustrine & beach Sediments, ignimbrites, unwelded tuff, rhyolite flow, domes and trachite of the nazreth series, and transitional subalkaline basalts with minor rhyolite & trachite eruptives of Alagae formations (Materials report).

5.3 Water Resources

The other sensitive environmental component is the water resources. Water is scarce in the project area in general. Awash River which is the major fresh water source is at far distance from the project alignment. Kessem River is the other major surface water source, but it is also diverted for irrigated farm development in the area. Perennial rivers traversed by the rail line are Qebena and Bulga Rivers from the Afar side, while Awadi River is found from the Amhara region side.

The hot spring within the Awash Park is also found at offset distance from the alignment. The Awash River traverses on opposite side and at distant location from the route alignment. However, there are several seasonal flood routes and seasonal streams crossed by the line.

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Figure 5.3.1 Bulga River after diversion for Sabure Sugar Cane plantation

Figure 5.3.2 Seasonal Streams crossed by the proposed line

5.4 Flora and Fauna Resources

The area is habitat for verity of flora and fauna resources, and is one of the forest conservation sites in Ethiopia. The project route corridor is dominantly covered by acacia forest and grassland. Both wildlife and livestock inhabit the forest and grassland areas of the route corridor.

Forests help to mitigate climate change by sequestrating carbon dioxide released to the atmosphere. Carbon released to atmosphere is absorbed in wood, leaves and soil. Forests and oceans are known for absorbing and storing carbon for longer period, and are known as 'carbon sinks'. The stored carbon is released when forests are burned. On the other hand, forests provide raw material (fire wood, furniture, house hold goods etc.), maintain biodiversity, protect soil and water resources, and play role in mitigating climate change. Above all forests are home for verity of wildlife resources and serve as tourist attraction sites.

5.4.1 The Awash National Park (ANP) and conservation areas

The Awash conservation area is located where the Ethiopian Rift Valley Joins with the Afar Triangle, and is found between 8°45' to 9° 15' North Latitude and 39° 45' to 40° 5' East Longitude.

The Awash National Park (ANP) which constitutes the major part of the conservation area is found at the project origin and is traversed by the rail line for substantial length. On the other hand longer distance is covered by the rail line within the neighboring conservation sites.

The ANP is among the 11 designated National Parks of Ethiopia. It is also one of the two first Gazetteed National Parks in Ethiopia, along with the Simien Mountain National park. These two national parks were legally gazetted in 1969 as established national parks of the country.

The ANP was established with the objective of preserving the flora and fauna resources of the area, to provide center of biological and ecological research, and to contribute to the national economy through the development of tourism and game cropping.

The conservation area is wider and includes the ANP and other wildlife reserve and conservation sites surrounding the Park proper. These are; 'the Wildlife Reserve areas' found to the west and northeast of the ANP and 'the controlled Hunting Areas' that occur further into the Afar triangle.

i) The Awash National Park (ANP)

The park is located at the center of the Awash area conservation site. The park area is estimated to cover about 75km^2 of land. The objective of establishing the ANP was to strictly conserve and protect the wildlife and objects of aesthetic, ecological and scientific interests.

Figure 5.4.1Forest cover of ANP

Figure 5.1.1Hot spring site within the park

ii) The Wildlife Reserve sites

This is found immediately to the west, north and north east of the ANP. These wildlife reserves are known as Awash West Wildlife Reserve and the Alledeghi Wildlife Reserve. These wildlife reserves are established as primary protection areas or buffer to the ANP. The purpose of the wildlife reserves are to conserve,

and propagate the wildlife within them, and are also where hunting , including licensed hunting is prohibited, but other forms of controlled land use, such as grazing and cattle ranching would not be excluded (Negarit Gazeta No. 416,1972).

iii) The controlled Hunting areas

These sites are found adjacent to the Awash West and Alledeghi WR. The controlled hunting sites are the Afdem – Gewane, and Erere Gota CHA and extend to the northern part further into the Afar Triangle.

Their function is also to act as buffer zone, but on secondary level with regulations being more flexible than those of the wildlife reserve. In these controlled hunting areas, licensed hunting of certain species of wildlife is permitted on limited and controlled bases. There is no restriction on residence and land use in this section.

Variety of flora and fauna species is found in the park and its surroundings. Abyssinian wild Ass, Grevy's Zebra, wild fox, wild cat, Cheetah and etc... are the major wild animals that are found in the region's national parks.

Some of the flora and fauna species of the conservation areas are included under the annex section.

5.5 Land resources and soil erosion problem

Land is communally used by the pastoralists on the Afar side, while land on the Amhara side is individual land holding system for crop cultivation.

Due to its physiographic nature, Afar region is one of the regions in the country where relatively less soil erosion takes place. According to the Woody Biomass inventory Map(2002), the soil loss rate of the region ranges from less than 3.125 to 200 tons/ha/year. 95.25% of the total regional land area has erosion rate of about 3.125 tons/ha/year; 2.18% of the land is eroded between 3.125 and 6.25 and 2.58% is eroded above 6.35 tons/ha/year.

The land resource of the project area is well protected by the vegetation cover, and no significant erosion problem is observed at the moment. This is mainly due to the flat terrain and also the area being protected as conservation site. The dense forest and grass cover of the area has assisted the soil loss. However, at some locations, especially at road sides, at river banks and at grazing grounds, signs of soil erosion are observed as a result of the existing roads construction. The access roads

constructed and track roads used by the pastoralists within the forested land has exposed the land for runoff and soil erosion effects.

Also livestock population in the area (animal grazing and watering by the pastoralists) has contributed to the degradation of the soil at some locations.

5.6 Socio-economic environment

5.6.1 Administrative Location of the project

The project is administratively located in two Naional Regional States namely Afar and Amhara regional states where the start of the project Awash town located on eastern part of Ethiopia located at 200km from Addis Ababa along Addis-Djibouti main road and ends at Kureberet village found on Northshewa zone of Amhara region, 200km from Addis Ababa, about 45km from Addis- Dessie main road. The project route create short access between the eastern part of Ethiopia and Northern part and also connects Oromia, Afar and Amhara regional states through railway and also links to the already existing Addis – Djibouti railway.

Most part of the project is located in Afar regional state, Zone 3 crossing two weredas called Awashfentale and Dulecha weredas. The reaming part of the project traverses in the north shewa zone of amhara regional state. There are total of three (3) Woredas affected by the project namely, Awashfentale & Dulecha in Afar and Kewet in Amhara.

5.6.2 Population and livelihood income

The density is characterized by sparsely populated settlement. The settlement becomes relatively dense at the destination of the route.

The major part of the Project area is rural and undeveloped. The livelihood of the population in the project area can be divided into two as it lies in two geographically different regional states. The livelihood of the Afar regional population is dependent on pastoral nomadism, people are forced to move from place to place in search of grazing land and water for their livestock. Because of the continuous movement of the population, there are not many villages or settlements that last for long periods except for the urban settlement mostly occupied by non-Afar people. The settlement pattern in the Afar region is mainly organized on a clan basis. In the case of the Amhara regional population, almost all part of the project area that traverses in one woreda which is rural where the main stay(95%) of the settlers is mixed agriculture.

The population of Qewet woreda is estimated at 108,170 in 2009, while in Awash Fentale and Dulacha woredas it is estimated at 31,528 & 21,902 people respectively. Population density is sparse in the route corridor, especially in the first section of the project.

There is no major permanent settlement site falling within the ROW width of the rail line. However, dispersed traditional huts of nomadic community encounter at different locations. As these are temporarily occupied and abandoned from time to time, it does not constitute permanently established domicile site.

The density is characterized by sparsely populated settlement. The settlement becomes relatively dense at the destination of the project.

The major settlement and economic development sites within the project influence area are; Sabure town in the Afar regional state and Kure Beret village in the Amhara national regional state towards the end of the project. However these settlement sites are outside of the ROW width of the rail line.

The rail line corridor is, dominated by pastoralist and agro pastoralist community.

The population in the Afar region is mainly pastoralist, while agro-pastoral community also exists. In the Amhara region majority of the population is agricultural community with some agro pastoralists in the eastern part. The livelihood income is derived from livestock and crop cultivation in Afar and Amhara woredas of the project respectively.

Cultivated land encounters towards the destination of the project for about 5 km, stretches around Kure Beret village.

The major part of the Project area is rural and undeveloped. The remaining segment is sparsely settled and temporarily occupied by pastoralist community in the Afar and crop producers/farmers in the Amhara region. The livelihood of the population in the project area in general can be divided into two as it lies in two geographically different regional states. The livelihood of the Afar population is dependent on pastoral nomadism; people are forced to move from place to place in search of grazing land and water for their livestock. Because of the continuous movement of the population, there are not many villages or settlements that last for long periods except for the urban settlement (mostly occupied by non-Afar people). The settlement pattern in the Afar region is mainly organized on a clan basis. In the case of the Amhara regional population, it is also rural type where the main stay (95%) of the settlers depends on mixed agriculture.

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List of woredas and population density that will be traversed by the Railway Project is as depicted on the following table.

Table-5.6.1: Population density of woredas traversed by the railway project

Regional State	Zone	Woredas	Population			Kebeles Crossed by the Railway
			Male	Female	Total	
Afar	Zone 3	Awashfentale	16,382	15,146	31,528	6
		Dulecha	11,860	10,042	21,902	-
Amhara	North Shewa Zone	Qewet	64,251	60,638	124,889	1
Total			**92,493**	**85,826**	**178,319**	-

Source: CSA Statistical Abstract: July 2010 and Respective Worde Administrations

5.6.3 Settlement and Housing

There is no significant settlement site within the route corridor, and is dominantly acacia forest mixed grass land that is traversed.

As is the case for most other areas, the type of housing unites vary in their style associated with purpose, types of construction materials and type of community (Urban or Rural). In view of this, most of the housing units of urban areas are constructed from wood and mud made wall and corrugated iron sheet covered roof.

On the other hand the housing style and settlement pattern of people in the rural area seems a function of their response to the challenging environment and pastoral life style. The type of houses favored by a HH largely associated to accessibility of building materials, affordability of those materials, environmental condition of the area, and the life of the communities in the specified area. Therefore they construct low cost traditional houses suitable to hot arid areas made of sticks, mats thatch and plastics. Their homes are women making simple to demolish and move to other area when they are in need.

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Housing Type at Afar, Awash Fentalle	*Houses at Kureberet, End of Project*

5.6.4 Economic Activity

The livelihood of the population in the project area can be divided into two as it lies in two geographically different regional states. The livelihood of the Afar regional population is dependent on pastoral nomadism, people are forced to move from place to place in search of grazing land and water for their livestock. Because of the continuous movement of the population, there are not many villages or settlements that last for long periods except for the urban settlement mostly occupied by non-Afar people. The settlement pattern in the Afar region is mainly organized on a clan basis. In the case of the Amhara regional population, almost all part of the project area that traverses in one woreda which is rural where the main stay (95%) of the settlers is mixed agriculture.

In Awash Fentalle woreda, there are some large plantations; which ones used to be State plantations to grow Sugarcane and other crops like maize. Major modern development activity within the project influence area is the Sabure Sugar Cane irrigated farm. This farm is found at about 40km along the rail way line and would be one of the beneficiaries of the project. Sabure Irrigation Farm and canals will also experience the impacts of the project. During discussions heled with Awash Fentale Woreda experts, it was also understood that in Boloita and Sabure Kebles, there is a total of 20,000ha land planed to be developed by irrigation from Awash River in the near future. Kure Beret Kebele is the other area having intensively cultivated field located along the route alignment.

	
Sabure irrigated sugarcane plantation site	Intensively cultivated crop field towards end of project

Apart from crop and livestock rearing, there is very small economic activity in the project influence area. In the town sections, there exists small scale non-farm activities; such as, grain marketing, kiosks and local drinking places and eating places.

5.6.5 Food Security Situation of Project Area

As the term food security refers, it is to mean that either producing sufficient food or make access to the society to obtain food crops. The project area is one of food insecure area. As per the information from the woreda profile of Awash Fentale Woreda, there has been food insecurity problem in the last three years. The major reasons for prevalence of repeated vulnerability to food shortage are specified under:

- Drought- Moisture stress that inhibits production at least one season reliable harvest;
- Population increase-not coupled with production;
- Backward livestock rearing methods,
- Absence of credit and loan associations and
- less infrastructure development among others :-distance of the Woredas from potential crop producers(in the northern highlands)

Food crops for the majority of the project area located in Afar are halved from the North showa zone of Amhara, Ankober and Aliuabad confronting with the very in accessible transport problems which ultimately causes inflation prices of all food crops. Contrary to that, the inhabitants do not afford to buy crops at a highest

price. As information obtained from Wereda Pastoralist, Rural and Agriculture Development Office, there has been no year without the provision of relief assistance to the Wereda people. It is also reported that there are 5 kebeles consisting of about 4900HHs currently obtaining food assistance organized by safety net. Out of the total HHs organized under safety net, 4048 are organized under community participation (public work) where as 854 HH are direct beneficiaries.

Therefore, it is expected that the current railway project will contribute to reduction of food insecurity problem by increasing the woredas' infrastructure and facilitating the development of other services in the area.

5.6.6 Educational and Health Services

The development of education, health and water supply interventions are important investment sectors for the attainment of social development in a given Wereda or country. Nonetheless, as the case for other pastoral communities of Ethiopia, the project area has been kept marginal for several years from the development of social services. Taking in to account this fact, The Ethiopian Government has paid emphasis and made vagarious efforts within in the past few years towards scaling up the number of educational institutions, health services and boosting safe water supply services especially in the rural areas.

According to data obtained from respective Education offices of Awash Fentalle and Kewet Woredas, there are 67 primary and 2 secondary schools in the two Weredas and 1 preparatory school in Awash Fentalle Wereda. High student dropout rate, low participation rate of girls and lack of preparatory school in the nearby for that of Kewet woreda, identified as the major problem of education in the project area as report obtained from respective Wereda education offices. The prevalent of high student drop out and low student enrollment rates are associated with the mobility of the pastoralists and recurrently prevailing food insecurity in the area.

The distribution of health services in the project area includes 4 Health centers, 2 in each Woredas and 24 health posts, 19 in Kewet and 5 in Awash Fentalle Woreda. The existing health facilities are ill equipped and under staffed and are also not sufficient to reach all the population in the project area.

Regarding major health problems in the project area, the following table presents top 10 leading causes of adult outpatient visits and inpatient (admission) in Awash Female woreda. The data for the remaining Woredas could not be found. However,

as per the information from Woreda health office of Kewet Woreda HIV/AIDS, Maleria,

Rank	Diagnosis	No. of Cases
1	Malaria	4806
2	Upper respiratory T. Infection	1292
3	Intestinal Parasite	884
4	Pneumonia	384
5	Diarrheal Disease	345
6	Skin Infection	261
7	Injury	161
8	HIV/AIDS	82
9	Anemia	69
10	Bloody Diarrhea	64

Waterborne diseases and Typhoid are the 4 top ones .

Generally, health facilities and its services in the project area suffer from a number of problems such as, low number of health professionals, uneven distribution of health institutions and low supply of drug and equipment as well as inadequate quality and efficiency of care.

5.6.7 Water Supply

According to Woreda Water Offices, the dominant water supply source for livestock and human population in the project area are Rivers like Awash and kesem in Afar and several ponds in the Amhara of kewet woreda. There are 24(20 Functional) and 30 hand pumps installed in different kebellese of Awash Fentalle and Kewet Weredas respectively. There is acute problem of clean water supply in the project area and significant proportions of the people are suffering from its after effect (Water born disease) ensuing mainly consuming not treated water from Ponds and Rivers.

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No.	Type of Major Water Supply Schemes	No. of Schemes	
		Awash Fentalle	Kureberet
1	Modern Hand Dug Well	24	30
2	Spring Development	1	47
3	Shallow Well	1	6
4	Deep Well	2	
5	Cistern (with wall)- Bono	1	
	Total	29	83

Regarding coverage of pure water supply in the project areas, in particular woredas of Awash Fentalle and Kewet, the data obtained shows that both woredas are poor in their pure water supply coverage 50% for Awash Fentalle and 52.5% for that of Kewet Woreda. Among the major reasons reported for the poor water supply condition of the area are:

5.6.8 Transport Services

The travel and transport pattern of the population in the project area and in the regions is mainly carried out by walking on foot. It is estimated that more than 90% of households in the project area walk on foot to reach different social services and facilities, such as, administrative centers, courts, police stations, markets, sources of drinking water, flour mills, and fuel wood collection places.

In the project area, an estimated small percentage of the population is also dependent on motorized or vehicular transport. Public transport services operate in the major towns and mainly on market days.

5.6.9 Gender

Transport infrastructure as one among the developmental sectors is very limited for rural population in general. The distribution of social services, such as, health and educational services in the project area is at its lowest and are mainly located in the administrative and urban sections, away from most of the population.

The situation is worse for women as they face social constraints on their access to resources and transport facilities in particular. Consequently, provision of improved

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and affordable transport system has major impact on the welfare and economic opportunities of rural women.

Women in the project area are facing multi-dimensional social, economic and political constraints as most of the project area is predominantly occupied by Muslim societies. Most of the problems seem to emanate from the social, cultural and religious setting of the area. However, the poor economic development of the area, repeated drought and water scarcity in the areas also play a major role in worsening the situation of women directly or indirectly. Women in the project area, particularly of the Afar and the rural parts of Amhar region are suffering from the following major problems:

- Discriminatory culture, norms and value systems of the society.
- Harmful traditional practices which includes: Female Genital Mutilation, polygamy and early marriage.
- Women excessive workload
- Low social status of women and poor access to and benefit from basic social services.
- Male dominated resource right and decision making power

The magnitude of women's poverty situation in the project area is reported to be high, and it is manifested through a number of socio economic situations including lack of transport services and facilities. The problem is worse among the Afar Women. With the construction of the railway project, it is expected that the poverty situation of women will show improvement and progress.

5.7 Ethnic Groups, Religion and Culture

In the project area there are two dominant ethnic groups namely, Amhara,and Afar each of which have distinct language and culture. The Amhara has the majority having high population density per km, while the Afar has low population density. The Afar society is composed of one ethnic group and which is divided into several clans and sub clans. Clan plays an important role in this society. The clan chief is the highest and respected authority. Islam is the dominant religion in Afar where more than 95% of the population in the project area is Muslim. Coming to the Amhara, 87% of the population in the woreda (project area) is Christian in religion.

Polygamy is widely practiced and very common in the Afar society and in the Muslim society of that of Amhara regional state in the project area. In Afar culture, marriage with external ethnic groups is strictly forbidden instead, marriage among

relatives (cousins) is widely practiced as a means to sustain the ethnic group. The Afar people are also known for their good tradition of information transmission. There are also a range of mutual support and care for the poor through the traditional institutions. These institutions have been working for generations and are highly important or instrumental for reducing risks.

5.7.1 Land use /land cover of the area

The land use / land cover of the route corridor is dominated by acacia forests and grassland. In the first section, partly the land to be occupied by the project falls within the Awash National Park followed by acacia trees and grassland in the first and middle sections, while cultivated land is traversed towards the end of the project around kure Beret kebele.

There is no significant settlement that encounters all along the stretch, it is only temporarily occupied pastoralist houses that encounters.

5.8 Cultural and Historical Resources

There are high PCRs in the project areas and in the region in general. The Fentale Mountain ranges, the wildlife habitat and parks, the landscape of the area, and the archeological heritages are some of the eminent resources in the project area. The Afar region is considered to be the place where old remains of Homo sapiens (Lucy and others) are discovered.

Awash nature reserve, Yangundu - Ras national park, Hadar and Aramis area, are the major tourist attractions of the region. The Hot springs, Afar old culture and cultural games are also other attraction area for tourism.

The Awash River valley is expected to be rich in archeological resources. Archeological findings indicate that the area had been home for the oldest Homo sapiens discovered so far. The culture and traditions of the pastoralist community is unique and remain untouched to date.

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6 POTENTIAL ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

The railway line project can have both positive and negative impacts. The EIA study will attempt to discuses on mitigating the adverse impacts and enhancing the positive ones

6.1 Beneficial / Positive Impacts of the project.

The positive impacts of the railway project are mainly related to socio-economic benefits that are attained by the population of the project areas all along the railway route and beyond. The impacts will have both local and national significance.

Accessibility to modern means of transport will be enhanced, and lower prices for transportation will be attained by trains.

Transportation of goods to different parts of the country and to and from the ports will also be facilitated and distance to be covered will be reduced.

6.2 Adverse impacts of the project

There is no significant economic loss and property damage that is expected to be caused, but significant disturbance to flora and fauna resources might result due to the project, and needs due care and strict management of the project implementation. The major potential adverse impacts of the project are discussed as here under.

6.2.1 Adverse impacts on Flora and Fauna Resources

The project area falls in a relatively dense forest and vegetation cover and rich wildlife habitat. The rail route corridor partly falls in The Awash Nature Conservation and wildlife habitat.

These are among major ecosystems with biodiversity and sensitive environmental components falling under the influence of the project.

The railway route construction requires plots of land to be cleared along the rail line alignment and within the ROW width, at material production sites and at locations for facilities erection and camp establishment. Clearance and degradation of the vegetation resource, can affect both the wildlife and plant species of the area, especially in the forest conservation area and in the Awash National Park in particular.

Poachers and intruders in to the forest cover of the nearby influence areas including construction workers may be encouraged by the availability of efficient transportation. Illegal timber trade may significantly be promoted which can adversely affect the resources.

Disturbance and accidental risks to the wildlife will be sever during the construction as well as the operation phases of the railway.

Forest degradation can cause Shift in flora and fauna species of the conservation sites. Impacts on wildlife would be relatively high due to traffic accidents and also due to poachers and illegal hunters. Currently exotic plant species, known as Prosopies juliflora is invading the area, and replacing the indigenous plants and grass species. Disturbance and interferences with the forest resource can introduce and encourage further development of exotic plant species.

Vegetation clearance also exposes the land to soil erosion effects. The land in the area is fertile and untouched so far. However, the site clearance and excavation works for the railway project can open up ways for soil removal by wind action and runoff water. The plot of land for the rail line will be permanently devoted as transport route and will not be put for other economic uses; this will have adverse impacts to the local economy and lively hood of the agro - pastoral community.

6.2.2 Proposed Mitigation measures

Clause 13(1) b of Proclamation 94/1994 prohibits the cutting of trees, utilization of the products they have or performance of other activities in a protected forest. Therefore, it is recommended and to be adopted in this project to adhere to exacting principles of design in order to avoid destruction of forest resources within the forest cover areas. There will be no quarrying and borrowing including construction of detour and access roads to borrow material pits and quarry sites within the forest areas.

Accordingly, No material production, no camps and garages, no detour roads and access roads, will be located within the boundary of the Awash National Park and the surrounding conservation sites including the wildlife habitats. Construction within the Awash nature conservation sites should follow the requirements and guidelines of the Park management, and regulations set by the wildlife conservation regulations.

The contractor and supervision consultant will liaison and keep closer contact with the Awash National Park Management, for coordination and guidelines to be followed while operating on the site.

Works within the park and in the conservation areas should be carefully handled not to cause disturbance to the flora and fauna resources of the area.

The ROW width for the rail line will be kept to the minimum possible to avoid excessive forest and vegetation clearance. The detour roads and access roads will follow the rail line alignment, and avoid long distance diversions during construction. This can be attained by adopting half width construction method in such sensitive ecological sites.

Therefore, the following measures should be taken to minimize the adverse impacts on the flora and fauna resources;

- The contractor is required to prepare detailed Site Environmental Plan (SEP) for the construction activities within the boundaries of the forest covered areas, and get it approved by the engineer. A clause should be included in the construction contract document to that effect. The major rail length falls in natural forest all along the stretch.
- Construction in dense forest areas of Awash conservation area forest should be made by half width. While work is underway on the half width, the remaining portion can accommodate and serve as passage for construction machinery and vehicles. In this case need for detour road construction can be reduced.
- Camps and garages should not be located in the dense forest areas, the supervising consultant should be informed that no approval of such site is given to the contractor. The environmental inspector and the resident engineer have the responsibility of ensuring that these requirements are met.
- The design will have wildlife and animal crossing corridor at suitable locations and intervals
- A clause should be included in the construction contract which makes it clear that the contractor will be responsible for any fire accident caused by his activities within the forest areas.
- Therefore, contract to make the contractor responsible for the conduct of his workforce in relation to environmental protection matters and to specifically prohibit unnecessary felling of trees.
- The respective regional and / or zonal Land Administration, Natural Resources Development and Environmental Protection offices should be informed about the project and arrange special policing to protect illegal timber extraction during construction.
- Excavated and paved grounds both for the road and at material production, camps and garage sites should be rehabilitated to the original condition as far as possible. Rehabilitation is done by backfilling, compacting and grassing or by seedling plantation.

- Trees cut / removed for the project should be replaced by planting and growing seedlings at appropriate place in the premises. At least 15 – seedlings have to be planted for every tree removed.
- Adequate monitoring mechanism should be established to supervise and control illegal deeds within forest conservation sites like; illegal logging, timber trade and charcoal making.
- Capacity building activities and awareness creation measures have to be taken both for the construction workers as well as to the surrounding community.
- The impacts due to poaching and intruders can be minimized through awareness creation among the employees and to the community of the area, setting regulations and employment obligations that prohibit poaching, illegal timber cutting and setting fire to the forest.
- Fire fighting brigade need to be organized at the major urban centers to counter act the fire risks.
- The contractor shall instruct and supervise his work force not to involve in illegal hunting, poaching and encroaching in to wildlife habitat and killing of wild animals, not to involve in trading, transporting and endangering wild animals.
- The contractor shall maintain rail side vegetation cover and forest trees that can serve as wild life habitat and as wildlife corridor.
- The contractor shall install warning signs and speed control signs at all animal crossing corridors as identified by the design engineer and in consultation with local community.

6.2.3Adverse impacts on land resources and soil erosion

The construction work involves site clearance, excavation, paving and grading activities, all of which involve disturbance of the land surface, loss of productive soil and loss of vegetation cover along the road route corridor, at quarry and borrow pit development sites, along detours, and along access roads to material production and camp sites

The land area to be occupied by the proposed rail line width would be permanently removed from the stock of land that can be used for agriculture and animal husbandry. The removal of such productive land from the local economy can reduce the potential socio- economic benefits expected. However, the land size is not that significant as compared to the available fertile land areas in the districts of project implementation.

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The area of land temporarily occupied for material production (quarry and borrow material), camp establishment and for access road is also substantial. However, the camp established is assumed to remain functional for other purposes after commissioning of the rail line project as well.

At present, erosion effects are minor due to the relatively dense vegetation cover of the project area. The excavation, paving and grading of surfaces accelerates erosion effects, and exacerbates land degradation problems in the project areas. Removal of the vegetation cover exposes the soil to erosion effects. Excess excavated material from the road cutting operation can kill the under lying vegetation and add to erosion and slope instability problems.

Rail and road side ditches constructed to divert surface drainages to adjacent lands are major contributors to soil erosion. Erosion effects can be enhanced especially at steep slopes due to; cuts in soil and rock, due to embankment construction, due to borrow pits and quarries especially those located at river banks, excavation of foundations for structures; bridges and culverts.

6.2.4Impacts on soils and on water resources and water quality

The project activities and services during operation can have impacts on the quality of the soil and water resources in the project influence areas. Soil and water contamination can result during construction as well as during operation phases of the project.

Water is scarce in the project area. Its spatial distribution is limited to some localities. However, ground water is ample and is the major source used for the population's water supply. It is, therefore, essential that the available sources have to be protected from adverse impacts, and to maximize their uses.

The major impacts on the water resources and seasonal marshlands of the area relate to changes in local flow direction of surface runoff, reduction in the rate of ground water recharge, and consequences of water quality and aquatic resources.

During construction period, excavated material and eroded soil that is transported to the nearby water body can cause sedimentation and change in the ecosystem, and on the quality of the water. Excavation is conducted for the railway line, for access roads and also at quarry and borrow pit development site.

Soil contamination and soil quality deterioration can result from spills and leakages of fuel and lubricants used on site; also from mismanagement of used oils and wastes around camps and garage sites. During the service period of the rail line,

soil contamination in the corridors can arise from traffic operation and from transportation of hazardous material and chemical products. This effect would be significant at river crossings and at the wetland/marshland ecosystem sites.

Damages and disruptions caused to the surrounding environment and natural resource base, in particular the land and soil resource, the vegetation cover, and natural drainage network would contribute to the impact on the water resources.

Degradation of water quality can be caused by entry of excavated soil material in to the river courses during construction activities, oil and fuel spillages form leaking machinery parts and upon refilling equipment. Sedimentation in river by soil deposit can hinder the growth and population of animal and plant life in the water bodies.

Wastes, both liquid and solid wastes generated at camp sites and garages can produce leakages and effluents loaded with pollutants which can contaminate the water sources by percolation and/or through surface runoff.

The rail line embankment can create barriers to the smooth water flow at the depressed grounds following river banks. These plots of land are seasonally water inundated. The blockage of flow can cause erosion of the road bed by hydraulic action and can result in carriage way damages. Adequate number/sized culverts or bridges should be provided to minimize the impacts.

Proposed mitigation measures

- Provision of adequate drainage structure 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, helps uniform recharge of water sources (both ground and surface sources) and wetland/marshland areas.
- Silt transport in the water bodies will be reduced by programming the construction during dry seasons, and also by soil erosion protection measures.
- Avoid stockpiling spoils at river banks, streams and groundwater sources and seasonal wetland sites.
- Cart away spoils soils immediately and regularly while working in the premises of wetland sites and river crossings.
- The water quality deterioration caused by pollution from oil products and chemicals can be minimized by timely maintenance of leaking machinery parts, good housekeeping practices in garages, campsites and asphalt plant

operation sites. The asphalt plant should be located at a properly selected site and away from water sources.

- Waste management and provision of waste handling facilities at garages, camp sites and at working places should be ensured by the contractor and the supervising inspector. Liquid and solid waste collection and storage facilities like pit latrines, cesspools and sold waste land fill sites should be located away from water sources and wetland areas.
- Avoid refueling of vehicles and machineries in wetlands and at river crossings.
- Avoid entry of excavated surplus material in to the water body and wetland/marshland areas.
- Camps and garages should be located away from sensitive ecological sites; from water sources and river crossings. .
- Provision of adequate flow dispersal structures following the natural flow regime of the runoff water.
- Check dams, diversion structures at major discharge points of the run off water may reduce direct entry of silt and pollutants to the lake.
- Stone rip raps or ditches might be required at the discharge side of culverts to minimize soil erosion and gulley formation.

6.2.5Adverse impact on cultural heritages and historical sites

The route follows open fields where, no significant settlement and established structures exists. Neither historical nor cultural heritage is found within the route corridor that is suspected to be affected by the rail line project. However, burial places might encounter at some locations that were temporarily occupied by the pastoralists. Archeological findings may also encounter up on excavation, and need to be considered and protected incase it is found by accident.

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7 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (EMP)

Environmental management plan specifies mitigation and monitoring actions with time frames, specific responsibilities assigned and follow-up actions defined. Major negative impacts and proposed mitigation measures have been out-lined in the above sections. Implementations of these measures have to be carried out at different stages of the railway construction & operation phases.

During the design stage the consultant should incorporate proposed mitigation measures in the design and tender documents. The contractual agreement should also include articles to enforce the environmental issues.

Construction stage activities are mainly the responsibility of the contractor and that of the construction supervision consultant. The actual physical implementation works are carried out mostly at this stage. The execution of the rail construction work should also equally treat the implementation of the physical works of environmental mitigation measures. The delegated section of the client has to make periodic inspection and performance evaluation of the works during the construction period to monitor the proper implementation of the proposed mitigation measures.

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

Environmental issues during the operation phase of the road shall be handled by the owner of the railway line infrastructure, the relevant department of the ERC. 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 detailed environmental management plan is described as in table 7.1below.

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Table 7.1: Schedule of Management and Responsibilities

No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
1	Design/ Pre-construction Phase	Land acquisition & Right -Of -Way clearance	• Include the environmental and social issues in the design and environmental clauses into the construction contract document	Design consultant ERC	Part of the design & RAP preparation cost
		• Stimulation of new construction in the ROW to obtain fraudulent compensation.	Prohibit new and additional construction within the ROW agreed up on as of the date considered to be final (cut of date) by the registration for RAP	Local administration	Normal administrative cost
		• Public doubts	• Informs the community about the project	Compensation	Daily

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		regarding land acquisition issue and property loss	objectives, project related impacts and associated planned remedial measures • Compensation and resettlement programs will be arranged and settled prior to commencing construction activity	committee composing of; ERC, Local administration, the affected group, Community representatives and NGOs in the area	allowances for compensation committee as included under RAP report.
		Forest & Vegetation clearance	• Defined access road is used during design and study • Limit vehicle movement only on paved access roads, avoid activities causing forest fire and oil spills within the Awash forest conservation	Design consultant	Part of the design cost

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
			and wildlife habitat & sensitive sites during route surveying.		
	Construction Phase	• Land slide and slop instability problem may encounter at deep cut trenches and ditches for culverts, bridges construction and at material production sites. • Change in landscape • Degraded land &	• Plant trees and grass cover at graded and steep slops. • Rehabilitate excavated ground up on completion of works • Surplus excavated top soil shall be stored and used to rehabilitate degraded grounds • Provide adequate drain pipes to avoid excessive concentrated flow • Place drain outlets to avoid cascade effect. • Line runoff receiving surfaces or ditches with stone ripraps or concrete	• Construction contractor • Supervising consultant • Bureau of agriculture and rural development • Bureau of land administration and environmental protection.	1,400,000 grassing of road side slops Other estimate shall be made and included in the BOQ by the engineering design.

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		erosion hazards	• Avoid Slide susceptible sites for use as construction material extraction area. • Re- habilitate and re- plant disfigured and excavated land for quarry and borrow pit. • The existing overburden/fill material is to be removed. • The rock face is to be benched in order to provide a key for the replacement of fill material. • A rock blanket 0.50 metres is to be placed on the natural rock (benched) to provide free draining of ground water under the road. • A Geo-textile is to be placed on the rock drainage blanket and the necessary fill material		

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
			and road Construction placed on top of the geo-textile.		
		Soil contamination	• Timely cart away surplus spoil soil. • Maintain leaking equipment and vehicle parts, Avoid fuel & oil spillages while refilling, collect and properly treat used oil and • Exercise proper waste management and disposal practices at camps, garages and at work places.	Contractor	Part of the engineering cost estimates.
		• Tree cutting, Vegetation removal, Poaching by	• Minimize ROW width in the Awash valley forest conservation sites • No detour or access road will be opened in	• Contractor • Supervisor consultant	1,700,000 birr for tree planting

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		construction workers • Accidental forest fire	those natural forest areas, half width construction methods will be used in such forest areas • No material sites, camps & workshops will be located in the Awash National Park and conservation areas, Consider possible design options to avoid and/or minimize damage to the forest resources • Limit vegetation removal to only areas required to the effective land required for project works. • Route selection for access to material sites, and detour road route should try to avoid dense vegetation covered areas	• ERC • Woreda Environmental Protection, land administration & use Core process. • Awash national Park Management	as replacement

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
			• Prohibit project workers from encroachment and poaching forest and wildlife areas, • Neither fire setting, nor disposal of lit matches and/or unlit used cigarette will be done in the forests. Avoid smoking as far as possible while working in the park area. • Accidental oil spills and refueling will be avoided as far as possible. In case it happens immediate remedial measures should be taken (clean ups of the spilled fuel will be done). • Arrange awareness creation program for machine operators and site supervisors on work discipline to be followed while working in the densely forested and wildlife		

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
			sites, so as to take care of the natural forests, not to damage or fell trees beyond what is essentially required for the railway width. • The rules and regulations set for the core and buffer zones of the Awash National Park management will be strictly observed, and workers are instructed and supervised to act as per the required discipline. • Prohibit forest fire setting and supervise fire risks by construction crew to minimize vegetation and wildlife damage and kills. • Re-vegetation of uncovered and graded grounds, excavated and abandoned quarry sites as soon as site work ends		

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
			• Planting at least 15-seedlings for every tree cut as a replacement to damaged forest resource.		
		• Illegal Timber cutting & trade • Illegal hunting	• Prohibit illegal hunting through regulations. • Prohibit and regulate illegal timber cutting and charcoal trade in the area.	• Woreda environmental protection and land administration core process • The Community • NGOs active in the area	Administrative cost
		• water source shortage,	• *Competition over water use due to influx of workers in the area, and due to the construction activity should be regulated by*	Contractor Respective Water	• Included in

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		• water quality deterioration due to contaminants, • Water supply service interruptions	*giving priorities to the resident community; the contractor will arrange water supply point that doesn't interfere with that of the local community.* • *To minimize Siltation and Sediment deposit in rivers and streams traversed by the rail line , at wetlands/marshlands along river banks and at quarry sites;* • *Program excavation activities at river crossing areas during dry period,* • *Re-vegetate erodible soil surfaces as soon as possible* • *Protect sensitive surfaces with mulch or fabrics, Stone ripraps, gabions etc.*	bureau	engineering costs for physical construction works • Cost estimate for compensation is included under RAP report

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
			• *Divert run off water flow through steep slope and erosion prone areas.* • *The road project may interfere with water supply systems in urban areas. In such cases, either the design has to consider avoiding the alignment or the water line has to be relocated. Arrangements have to be made for the relocation and compensation. Relocation has to be made prior to mobilizing the construction work or alternative supply line is provided until relocation is done, not to interrupt the water supply service.*		
		• Wetlands/marshlands degradation	*To minimize wetland/ marshland contamination and pollution effects;*	Contractor/ supervising consultant	Included in the construction

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		during works, • decrease in recharge rate, • contamination by oil and chemical product)	• *Maintenance of vehicle to minimize oil spills and prohibit open field waste disposal.* • *Minimize disturbance by the construction works in compliance with works contracts/ specifications* • *Provide adequate flow dispersal structure (culverts, etc.) to maintain the natural flow direction and to avoid flow concentration to specific locations, and maintain normal recharge of the wetland areas.*	ERC	cost estimates
		• Air pollution from crushers and asphalt plant • Dust pollution and	• *Avoid excessive noise in the premises of wildlife habitats of Awash National park* • *Regular maintenance of machinery and vehicle to reduce excessive gaseous*	Contractor	Part of construction cost

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No	Project Phase	Potential Environamental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		noise during construction	*emissions* • *Install dust and smoke suppression accessories on crasher equipment* • *Locate crushers away from town centers and densely populated areas.* • *Consider wind direction effects while selecting sites for plant erecting.* • *Transported soil and fine particle materials should be covered to protect from spread and wind blow in to the atmosphere.* • *Avoid operating crusher plant during rest hours and sleeping period.*		
			• Workers should be briefed on behavioral	The contractor	

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
			issues as relates to local cultural assets and attitudes and made aware of conducts and respects to be accorded to the community's social life • Locate camps away from sensitive sites like villages, forested lands and wildlife habitat. • Arrange contractual commitments to respect social factors for temporary employees.	The local administration	Administrative cost
		• Loss of crops, trees, fruit and Loss of land due to immigrants in to the area	• Compensation to the affected group should be effected according to regional as well as federal rules and regulations(proclamations No 255/2000, 256/2000) • Resettlement of displaced people and relocation	A committee composing of : • ERA ROW Agent,	As per RAP cost estimates

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		• disruption of other social service infrastructures	of properties and utilities should be completed well in advance of commencing the construction • Resettlement plan should be prepared in consultation and with full participation of the affected group. • Immigrants' land requirement should be administered by the local authorities	• Local administration • Affected group(PAPs) • Utility owners • Agriculture bureau • NGOs in the area • Community representatives	
		Traffic Accidents due to; • Increased	• Flag men /safety personnel assigned to guide traffic flow at critical locations		Included in the Engineering cost estimates

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		construction traffic (vehicle, machinery and non motorized traffic) • interference with wild life migratory routes	• Traffic signs are provided as required. • Speed control and traffic management measures put in place including bumps to be constructed at critical locations • Provide wildlife and animal crossing corridor and/or maintain existing corridor. • Provide over pass/underpass at road junctions and road crossings to avoid accidents with road transport vehicles and animals etc. • Post traffic signs at animal crossing corridors to alert drivers. • Awareness creation on traffic safety and rules	Contractor supervision consultant	

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		Traffic accidents	• Traffic rules and discipline should be observed by all workers. • The employer should ensure that all operators and drivers are fully qualified and are able to handle the responsibility they are assigned to	• Traffic police • Contractor	Administrative cost
		Workers' health problem due to communicable diseases (Water born diseases, respiratory diseases etc)	• Provide water for workers from protected sources or public water supply • Ensure sanitary conditions, proper waste disposal and waste management in camps and at work places. • Rehabilitate excavated grounds at quarry sites and borrow pits to avoid mosquito breeding. • Provide standard clinic; (adequately staffed	• Contractor • Local health institutions	Included in Engineering cost estimates

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
			with skilled professionals; and equipped with necessary medicines and instruments) at main camps.		
		HIV/AIDs pandemic & STD diseases prevalence	• Awareness creation and counseling, • availing of condom & protective facilities	• Contractor's health expert • Woreda health centers • NGOs in the area	Birr 1,700,000 for counseling, awareness creation and provision of condom
		• Impairment of non motorized transport, like camel caravan.	• Provide wider road shoulders and separate lane for pedestrian and non motorized transport • Provide paved and well constructed detour road during road construction.	• Supervising Consultant • Contractor	Part of engineering cost estimate

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
			• Maintain and apply dust suppression measures to minimize dust pollution and vehicle accidents caused due to distant visibility problem.		
		• Increase in Price of consumable items • Employment opportunity • Increase in house hold income	• Arrange and ensure supply of basic consumable items by encouraging entrepreneurs in the area. • Periodically avail basic items to workers at camps against payment of fair prices. • Local work force will be encouraged to benefit from the employment opportunities during construction. • Encourage workers to use locally available products to assist local economy.	• Local administration • Contractor • ERA	Administrative cost

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		Degradation of Sacred places; religious places, monuments and burial places, Archeological sites,	• Protect and avoid as far as possible such sites as burial places • Preserve any archeological findings encountered up on excavation. • Arrange orientation program and training of machine operators on work procedures, and discipline at physical and cultural heritage sites. They need also to be oriented on recognizing types and characteristic of such heritages and means to identify them while undertaking excavation operations. It is also essential that the operators trained on site management procedures to be followed, particularly if a PCR	• Regional/zonal culture and tourism bureau. • Contractor • Supervising consultant • The community • ERC	200,000 Birr for relocation of cemeteries Other measures are Part of administrative costs of each actor

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
			encountered is not movable • Liaison and make arrangements with the regional bureau of culture and tourism for the training and orientation of the workers and to cooperate by timely responding to reported findings. • Report to the relevant bureau up on finding of unregistered heritages as soon as possible, before making any change to its location and feature.		
3	Operation Phase	Soil erosion and soil contamination	• Maintain storm drains and ditches regularly • Grass cover slops and graded grounds, and protect livestock grazing at railway shoulders and embankments	Regional rural roads authority ERC delegated offices	Regular administrative cost

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		Water sources and wetland/marshland ecosystem preservation	• Waste management practices should improve, road side littering especially in towns and villages should be regulated	Municipalities ERA	
			• Minimized vehicular accidents through implementation of traffic and transport regulations – which will be a major cause of oil leakage.	Traffic police	Normal administrative cost

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		Flora and fauna degradation	• Prohibit illegal hunting by enforcing rules and regulations. • Prohibit and regulate illegal timber cutting and charcoal trade in the area. • Supervise closely the protection and conservation of forest areas and wild life habitats. • Minimize forest fire risks by creating awareness among the road users and the surrounding community. • Post warning signals at critical location	o Woreda environment office o Local administrative organs, o farmers' cooperatives o Agricultural bureau o Forestry & wildlife desks	Administration

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		Impairment of non motorized transport Availability of public transport transport cost	• Encourage local mode of transport to sustain, especially for transport of goods to market places and short distance service centers like flour mills, by maintaining separate lane. • Enforcing traffic safety guide lines and posting traffic signs as required • Assign adequate number of transport vehicles both private and public transport. • Transport fees should be in accordance to the improved road standards	Local transport desk	Normal administrative cost

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No	Project Phase	Potential Environmental & Social Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimates (birr)
		Traffic accidents	• Road shoulders have to be kept wide enough especially in towns and villages as per the design for use by the pedestrian. • Maintain traffic posts and traffic signals	District road maintenance team of ERA	Administrative cost
			• Organize awareness creation forum on traffic regulations and safety principles both to the community, drivers and to the investors in transport industry of the area.	Traffic police	Normal Administrative cost.

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8 CONCLUSION AND RECOMMENDATIONS

The implementation of the railway project scales up the transportation network and facilities of the country to a higher standard and coverage. It will have significant contribution to the socio-economic development of the country in general.

The Awash – Armenia rail line segment traverses mainly open animal grazing land and acacia dominated forest covered land at the boundary of the Awash National Parkt in its first section and middle sections; and cultivated crop fields towards the end of the project in Qewet woreda of the Amhara region. Due to its proximity to the Awash National Park, impacts on wildlife of the park and vegetation cover will be significant and is of concern. There are also significant livestock population kept by the pastoralists and herders all along the railway line corridor. These impacts have to be given due attention and proposed mitigation measures have to be strictly implemented and monitored. No ancillary activity will be allowed in the Awash National Park holdings including access road & detour, material production, camping etc. Disturbance to wild animal and livestock population will be minimized as far as possible. Towards the project end, impacts on crop field will be mitigated by proper compensation and minimizing the width of ROW and avoiding ancillary activities in the crop fields. The implementation of the mitigation management plan and strict environmental compliance monitoring system should be in place and has to be included in the work plans of the construction supervision consultant and that of the construction consultant.

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APPENDIX NO. 5: LOT 11-ESIA Report (APRIL 2012)

THE FEDERAL DEMOCRATIC REPUBLIC OF ETIOPIA (FDRE)
ETHIOPIAN RAILWAYS CORPORATION (ERC)

CONSULTANCY SERVICES FOR DETAIL ENGINEERING DESIGN, TENDER DOCUMENT PREPARATION & CONSTRUCTION SUPERVISION OF LOT 11, ARMENIYA - KEMISSIE RAILWAY PROJECT

Final Environmental Impact Assessment Report

April, 2012

Engineering Consult

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1. BACKGROUND INFORMATION

1.1 Introduction

Railway has been the effective means of land transport for freight & passenger since the days of the industrial revolution. It has also been the driving force of the socio-economic development of the successful economics of the world for over 150 years. Currently the developing countries are realizing the importance of the railway industry and have been investing in the infrastructure. It is also believed that a railway system well integrated with other modes of transport is environmentally friendly, economically feasible and can be a growth engine for developing economy.

It is with the above background that the FDRE Government in its Growth & Transformation Plan (GTP) is engaged in the implementation of over 2300 km of railway in eight corridors connecting the potential development areas of Ethiopia.
The Ethiopian Railway Corporation (ERC) has identified eight railway corridors for study, design and subsequent implementation with the regulation mandates to develop railway infrastructure and provide Passenger and freight rail transportation services in Ethiopia.

The Armenia- Kemise rail way project is one segment of the eight railway corridors that the Government of the Federal Democratic Republic of Ethiopia endeavors to connect in order to meet the requirements of the increased socio-economic activities along the rail way project corridor.
The proposed railway construction will have essential benefits to the Nation's economy as well as to the environment through promotion and enhancement of social and economic development along the Project corridor and its catchment areas respectively.

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1.2 Objectives of the Environmental Impact Assessment

The fundamental objective of the environmental impact assessment is to ensure that the proposed Rail-way project is environmentally sound and contributes to the socio - economic development of the country. It is also expected to provide a means whereby the overall environmental performance of this project can be enhanced through:

- Identification of sensitive environmental components likely to be affected by the rail-way project.
- Identification and evaluation of the potential impacts associated with project implementation and subsequent operation, and
- Preparation of plans and mitigation measures that will minimize adverse impacts and enhance beneficial impacts.

1.3. Methodology and approach for the study

The methodology of this Environmental Impact Assessment (EIA) is based on the review of the available data and information, comprehensive field surveys, and consultations with the local authorities and local community members which are concerned / affected with the proposed Armenia - Kemise rail-way project.

Site visits where carried out to assess existing environmental conditions of the rail-way project influence areas, to identify sensitive environmental components that are likely to be significantly affected by the rail-way project.

During the field investigation, information on physical and biological resources, economic development activities, socio-economic profile data, have been collected. Woreda level and zonal level data were collected from the respective offices.

1.4. Limits of the study area

The environmental Impact Assessment study has been conducted for those areas that would be influenced by the impacts of the rail-way project implementation. The rail-way route corridor, the woredas traversed by the rail-way and the neighboring woredas are the most impacted areas either directly or indirectly by the project implementation. The socio- economic and environmental impacts can, however, be felt beyond those limits. The Right - Of - Way width of 40 meters shall be considered following the centerline of the proposed rail-way alignment, and

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this is expected to be the area that would be most affected by the direct impacts of the railway project.

2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1. The Constitution of FDRE

The Constitution (FDRE 1995), 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 forms the fundamental basis for the development of specific environmental legislative instruments.

In the section which deals with democratic rights, Article 43 gives the right to people to improved living standards and to sustainable development. Article 92 of Chapter 10 (which sets out national policy principles and objectives), includes the following significant environmental objectives:

- Government shall endeavor to ensure that all Ethiopians live in a clean and healthy environment (Article 44 states that all persons have the right to a clean and healthy environment)
- 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. Peasants have the right to obtain land without payment, and are protected against eviction from land in their possession. Full right to immovable property and permanent improvements to land is vested in individuals who have built the property or made the improvements, but government may expropriate such property for public purposes, subject to the payment in advance of compensation commensurate to the value of the property or alternative means of compensation, including relocation with adequate State assistance.

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2.2 Environmental policy of Ethiopia

The Environmental Policy of Ethiopia (EPE) has provisions quite relevant to road and transportation projects concerning impact assessment, resettlement and rehabilitation issues. The major elements are:

- to ensure that environmental impact assessments (EIA) consider not only physical and biological impacts but also address social, socio-economic, political and cultural conditions;
- to recognize that public consultation is an integral part of an EIA (Proclamation 299/2002, Part Five-Article 15, Public Participation) and ensure that EIA procedures make provision for both an independent review and public comment before consideration of decision makers;
- to ensure that an environmental impact statement always includes mitigation plans for environmental management problems and contingency plans in case of accidents;
- to ensure that, at specified intervals during the project implementation, environmental audits regarding monitoring, inspection and record keeping take place for activities where these have been required by the Environmental Impact Statement (Proclamation 299/2002, Part Four-Article12, Implementation Monitoring);
- to ensure that preliminary and full EIAs are undertaken by the relevant sectoral ministries or departments, if in the public sector, and by the developer, if in the private sector, in accordance with Proclamation No. 299/2002 in order to predict and manage the environmental effects of proposed development activities and resulting in modification or termination of its design or ongoing construction/operation;
- to create by law an EIA process which requires appropriate environmental impact statements and environmental audits for private and state development projects;
- to establish the necessary institutional framework and determine the linkages of its parts for undertaking, co-coordinating and approving EIAs and the subsequent system of environmental audits required to ensure compliance with conditionalities;
- to develop detailed sectoral technical guidelines in EIAs and environmental audits;
- to ensure that social, socio-economic, political and cultural conditions are considered in environmental impact assessment procedures and included in sectoral guidelines; and

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- To develop EIA and environmental audit capacity and capability in the Environmental Protection Authority, sectoral ministries and agencies as well as in the regions.

2.3 Sectoral Environmental Policies

Several detailed sectoral environmental policies are currently in various stages of preparation. Some of the sectoral environmental policies cover:

- 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

Water Resource Policy: The 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 to establish and institutionalize environment conservation and protection requirements as integral parts of water resources planning and project development.

Wildlife policy: It is developed by the Ministry of Agriculture 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 into 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.

Proclamation on Conservation, Development and Utilization of Forests This Proclamation 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. 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.

National Population Policy:- This Policy was issued in April 1993 and aims at closing the gap between high population growth and low economic productivity through a planned reduction in population growth combined with an increase in economic returns. With specific reference to natural resources, the main objectives National Population Policy are:

- Making population and economic growth compatible and the over-exploitation of natural resources unnecessary;
- Ensuring spatially balanced population distribution patterns, with a view to maintaining environmental security and extending the scope of development activities;
- Improving productivity of agriculture and introducing off-farm non-agricultural activities for the purpose of employment diversification; and
- Maintaining and improving the carrying capacity of the environment by taking appropriate environmental protection and conservation measures.

National Policy on Women: - This Policy was issued in March 1993 emphasizing that all economic and social programs and activities should ensure equal access of men and women to the Country's resources and in the decision making process so that they can benefit equally from all activities carried out by the Federal and Regional Institutions.

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2.4 Land Tenure

Land is the property of the state/public and does not require compensation. The land Proclamations 31/1975 of rural land and 47/1975 of urban land stated that the Government holds the ownership of land. The constitution of 1995 also retained land ownership under the Ethiopian people. Buying, selling or exchanging to other means is prohibited, however, tenure rights and leasing of use rights to or from others is ensured. Article 7(72) of proclamation 4/1975 states that the Government shall pay fair compensation for property found on the land, but the amount of compensation shall not take any value of the land into account, because land is owned by state.

Proclamations No. 80/1997, article 6.18 and No.55/1993, article 5, 2(k), state that ERA shall use, free of charge, land and such other resources and quarry substances for the purpose of construction of highways, camp, storage of equipment and other required services, provided, however, that it shall pay compensations for the properties on the land it uses. The Authority pays compensation for the property on the land.

Dislocated farmers will be paid equivalent amount to the benefits they are supposed to get from their land had they where not displaced from their original.

Proclamation No.455/2005 is addressing the procedures and the responsibilities of the implementing agencies for the expropriation of land holdings for public purposes, and the procedures for valuation of properties and for the determination and payment of appropriate compensation.

The Right-of-Way (ROW) is the land allocated and preserved by the law for the public use in road construction, rehabilitation and maintenance work. For example in the ERA Geometric Design Manual - 2002 (Tables 2-3 through 2-7) 50m width on either side of the road centreline fall into the legal ROW for roads of Design Standards DS1 to DS5. Thus, property within those limits could be removed/demolished by the road authority without public consultation.

2.6 Environmental Legislations Framework

The Federal Government has recently approved three Proclamations. These represent a framework building on the policies and strategies set out in the CSE and the EPE, which sets out basic and general provisions for the regulation of environmental matters and is proposed to be supplemented in due course by more sector-specific legislation.

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2.7 Proclamation on Environmental Impact Assessment

The aim of this Proclamation No. 299/2002 is to make an EIA mandatory for specified categories of activities undertaken either by the public or private sectors and is the legal tool for environmental planning, management and monitoring. The Proclamation elaborates on considerations with respect to the assessment of positive and negative impacts and states that the impact of a project shall be assessed on the basis of the size, location, nature, cumulative effect with other concurrent impacts or phenomena, trans-regional context, duration, reversibility or irreversibility or other related effects of a project. Categories of projects that will require full EIA (given in an Annex to the Proclamation), not full EIA (some negative impacts expected but not too serious) or no EIA (for reasons of "special" or "overriding interests").

To affect the requirements of this Proclamation the EPA issued an *'Environmental Impact Assessment Guideline Document (May 2000)'*, which provides in depth detail to the EIA process and its requirements. The Guideline follows the conventional pattern adopted in many other countries and makes provision for screening, scooping, identification and evaluation of impacts, the development of environmental

2.8 Proclamation on Environmental Pollution Control

This Proclamation No. 300/2002 is mainly based on the right of each citizen to have a healthy environment, as well as on the obligation to protect the environment of the Country and its primary objective is to provide the basis from which the relevant ambient environmental standards applicable to Ethiopia can be developed, and to make the violation of these standards a punishable act. The Proclamation states that the "polluter pays" principle will be applied to all persons. Under this proclamation, the EPA is given the mandate for the creation of the function of Environmental Inspectors. These inspectors (to be assigned by EPA or regional environmental agencies) are given the authority to ensure implementation and enforcement of environmental standards and related requirements. In addition to this, Proclamation No. 200/2000 addresses public health issues.

2.9 Institutional and Administrative Framework

2.9.1 Federal and Regional Administration

The Federal Democratic Republic of Ethiopia comprises of the Federal states with nine Regional State members. The Federal Government acts from the centre to the regions and localities, and its respective duties and authority including fiscal matters at the different levels (Federal, Regional and Local) have been defined by the Constitution.

The duties and responsibilities of the Regional States include planning, directing and developing social and economic programs as well as the administration, development and protection of natural resources of their respective regions. The basic administrative units in each Regional Government are the Woredas, which sub-units are the Kebeles in urban areas and farmers associations in rural areas. Further, based on their authority and responsibilities the regional governments have established Sectoral Bureau, Commissions and Authorities.

2.9.2 Environmental Protection Authority (EPA)

One of the environmental policies of the EPA is to protect and rehabilitate the fundamental causes that lead to degradation, adverse effects and determine mitigation measures. The policy is usually integrated and compatible to fit to a long term economic development strategy known as agricultural development-led industrialization (ADLI) and other key policies. As per sub-article 2 of article 6 of Proclamation No.9 of 1995, environmental development and management as well as protection in Ethiopia are designated. In this case the socio-environmental assessment needs to be reviewed and incorporated into different road project phases: at designing & planning, construction, monitoring, post-project evaluation and maintenance phases.

2.9.3 Road sector policies and guidelines

Road and Rail way sector Environmental Assessment Guideline, Federal EPA, 2004. The guide line describes major environmental issues related to a road or railway Projects. The guideline highlights major issues and potential impacts that should be taken into account during the preparation and assessment phases. It emphasizes that appropriate enhancement and mitigation measures should be integrated as early as possible, preferably in the project design.

2.9.4 World Bank policies

The World Bank provides guidance on requirements in the Environmental Assessment Sourcebook, which includes recent versions of the World Bank Operational Policies as well as the updates. The World Bank has ten "Safeguard Policies" whose primary objective is to ensure

that Bank operations do not cause adverse impacts and that they "do no harm". The ten Development and International Law. Of these ten safeguard policies, three are not applicable as they relate to international law on waters and disputed areas, and the safety of dams.

2.9.5 Multilateral Agreement

The Federal Democratic Republic of Ethiopia has ratified several international conventions and protocols and these include:

- Vienna Convention on Ozone Layer Protection (1990);
- Montreal Protocol for Substances Depleting the Ozone Layer (1990);
- Convention on Biodiversity (Rio convention) (1997);
- Framework Convention of United Nations on Climate Change (1997);
- Convention on the Control of Transboundary Movement of Hazardous Substance

3.0: PROJECT DESCRIPTION

3.1 Background to the project

3.1.1 Location

The lot 11, Armenia – Kemise Rail way Project is located in the North-East part of Ethiopia. The project rail-way is the one that connecting the North part with the East part of the country and Djibouti. The project Rail –way traverses through North shewa of Amhara region and Kemise Oromia special zone of Amhara regional state.

The Armenia – Kemise rail-way project starts from Seffi Beret of Kewot Woreda in North Shewa, traversing Kewot, Jile Tumuga, Eferata Gidim, Artuma Fursi and Antsokia woreds and it follows a North eastern direction. There are three tunnels on the route from Seffi Beret to Kemise at chainages (42+700 - 49+800), (56+500- 56+700), (68+200 – 75+600). The total distances of this project railway from Armenia to Kemise covers 105 km.

The Project rail way will be a major link providing access to a large part of Amhara and Tigray regional states, thereby becomes a short cut to important agricultural and tourist areas in the Northern part of the country as well as facilitating suitable conditions of market accessibility that connecting the North parts of the country with the East. At present, the lack of access road directly connecting North parts of the country to the East parts imposes difficulties and heavy

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costs in the movement of goods and people. As a result, the road's condition hinders national and sub-regional development and integration.

photo:- Tunnel

3.1.2 Project rationale

The railway project is one of the components of the Road Sector Development Programme given attention now a days and has been formulated to improve and expand the country's road network in the GTP, and which has been given high priority by the Government of Ethiopia in order to stimulate growth of the economy in the country.

Agriculture holds a strategic position in relation to the economic development of Ethiopia, and is expected to do so for the foreseeable future. The overall, long-term economic development policy is centered on implementation of a strategy known as Agricultural Development-Led Industrialization (ADLI) which, in part at least, is based on the supply of agricultural products including livestock to processing industries. Agricultural exports also form a significant proportion of the country's foreign currency earnings.

Growth in agricultural output is seen as the key factor governing growth of the economy in general, and is dependent on an efficient road transport system which connects producers with processors and consumers of agricultural products, and also allows cost-effective transport from major product collection points to the export port of Djibouti.

The majority of agricultural producers are small-holder farmers, who are located in dispersed small rural communities throughout most of the project area in particular and in the country in

general. On the other hand, major markets, processing and collection centers, and the distribution points for agricultural inputs are located in relatively few urban centers, which are mainly located at some distance from the primary producers.

The present rail way project construction, through providing transport facilities and communications between North and East parts of the country, as well as to the export port Djibout is expected to make a significant contribution to lessen some of the constraints on agricultural and livestock resources development in the project area.

4. BASELINE ENVIRONMENTAL CONDITION OF THE PROJECT AREA

4.1 Physical environment

4.1.1 Topography

The Armenia – Kemise rail way project is situated in North Shewa and Oromia special zones of Amhara regional state. The project starts from Kewot woreda which is fall below 1500 m a.s.l and traverses Jile Tumuga which 80% of the woreda land mass is found below 1500 m a.s.l.

According to the data obtained from Zonal BoFD, (2002 E.C), the topography along the Armenia - Kemise rail way project section can be described as predominantly rolling with some undulating and mountainous sections

Photo:- landscape of some place of the project area

4.1.2 Climate

Ethiopia has three climatic zones: a cool zone of the high plateaux above 2,400m, a temperate zone between 1,500 and 2,400m and the hot lowlands below 1,500m. As the woredas' socio-economic profile indicate, however, the climatic conditions of the project areas varies from place to place depending mainly on the altitude , most of the land mass of the woredas in which the rail way project traverses located below 1500m.

The mean annul temperature in Jile Tummuga and Kewot woredas 20- 27°c and descends in Eferata Gidim and Artuma Fursi woredas in the range of 15- 20°c. The climate in the project area lies predominantly within the hot lowlands. Hence, the annual temperature range of the rail way Project route has similar trend throughout the seasons and varies between 20 °C and 27 °C.

Most of the rail way project areas have bimodal rainy season. However, there have been considerable rains observed in Kiremt, Meher and Belg with differences in amount of rain and duration. According to the data obtained from the project woredas the annual maximum rain fall is 1800ml and the annual minimum rain fall in the project area is 1500ml.

4.1.3 Air quality and Ambient noise

Air quality record is none existent and is not common practice nationwide, hence there is no information regarding the air quality of the project area. In view of the absence of major industries, and the relatively low traffic volumes on the existing road passing through the proposed railway project, it is assumed that the local air quality is not disturbed so far.

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Data regarding ambient noise levels is not available and is difficult to indicate numerically the situation in the project area. However, in view of the low level of traffic load in the area and with the rural character of the railway project route corridor, it can reasonably be assumed that ambient noise levels in the project areas are below the widely accepted guideline level (Leq) of 65 dB, above which significant noise nuisance may be experienced.

4.1.4 Geology

The geological structure through which the Armenia - Kemise rail way project passes belongs to the Mesozoic Sediments and the Precambrian Metamorphic.

4.1.5 Soils and Soil Erosion

The predominant soil types of the project areas is Eutric Cambisols 51.85%, Vertic Cambisols 14.96%, Eutric Rigosols 13.82% and Chromic Vertisols 5. 87%. Soil erosion has been observed to be severe along the rail way alignment, due to the nearly completely deforested landscape of the woredas that the rail way traverses. Many areas are subject to wind and water erosion; thereby deep gullies have been formed presenting a risk and creating obstructions to the movement of people and animals.

In particular severe gully erosion is seen on sloppy/hilly areas where erosion protection measures were not implemented and where the ridge of hilly has been left bare. Controlling soil erosion by means of various physical, engineering and biological methods like check dams, micro basin, sufficient cross drainage, hill terracing & trenches, tree planting and grass strips for sediment trapping is lacking. Some efforts have been prevailed in some areas of the rail way project corridor, which have contributed to lessen the erosion problem by covering the bare hill sides with vegetation, concentrating and diverting surface runoff water flows that has resulted in serious erosion in the roadside drains, diversion ditches and/or in downstream areas

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Photo: -Gully formed by erosion

41.6 Water Sources

The Armenia - Kemise rail way project is located in the North East upper catchment areas of Awash basins. The rivers crossing the rail way project, namely Jewa, Robit, and Borkena are drain to Awash River.

Robit River and Borkena River around shewa Robit and in Dewa Chefa are used for irrigation respectively. Borkenna river forms swampy/ wetland nearby kemise, which is used for grazing and irrigation. Surface water sources are scarce along the rail way route. Though there are some streams and small river courses encountered along the route, most of them are seasonally flowing (only during the rainy period)

Competing water uses may encounter during the constriction period, with the local community and other development activities. The contractor is expected to investigate other sources to augment its requirements and to avoid interferences with the community's demand so as to keep their usual uses uninterrupted.

Wetlands and marshland

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Wetlands have got several important functions to the local environment, to the community and to the wild life. Wetland ecosystems is also valuable for ground water recharge discharge processes, control sediment & floristic retention, pollutants removal, food protection & food chain support, and serve as wild life habitat and for climate control. Wet- lands support a wide range of biotical, hydrological, and physical processes which result in the proper ecosystem function and the provision of valuable goods and services. Typical species Common to flooded grassland include; Hypermedia rube, Echinochload scrabra (stagnina), Leersia hexandra, paspalidium geminate.

There are two wetland areas on the rail way project route at around karra koree village and which is formed by Borkena River nearby kemise. These wet lands are seasonally flooded during rainy period and gradually get drier / shrink during the dry season. They are the major grazing and irrigation grounds during the dry season.

Photo:- wetlands of Borkena River on the route of Railway Project

4.1.7 Land Use and Land Cover

The Armenia – Kemise rail way project corridor shows agricultural activities with about 31% crop cultivation, 15% grassland, 19% bush & shrub land. Main land use activities are based on rain fed subsistent peasant cultivation of grains, bil seeds, pulses. Livestock rearing cows, camels, goats and donkeys is relatively high, especially in the vicinity of the villages/towns.

Traditional small scale irrigation of fields was encountered during the field investigations, along the rail way project route at jawuha river, Majet Village, Borkena River.

Photo:- Irrigation on the railway project route at Majete

4.2. Biological Environment

4.2.1 Vegetation

There is no considerable forest on the Armenia – Kemise rail way project route. Scattered shrubs and bushes have been observed in the woredas of the project traverses. Most of the flora along the rail way project corridor has been destructed and transformed into cultivated farmland and grazing areas for livestock. The hill sides and mountains ridges are seen bare without vegetation cover.

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Photo: vegetation covers of the project traverse (around seffi beret & Kerra Kore)

4.2.2 Wildlife

The wildlife population and native wildlife habitat have been significantly impacted by both natural and man-made causes and this has resulted in low wildlife diversity in the areas and along the rail way project influence areas. Different types of wildlife and birds are found in the woredas in which the railway project will traverse. According to the data collected from woredas of the project area reveales there are some wildlife common in the project woredas. This list include; like hyena, Monkey, Rabbit, Hedgehog, Chameleon, Spring bok, Wolf, Ape, warthog, and duiker.

4.2.3 Protected Areas and Sensitive Habitats

Within the rail way project corridor/ route from Seffi Beret in Kewot woreda to Kemise, no protected areas are existing. However, sensitive ecosystem wetlands found around kera kore villege and Borkena River are traversed by the railway projects respectively. These swampy lands (wetlands) are used for irrigation and livestock grazing during dry seasons.

4.3 Historical, Cultural, Religious and Archaeological Resources.

The Ethiopian Tourism Commission has published a Tourism Master Plan (Tourconsult, 1995) which identified a number of sites of historical, cultural, religious and archaeological importance

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in the country and none of these are located along this railway Project route. Enquiries to residents along the railway project have indicated that even though there are some historical, religious and cultural sites in the woredas traversed by the railway project, the project corridor is neither contiguous with, nor in close proximity with any of them.

4.4 Economic Conditions and Livelihood

Agriculture sector is the main livelihood base of population of the project area. However, it is characterized by lack of access to modern technology, market, low productivity, dependency on rainfall and lack of advanced irrigation practice, etc. As a result the sector has remained subsistence in its nature.

According to the data extracted from the socio- economic profile of the woredas in which the railway project traverses the major types of crops that are produced include sorghum, maize, teff, and wheat from cereals and horse beans from pulses and Niger seed from Oilseeds. Sorghum occupies the largest cultivated land area and production that accounts for 42.5 % and 48.5 % of the project area land under crops respectively and used as the most staple crops of the area. Sorghum is the leading crop followed by Teff. Rain fed agriculture is the dominant crop production system of the project area during Meher season under private peasant holdings.

Livestock has a great interdependence with the rural area and makes a substantial contribution to the rural economy. Most rural farming, transport and source of income do directly or indirectly link with them. There are diversified livestock populations found in the project route. As data obtained from the project woredas indicted, in terms of livestock population cattle stands first in number 395731 and that is followed by Goats 157839. The major livestock feeds in the project area include open pasture, hay, crop residues. There is a gradual decline in pastureland. On the other hand the regular extension service did not encourage expansion of modern pasture. The productivity of livestock in the Woredas is affected by prevalence of diseases. Various diseases, shortage of feed, traditional method of rearing and problem of water have resulted in diminishing of the livestock population. Due to these cumulative effects the production obtained from livestock still remains low.

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4.5 Stakeholders and public CONSULTATIONS

Stakeholders and public consultation and participation is an integral part of the EIA study and implementation of the EIA recommendations. The Environmental Policy of the FDRE also recognizes that public consultation is an integral part of EIA and that it should be ensured that EIA procedure includes public comments before consideration by decision makers. Also many donor assisted programs and projects require different consultations to ensure people's participation.

Consultations with key stakeholders found along the railway route were conducted during the field visit. Key officials and experts of the Woredas in which the railway project is traversing and the farmers' representatives were contacted and consulted about the proposed railway project. The contacted offices include Woreda Administration and sector offices of Kewot, Jile Timuga, Eferata Gidim, Artuma Fursi and Atsonkia Woredas of the North Shewa and Kemise zone of Amhara region. Furthermore, the Kebele administrators, development committee members, elders and other informative individuals met along the railway project were interviewed.

The different stakeholders; farmers, community leaders, Woreda officials, view is that the implementation of the Project will enhance and improve the economic well being of the society and the quality of life, so that the acceptability of the railway project by the local communities and stakeholders is very high.

A list of organizations and individuals met/contacted during the field surveys is presented in appendix

4.6 Gender Equity

Women in the Railway project area lead the same life style like in almost all rural community of Ethiopia. The major house hold responsibilities fall up on them. In addition to domestic work load and child care, women also take part on agriculture and livestock production activities, water and fire wood fetching etc. activities. Above all women are responsible also to carry and transport their agricultural products to market places and bring their house hold consumable commodities back home.

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On the other hand their school participation and participation in development planning is low. This is due mainly of low level of infrastructure development in the area. The railway project implementation in the area shall improve the availability of transport facility in the area, which would enable to relieve most of the burdens of the women in the area.

5. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1 General

The major positive impacts of the rail way project are those of social and economic benefits attained from the improved transport access in the region due to the construction of this rail way, while major adverse impacts are attributed to the impact on the vegetation and wildlife habitats traversed by the rail way project route, and pollutions emanated from construction and operation phases, loss of farm and grazing lands

Hence, early in the design process, a decision has to be made to avoid disrupting important historic and ecological sites. The impacts of the construction phase have been identified and steps will be taken to ensure that these are short-term and reversible apart from the construction of the rail way line and the resettling of people following land acquisition for the railway, long-term and irreversible impacts have been minimized and mitigation measures developed.

All contractors will be required to coordinate with appropriate local officials and monitoring agencies before and during construction. They will be required to inform workers of the need to adhere to appropriate standards and to use best practice; Applicable laws, regulations and standards are presented in the EIA guidelines.

5.2 Adverse Impacts

5.2.1 Loss of Land under Various Uses

Construction of the proposed rail way project will cause a permanent loss of land due to land acquisition for railway line. In addition, there will be temporary land losses that mainly will arise from construction of access roads to material sites, exploitation of quarries and borrow pits, establishment of contractor's site facilities (campsites and construction materials processing and storage sites), and disposal of spoil materials from tunnels and land cuts. The land loss at most of the quarries and borrow sites could be permanent as restoration of those sites to productive state may be not feasible

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Mitigation Measures

Mitigation measures proposed to minimize land losses include the following:

- Apply appropriate engineering design in order to keep the land requirement for the construction of the road to the absolute minimum.
- Limit land acquisition and works/ operating equipment to the imperative area/zone shown in the engineering design to minimize land losses and compaction of adjacent lands..
- Avoid side-tipping of excavated materials onto adjacent agricultural lands or vegetation areas or down-slopes. All surplus excavation materials should be disposed of in approved spoil disposal areas with appropriate landscaping and planting with appropriate species afterwards.
- Reinstate the land areas affected by temporary uses like campsites, detour roads, and access roads to productive state by removal of existing pavement materials, loosening of compacted soils and spreading of the topsoil stockpiled for this purpose.
- Implement effective drainage systems that would minimize erosion or flooding by runoff water diverted or concentrated and released onto productive lands in adjacent or downstream areas.
- Restore borrow sites, construction camps and materials processing and storage sites through back-filling, landscaping, covering with top soil and re-establishing vegetation cover to the extent possible.
- Preserve topsoil from the realignments, borrow sites and site facilities for re-use on embankment slopes and for re-filling borrow sites and reinstating the land taken for access roads

5.2.2 Air Pollution and Noise

During construction, there will be a moderate and temporary deterioration in air quality, caused mainly by dust accompanied by minor increases in the level of NOx and SOx (from construction equipment). The dust will settle on trees and crops, and will cause some degree of respiratory stress for nearby residents. Construction work and equipment will cause noise and dust development which creates nuisance for local residents or endangering of traffic and will disturb traditional irrigation. Moreover, the exploitation of borrow pits and quarries, and the transport of

construction material will create noise and dust, which finally leads to nuisance of local community.

Mitigation Measures

Frequent use of water spray trucks to wet down the roads to suppress dust emission will be mandatory. Contractors will use low-sulfur gasoline and diesel fuel, and the exhaust fumes of the equipment will meet emission standards. Equipment and vehicles that show excessive emissions of exhaust gases and noise due to inefficient combustion of engine fuel shall be maintained and checked periodically.

5.2.3 Competition for water resources

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, cattle watering and in some areas for small scale irrigation 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 amount of withdrawals by contractors could reduce water availability to existing downstream users. In view of the widespread need for contractor abstraction over a large part and the serious implications of reduced supplies for the local communities especially for low flowing watercourses potential impact is considered to be very significant.

Mitigation Measures

Impact can be minimized satisfactorily by requiring the contractor 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. Therefore, water for construction either has to be made available by constructing ponds or transporting from River or other streams in the vicinity where there is no crowded users.

5.2.4 Adverse Impacts on Wildlife

Ethiopia is making efforts to protect biodiversity and conserve resources through the creation of protected parks, wildlife resources, and controlled hunting areas. The establishment of these Conservation and Protection Areas has been one of the more farsighted and ecologically beneficial occurrences in the country.

There are no rare and endangered wildlife species in the project area that are suspected of extinction or disappearing. No wildlife sanctuaries or protected site that has been identified in the study corridor. According to Ethiopian Wildlife and Natural History Society (EWNHS, 1996), none of the 69 nationally designated Important Bird Areas are found anywhere near the project road. The impacts of the project on the available wildlife resources can be flee of the wildlife from the area due to the destruction of their habitats. In addition, illegal hunting, disturbance by machine noise and accidents affect the wildlife existing in the railway project corridor.

Mitigation measures to conserve wildlife are dependent on the extent of measures taken to conserve the wildlife habitat mainly the vegetation cover and forest resources.

Mitigation Measures

- Illegal hunting and poaching in to the wildlife areas be prohibited and supervised both by the project implementers and the local administrative structure.
- Traffic regulations shall be put in place and traffic posts erected at critical locations be implemented to minimize accidents to wild life.
- During the construction phase the contractor shall implement the following mitigation measures so as to minimize the impacts on wildlife
- Awareness creation programs on the precautions to be taken while operating in wildlife areas shall be organized and conducted by the contractors.
- The contractor shall instruct and supervise his work force not to involve in illegal hunting, poaching and encroaching in to wildlife habitat and killing of wild animals, not to involve in trading, transporting and endangering wild animals.
- The contractor shall maintain road side vegetation cover and forest trees that can serve as wild life habitat and as wildlife corridor..

5.2.5 Impacts on Sensitive Ecosystem Wetlands

Valuable wetlands immediately adjacent to the railway project route are found at Kerra kore and around kemise on the Borkena river. The railway construction can affect the ecosystem by increased movements of heavy trucks in the wetland, dumping spoil soil on the swampy areas,

increased more pressure by extracting water from the wetlands for the consumption of different purposes, which results in drying up of the wetlands. This can damage the life system found in the wetland and consequently affects the proper functioning of the wetland.

Mitigation Measures

The proposed mitigation measures in order to maintain the proper functioning of the wetland ecosystem are;

- The design of the railway has to be done taking in to account to create buffers between the railway line and the wetland
- The contractor has to take the responsibility of not disposing spoil soil and other waste materials in the wetland. They have to use environmentally sound waste disposal sites
- The contractor has to arrange to use its own water sources either by digging bore holes or fetching from rivers without competing with local community
- The borrow pits and quarry site are not located crossing the wetland in order to reduce the movement of heavy trucks and other vehicles over the wetland to transport the raw materials

5.2.6 Environmental Health and occupational Diseases

The influx of people by the contractor's work force may create an impact on the community health as well as on the construction workers themselves through communicable diseases and sexually transmitted infections. Stagnant waters caused by uncompleted construction activities in/near housing areas could bother people and create hygienic problems.

The exploitation of borrow pits and quarries with heavy machinery could create health risks for the worker's. Quarry sites and borrow pits become breeding sites of water borne vectors since past experience in Ethiopia shows that hardly any attempt was made to reinstate the quarry/borrow pit land to its original condition.

Mitigation Measures

Concerning general health problems in the project area and sexually transmitted infections including HIV/AIDS, the contractor's Safety/Health Officer shall liaise with the local health authorities and provide the necessary information on precautionary measures to the work force through educational lesson.

According to the nature of work and with regards to the climatic conditions in the project area the workers need to be provided with appropriate protective clothing. First aid facilities have to be on site as well as a first aid station in the camp.

Newly opened materials sources as well as the newly used areas of existing sources shall be restored after completion of works to their initial state. Sites shall be graded, well drained and replanted with grass seeding and appropriate vegetation. The contractor has to submit a re-cultivation plan for the borrow pits/quarries to the supervising engineer before starting exploitation.

5.2.6 Exposure to HIV/AIDS and Other Sexually Transmitted Diseases (STDs)

Ethiopia, the HIV/AIDS pandemic has emerged as a major health hazard, affecting mainly the age group 15 to 49 years who are supposed to be highly productive. Road construction and other similar type of project workers and truck drivers are considered to have high potential for the spread of HIV/AIDS and other sexually transmitted diseases (hereafter called STDs) due to their mobility. This is partly because construction workers are mostly young, sexually active group of the population, mobile and are partly because they are forced to live in hotels and camps without their families.

Impacts from the construction camps will be severe if camps are built close to the local settlement areas. The impact from the construction camps that are constructed close to settlement areas may contribute more to the spread of communicable diseases such as STD and HIV/AIDS. The other impact is transmission of HIV/AIDS from local sex workers to the project workforce. Hence, when dealing with the pandemic problem, not only the project workers shall be assumed as carriers, rather, they may be equally vulnerable from local (sex workers) carriers.

Mitigation Measures

As preventive measures, construction workers and local population must be informed through education campaigns about HIV/AIDS. This has to be done on the one hand by the contractor, responsible for his workers and on the other hand by the communities along the railway project targeting specially women.

At the community level, special information campaign for women should be enhanced. Condoms shall be provided at subsidized rate or for free and health facilities must be supported with supply

of condoms and must communicate information about risks. To have an effect in the long-term, schools should include information campaigns and/or special courses as suggested below:-

- Conduct education and awareness creation campaigns on the spread and transmission of HIV/AIDS and other STDs for the construction workers and local communities living close to the construction camp sites
- Provide free distribution of condoms to construction workers by the contractor to check the spread of HIV/AIDS and other STDs
- Put educational posters and flyers on HIV/AIDS using local language at public gathering locations, bus terminals schools and road sides to minimize the spread of HIV/AIDS
- Monitor the above mitigation measures through proper monitoring indicators
- Adopt ERA's /ERC policy on HIV/AIDS and make a condition on the contract of the construction works
- Spread education for preventing communicable diseases, HIV/AIDS and other STDs and practicing Safe Sex by using condom

5.3 Positive/ Beneficial Impacts of the Railway Project

Development projects are planned for the socio-economic development of the nation and to bring improved life style to the community. The major positive impacts are related to job opportunities, access to health and education and economic growth, with potential gender benefits. The direct and indirect job opportunities that will be provided by the project can be considered as a positive aspect.

The local people will be directly employed to work at the construction sites and others will be employed in sectors of the economy which have been developed by the road such as agriculture and commerce. Some individuals may gain skills of the sector that can be applied in other road construction projects. This project will also give the people of the zone access to health, education and other social facilities.

Improved access will make possible increased mobility of government officials and employees, agricultural inputs and consumption goods and construction materials. Other access benefits will

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be more readily available to the population and extension/social services could more easily be provided by the administration for improved services in the region.

On the gender side, women should benefit from opportunities to work on the project as a result of project gender policy. Such income and opportunities for trade to salaried project workers and provide roadside services to subsequent road users will help women to start small businesses. The railway will also improve the transport facility and eventually introduces general socio economic dynamism to the life of the people who are now living at no more than subsistence level. The major positive impacts are related to job opportunities, access to health and education and economic growth, with potential gender benefits.

6. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

6.1 Environmental Management Plan

Environmental management plan specifies mitigation and monitoring actions with time frames, specific responsibilities assigned and follow-up actions defined. Major negative impacts and proposed mitigation measures have been out-lined in the above sections. Implementations of these measures have to be carried out at different stages of the road construction & operation phases.

During the design stage the consultant should incorporate proposed mitigation measures in the design and tender documents. The contractual agreement should also include articles to enforce the environmental issues. Construction stage activities are mainly the responsibility of the constructor and that of the construction supervision consultant. The actual physical implementation works are carried out mostly at this stage. The execution of the road construction work should also equally treat the implementation of the physical works of environmental mitigation measures.

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

Environmental issues during the operation phase of the railway shall be handled by the ERC, the relevant agency. The staff of the ERC or a designated unit in the ERC should acquire basic

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knowledge of the environmental monitoring activities to effectively assume the responsibility. Training of personnel is, therefore, essential.

The Implementing agent (IA) will work directly with national and local government agencies and with contractors to ensure compliance with standards and the implementation of mitigation measures. The IA will establish an environmental and social monitoring unit that will ensure implementation of the social/environmental management and monitoring plan during construction and operation phases of the project. Independent monitors will verify implementation of appropriate mitigation measures and reporting schedules.

Table 1. Environmental Management Plan for the Armenia – Kemise Rail way Project

Types of Impact	Phases	Mitigation Measures/ benefit enhancement Measures	Responsible Institution	Time	Cost estimated
Soil Erosion	Construction and Operational Periods	Soil erosion protection plan. This will be updated to match the detailed design	Consulting	Design	
Dust and Noise	Construction and Operational Periods	Continuous management measures	Contractor, consultant, local administrative		
Air pollution	Construction and Operational Periods	Regular maintenance of machinery and vehicle to reduce excessive gaseous emissions Install dust and smoke suppression accessories on crasher equipment Transported soil and fine particle materials should be covered to protect from spread and wind blow in to the atmosphere	Contractor ERC Consultant Community Local administration	Construction and Operation	
Water pollution	Construction and Operational Periods	Waste management practices should improve Oil spills and vehicle leakages shall be minimized through regular monitoring and supervision, annual checking of vehicle conditions	Traffic police Water department Regional EPA Local administration	Construction	
Flora and Fauna damage	Construction and Operational Periods	Prohibit illegal hunting by enforcing rules and regulations Prohibit and regulate illegal timber cutting and charcoal trade in the area. Supervise closely the protection and conservation of forest areas and wild life habitats	Local administrative organs, farmers' ERA, ERC Agricultural bureau	Construction	
Solid wastes	Construction	Spoil to be used in embankment and used to fill borrow pits quarry pits garbage and debris buried in landfill	Contractor	Construction	
Cultural, Historical, Archaeological	Construction	Borrow pits, spoils dumps and work camps will not be located within known sites. Preserve any archeological findings	Regional/zonal culture and Tourism bureau Contractor	Construction	

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Sites		encountered up on excavation. Report to the relevant bureau up on finding of unregistered heritages as soon as possible, before making any change to its location and features.	The community		

6.2 Environmental Monitoring Program

Environmental monitoring is an essential tool in relation to environmental management as it provides the basis for rational management decisions regarding impact control. There are two basic forms of monitoring:

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

The monitoring programme for the present project will be undertaken to meet the following objectives:

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

The monitoring activities will be made both internally and by external supervising institutions and/ or other stakeholders.

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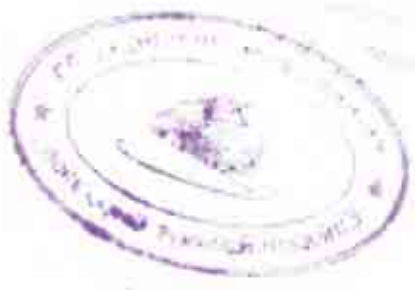

APPENDIX NO. 6: LOT 12 – ESIA Report (MARCH 2012)

Federal Democratic Republic of Ethiopia
Ethiopian Railways Corporation (ERC)

Consultancy Services for The Detailed Engineering Design and Construction Supervision of

Route 5 – Awash – Kombolcha - Mekele Railway Project

Lot 12 - Kemissie-Hayk Railway Project

SOCIAL AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

(FINAL)

March 2012

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Ethiopian Railways Corporation

ACRONYMS

AfDF	African Development Fund
CGD	Community Group Discussions
EMB	Environmental Management Branch of ERA
EPA	Environmental Protection Authority
ERA	Ethiopian Roads Authority
ERC	Ethiopian Railway Corporation
GOs	Government Organizations
HHs	Household Heads
IEE	Initial Environmental Examination
NGOs	Non-Governmental Organization
PAH	Project Affected Households
PAPs	Project Affected Persons
REA	Regional Environmental Agency
SEIA	Socio-environmerntal impact assessment
SMP	Socio-Environmental Management Plan
SEIA	Socio-economic impact assessment
SMP	Social management plan
VCT	Voluntary Counselling and Treatment

WEIGHTS AND MEASURES

ha	hectare
km	kilometre
m	meter
Qtl	Quintal

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DEFINITION OF TERMS	
Compensation	Payment given in cash or in kind to affected households (PAPs) at replacement cost for assets, resources or income acquired or adversely affected by the project.
Food insecurity	Food insecurity is a situation in which individuals have neither physical nor economic access to the nourishment they need.
Food security	Food security is conventionally defined as "access by all people at all times to enough food for an active and healthy life" (World Bank 1986).
Inventory of loses (IOL)	This involves the conduct of empirical survey to identify the affected properties due to the project implementation.
Involuntary resettlement	Resettlement is involuntary when it occurs without the informed consent of the displaced persons or if they give their consent without having the power to refuse resettlement.
Influence area or Zone of Influence (ZOI)	Influence area or Zone of Influence (ZOI) refers to the area in which the project will cause an impact either in the form of a direct impact or an indirect impact. It encompasses the proposed railway lines as well as offsite and/or ancillary works such as borrow pits, quarries, construction water sources, access roads and detours etc.
Impact of of the railway line ROW	The impact on the width measured from the centerline of the ROW. All agricultural land, structures and obstructions found inside the proposed ROW width will be cleared to pave the way for the development of the railway facility.
Kebele	A group of villages forming an administration unit in Ethiopia.
Land acquisition	Refers to the process whereby an affected person in the Project estate is compelled by the government through the project Executing Agency to alienate all its landholdings thereat in favor of that agency in return for compensation and other entitlements as provided by the project resettlement policy.
Project-affected household (PAH)	All members of a household, whether related or not, operating as a single economic unit, who are affected by the project.
Project-affected person(s) (PAPs)	Any person who, as a result of the implementation of a project, loses the right to own, use, or otherwise benefit from a built structure, land (residential, agricultural, or pasture), annual or perennial crops and trees, or any other fixed or moveable asset, either in full or in part, permanently or temporarily.
Rehabilitation	This refers to additional support provided to affected households losing productive assets, incomes, employment or sources of living, to supplement compensation received for acquired assets, in order to achieve, at a minimum, full restoration of living standards and quality of life.
Relocation	This is the physical relocation of an affected household from his/her pre-project place of residence and/or business.
Replacement cost	The rate of compensation for lost assets must be calculated at full replacement cost, that is, the market value of the assets plus transaction costs. This is the amount calculated for the loss assets which include:

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DEFINITION OF TERMS	
	(i) Land (farmland, residential, and commercial land) based on current market prices of crops that could be produced from the land within determined years span. (ii) Houses and other related structures based on current market prices of materials and labour without depreciation nor deductions for salvaged building materials; (iii) Perennial crops and trees, cash compensation equivalent to current market value given for the type, age and productive value (future production) at the time of compensation. (iv) Fences and other properties
Resettlement	Refers to various measures provided to affected households to mitigate any and all adverse social impacts of the project, including compensation, relocation (where relevant), assistance and rehabilitation as needed.
Resettlement Action Plan (RAP)	This is a time-bound action plan with budget, setting out the resettlement objectives and strategies, entitlements, activities and responsibilities, resettlement monitoring, and resettlement evaluation.
Stakeholders	Any and all individuals, groups, organizations, and institutions interested in and potentially affected by a project or having the ability to influence the project.
Vulnerable groups	People who by virtue of gender, ethnicity, age, physical or mental disability, economic disadvantage, or social status may be more adversely affected by resettlement than others and who may be limited in their ability to claim or take advantage of resettlement assistance and related development benefits. These specifically include: (i) households that are headed by women with dependents, (ii) household heads with disabilities, (iii) households falling under the generally accepted indicator for poverty, and (iv) elderly households with no other means of support.
Woreda	A local administrative group of Kebeles that form a 'district'.

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0. Executive Summary

0.1 INTRODUCTION

The Kemissie-Hayk Railway project is part of the Shire-Awash Railway Route traverses through four regional states of the country, Tigray, Amhara, Afar and Oromia. The length of Kemissie-Hayk section is about 100 km, located solely in two Zones of the Amhara Regional state, Oromiya Zone and South Wollo Zone. The start of the project is at Kachur Kebele of Kemissie Town Administration located at about 325 km from Addis Ababa. The section of the railway ends at Basso Mille town about 445 km away from Addis Ababa. The railway line crosses two Woredas of Oromiya Zone (Kemissie and Dawa Chafa) and six Woredas of South Wollo Zone (Kalu, Kombolcha, Dessie Zuria, Tehuledere, Hayk and Werebabu).

The railway project is aimed at improving the infrastructure network of the country. Railway line is reliable, affordable and environmentally friendly transport system. The provision of railway transport in the country will provide better access to economic development and increase the flow of tourists. Construction of the railway will attract private investors to the project influence areas and increase public and private participations in the development endeavors to boost the country's economy.

However, constructions such as highway and railway do not always have high socio-economic benefits without causing adverse effects on physical, biological and social environment. Serious disruptions of the social structures and infrastructures can be resulted if the proposed railway project designed and constructed without considering relevant socio-economic issues. Therefore, integrating socio-environmental and economic concerns into development activities will be essential to ensure sustainable development. Socio-environmental and economic impact assessment as one one of the socio-environmental management tools facilitates the inclusion of principles of sustainable development aspiration well in advance.

Hence, the primary purpose of Kemissie-Hayk Railway Section Socio-Environmental Impact Assessment (SEIA) is to ensure that impacts of the project will be adequately and appropriately considered and mitigation measures for adverse significant impacts incorporated when decisions are taken.

To accomplish the objective of this task, field survey was conducted to collect the appropriate data to prepare the SEIA Report. The main approach used to undertake the detail study was to administer different types of questionnaires, carry out public consultations and collect relevant information.

CWCE was commissioned by the Ethiopian Railways Corporation (ERC) to undertake SEIA and detailed design and construction supervision for the railway project. This report deals with the socio-environmental and economic impact assessment of the project.

Scope of SEIA Study

The scope of this SEIA is limited to assess the potential adverse and positive impacts of the proposed project within its influence areas and to propose appropriate mitigation and enhancement measures for the identified effects.

Objectives of SEIA and Study Methodology

The main objectives of the SEIA study are as follows:

- To describe the socio-environmental and economic baseline conditions of the road environment;
- To assess the potential positive and negative effects of the proposed railway line section; and
- Recommend appropriate mitigation measures to avoid or minimize any undesirable effects resulting from construction and operation of the proposed railway project.

The purpose of the study is to ensure that the socio-environmental effects of the proposed activities are adequately and appropriately considered before decisions are made for their implementation.

Data required for the SEIA was collected from different sources. These include:

- From other components of the project (hydrology, geotechnical and materials, and engineering studies);
- Previous studies and documents;
- Data from relevant offices and authorities;
- Field assessment in the project areas, and
- Public consultations.

Collected data and various documents were reviewed and analyzed in order to:

- describe and assess the effectiveness of relevant policies and legislative framework;
- describe the baseline condition of the project areas; and
- identify, predict and evaluate the potential impacts of the Kemissie-Hayq Railway Section of the Project.

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0.2 POLICIES, LEGAL AND ADMINISTRATIVE FRAMEWORK

Relevant policies, proclamations, programs/plans, strategies, guidelines and international conventions, and the administrative and institutional framework are reviewed in this report; which includes:

- The Constitution of the Federal Democratic Republic of Ethiopia;
- Policies, Proclamations and Regulations; which include:
  - Development Policies
    - Railway and Road Sector Policies,
    - Land Policy and Tenure,
    - Water Resource Policy,
    - National Policy on Women,
    - HIV/AIDS Prevention and Control Policy,
    - Biodiversity Policy,
    - Wildlife Policy,
    - National Policy on Population,
    - Health Policy of Ethiopia, and
    - World Bank EA Policies.
  - Proclamations and Regulations;
    - Environmental Impact Assessment Proclamation,
    - Environmental Pollution Control Proclamation,
    - The Rural Land Administration And Land Use Proclamation,
    - Amhara Environmental Protection, Land Administration and Use Authority (AEPLAUA),
    - Environmental Protection Organs Establishment Proclamation,
    - Research and Conservation of Cultural Heritage Proclamation,
    - Proclamations on Ethiopian Water Resources Management,
    - Proclamation to Promote the Development of Mineral Resources,
    - Proclamation on Expropriation of Landholdings for Public Purposes and Payment of Compensation, and
    - Regulations on Payment of Compensation for Property Situated on Landholdings Expropriated for Public purposes.
- Development Strategies; which include:
  - Agricultural Development Led Industrialization Strategy (ADLI),Strategy,
  - Industrial Development Strategy,
  - Conservation Strategy of Ethiopia (CSE), and
  - Amhara Regional Conservation Strategies and Policies.
- Development Programs and Plans; which include:
  - The Growth and Transformation Program (2010/11 to 2014/15), and
  - The 4th Road Sector Development Program (RSDP).
- Environmental Impact Assessment and Compensation Guidelines; which include:
  - EPA Environmental Impact Assessment Guideline,
  - ERA Environmental Management Manual,

- AfDB Environmental Impact Assessment Guideline,
- ERA Standard Technical Specifications,
- ERA Environmental Procedure Manual,
- Guideline No. ES2 Resettlement Action Program, and
- Amhara National Regional State Guideline for Compensation.

- International Conventions, which include:
    - Convention of Biological Diversity,
    - Framework Convention on Climate Change,
    - The Vienna Convention to the Protection of the Ozone Layer,
    - The United Nations Convention to Combat Desertification,
    - The Basel Convention,
    - The Stockholm Convention, and
    - Convention on International Trade in Endangered Species of Fauna and Flora.

- Administrative and Institutional Framework; including:
    - Federal and Regional Administration,
    - Ethiopial Railway Corporation (ERC),
    - The Environmental Protection Authority, and
    - Sectoral Environmental Units.

0.3 DESCRIPTION OF BASELINE CONDITIONS

0.3.1 Physical Environment

The topography of the land in the project areas is rugged, and major parts of the land is bare and exposed to direct actions of erosive factors like rainfall and winds.

Erosion effects are already observed at steep slopes and downside of the existing track roads due to discharges from culverts and drainage ditches. This impact is expected to be aggravated with the railway construction and improvement in runoff collection/runoff concentration along the rail line sides. Unless proper protection and mitigation measures are incorporated in the design and construction of the drainage discharges, the impact can be significant.

The steep sloped mountain sides have been severely damaged by runoff removing the top soil. At most locations, rock material including big boulders are being removed from the hills and mountains and deposited at down side water courses or plain grounds. For most of its length, the railway line follows mountain sides and at some locations there might be a need for tunnel crossings.

There are several rivers and streams that are crossed by the railway route and others that fall in the influence areas. Some seasonal marshlands in the flood plains of Borkena, Dirma and Mille Rivers are habitat and feeding grounds for variety of flora and fauna species, including livestock grazing, crop production etc. The water sources are used for all purposes including domestic water supply, animal watering and irrigation. The upkeep of the water resources is, therefore, very crucial both to the health and economic wellbeing of the community.

The major impacts on the water resources and seasonal marshlands of the area relate to silt deposits at the river beds, changes in local flow direction of surface runoff, reduction in the rate of ground water recharge, and consequences of water quality and riverine ecology. Damages and disruptions caused to the surrounding environment and natural resource base, and natural drainage system would contribute to the impact on the water resources. Most of the rivers and stream courses in the area are severely affected by deposits of rock and silt material transported from the bare land of the catchment. The silt build up in the river beds has caused meandering of the water flow and river bank erosion.

0.3.2 Biological Environment

The vegetation cover of the area is severely degraded by intensive crop cultivation, animal grazing and use as fire wood. No significant natural forest is found in the area; though, plantation forest is seen along the route corridor.

Impacts on vegetation cover that may be caused for the road will be due to:

- the widths of the railway,
- quarry and borrow pit development for material extraction,
- camp site and garage construction,
- access to material production sites and
- detour roads.

Major impacts to the vegetation cover would be caused during the construction phase of the project.

There is no major wild life habitat like parks and sanctuaries that fall in the right-of-way of the road project. However, smaller wildlife species common to the sparse vegetation covered areas are found in all of the Woredas.

0.4 DESCRIPTIONS OF SOCIAL AND ECONOMIC ENVIRONMENT

The railway section is located in the Oromiya and South Wollo Zones of the Amhara Region. The topography of the project area is predominantly flat and rolling with some hilly and mountainous terrain.

The population within the vicinity of the proposed railway line and peoples of the Woredas which the railway line traverses through will be the project direct beneficiaries. These people would have access and opportunities to share both possible benefits and adverse impacts of the project that would be caused during construction and operation.

The project influence Woredas are Kemissie and Dawa Chefa of Oromiya Zone; and Kalu, Kombolcha, Dessie Zuria, Tehuledre, Hayk and Werebabu of South Wollo Zone. All these Woredas are in the Amhara Regional State.

The total population of the Woredas according to Statistical Abstract 2007 is estimated to be 809,129; out of which 49.97% are males and 50.03% are females. The average family size of the project influence Woredas is 4.3 and the average population density of the same (excluding Kemissie and Kombolcha) is about 226 persons per square km.

The major ethnic groups of the Woredas are Amhara and Oromo. The communities within the entire ZoI are organised into 153 Kebeles, the lowest governmental administrative unit.

The place of residence of the population of the project influence areas is 12 % rural and 88 % urban.

Regarding religion affiliation, Muslim shares the highest portion and flows by Orthodox and Protestant, respectively.

Framing and livestock keeping (mixed agriculture) is the mainstream of the local economy of the project affected communities. Irrigation agriculture to some extent is practicing along the banks of the perennial rivers and produce such as vegetables and fruits. There is also beekeeping as supplementary sources of income for some households. Besides, some people of Lake Hayk area have benefits from tourists while they visit tourist attraction areas located around.

Since the livelihood of the people of the project influence areas is characterized by subsistence mixed farming system, great majority of the people get their livelihoods by cultivating a variety of crops and rearing livestock simultaneously. However, as various studies have revealed, food security in South Wollo Zone and Oromiya Zone in the Amhara Regional State is precarious due to a high population density, small land holdings per household, heavy reliance on (often erratic) rain and decreasing soil fertility. The per capita landholding is very small. Overpopulation will be among the causes for diminishing holding size for individual farmers, which partly will be constraint to produce sufficient food grains.

It is understood form the discussions held with Women, Children and Youth Affairs of the project influence Woredas and data collected from various resources that there are many problems in the Woredas with regard to harmful traditional practices and other gender related issues. Men are usually responsible for decision-making and planning of activities, while women have little power and seek their husbands' permission before they commit family resources or make decisions. The consulted Woreda Women, Children and Youth Affairs believe that awareness rising among the people and expansion of education which aimed at attitudinal change is the only effective key to change the poor situation.

0.5 PUBLIC CONSULTATIONS

The Consultants have undertaken public consultations with Woreda Administration people and community members of some project affected areas to obtain the opinions of the beneficiary communities and the local government officials they have towards the proposed project.

The consultation took place in co-operation with and facilitated by both the Woreda and local authorities. The consultation participants were selected with emphasis on their social status and representative views.

The discussions were focused on various issues, mainly on: opinions towards the project; expected benefits from and possible adverse impacts of the proposed project; and about the possible enhancement and mitigation measures to optimize possible project benefits and to manage /ameliorate the negative impacts thereof; and about the participation of the people to support its implementation.

All participants of the consultation meetings were very interested to participate in the discussions and to share their views and opinions. All participants felt that railway transport

is very vital to get access to foreign markets, for both import and export business and to speed up the endeavours towards development and poverty reduction. They believe that the project influence areas will have access to take their livestock and associated products and agro-industry surplus to national and foreign markets and consequently, the living standard of the local people will get improvement. Moreover, the railway project will contribute to bring reliable public transport services in the country and to have access to neighbouring countries. The project benefit is versatile that it will accelerate the development of mutual socio-cultural, economic and political relationships of the country with neighbouring countries; and it will improve the flow of tourists to the counry.

The consulted people are also discussed about the possible adverse effects of the project and their possible measures. The possible expected negative impacts that were raised and discussed during consultations include:

- Loss of farmland, residentioal houses, other structures, trees, fruits and cash crops due to the project construction;
- Increase accidents during and after project construction;
- Increase pressure on scarce resources, mainly during construction;
- Spreading of communicable diseases such as HIV/AIDS and STDS in the project influence areas particularly in urban areas due to influx of people searching for job opportunity in the project;
- Various cultural impacts (it would be adverse or positive) on the local communities as the consequent of flow of people from different origins; and
- Increase illegal and/or immoral acts such as theft, robbery, adultery and woman and child abuse.

The main points arising from public consultation with regard to the possible means of managing negative impacts that would be caused during and after the construction of the project is summarized and presented below.

- Undertake public consultation during design, construction and post-construction phases of the project to take appropriate measures for the possible impacts;
- Maintaining strong work relationships with the local administrations and communities of the project;
- Deliver compensation payment before start of construction;
- Give priorities for job opportunity to community members affected by the project construction;
- Participate local people to involve in preparation of projet design and implementation;
- Provide proper and adequate attentions for the prevention and control of HIV/AIDS and other sexual transmitted diseases (STDs);
- Establish close relationships with local communities, and Kebele and Woreda administrations to protect project properties from theft and robbery; and
- The need to provide awareness to the project workforce to respect customs and norms of local communities.

0.6 ASSESSMENTS OF POTENTIAL IMPACTS

The construction and operation of the proposed railway project is expected to bring both positive and negative socio-environmental impacts on the project influence areas. The impacts would vary in intensity and duration. Some will have short-term effects, while others will have long-term implications. The main potential impacts are summarised below.

0.6.1 Positive Impacts

The expected benefits from the proposed Railway Project will include the following:

- The transport system of the country, in general, will be improved as the result of the implementation of the proposed railway project. The following reasons could be cited:
  - Public transport system will be improved;
  - It is a safety and reliable mode of transport for both goods and passengers;
  - Railway transportation will bring significant reduction in travel time;
  - It is a safe and reliable access to foreign markets;
  - It will provide more efficient transit services; and
  - Car dependency and car congestion will be decreased.
- Comparing with road carriers, railway has more transportation capacity; low cost; and lower transport restrictions;
- It has benefits for local employment for the fact that railway project will employ significant number of local labourers during the project construction and operation phase;
- It has benefits for local economy since the employment opportunity, income from shops, house rental, increases demand for food, beverages, etc are the areas of income during construction period. Moreover, establishing railway transport network will encourage producing diversified market oriented surplus and purchasing of agricultural and agro-industry inputs and consumer-goods from outside;
- The proposed railway in the country connects regions to regions and gives access to neighbouring countries and alternate ports. This will contribute to develop strong Interwoven social interactions among regions, and close economic and cultural relationship between Ethiopia and neighbouring countries. The availability of access to local and foreign markets will in turn encourage the development and expansion of commercial farms and agro-industries in the country for there will be low cost, safe and speeder access to local and foreign markets. This will also encourage increasing productivity, job creations, knowledge transfer; urban development, and economic growth.
- Access to railway transportation have positive effects in improving public health and living conditions for the reasons that:

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- There will be more time for family and community activities and more leisure time since railroad reduces travel time;
- There is sense of security during travel since there is no much stress and road rage;
- The probability of accidents and fatalities due to railroad is very minimal; and
- The impact on air pollution is insignificant.

- The proposed railroad would greatly facilitate development activities as well as humanitarian works (during emergency cases) as it enables to transport bigger quantity of goods on long or medium distances at relatively low costs and speeder than of other road transport;
- Compared with automobile or air transport, railway transport produces the lowest amount of emissions and requires much lower costs on regeneration of damaged environment. Besides, noise strain produced by the railway transport on environment is lower than by the road transport.
- The influx of people during and after the construction of the railway project will bring more social interactions, skill transfer and other socio-cultural developments in local communities; and
- It will enhance ecotourism development. The flow of tourists will be increased in the railway project influenced areas and this will induce ecotourism development.

0.6.2 Negative impacts

0.6.2.1 Impacts on Bio-Physical Environment

The Railway construction activities involve site clearance, excavation, paving and grading activities, all of which can cause vegetation removal and soil disturbance. These activities can contribute to the damages and degradation of the natural resource base of the area; soil and water resources.

Besides, impacts due to the rail line project is also expected to be caused by the environmental phenomenon such as flooding in the plain lands following river banks (like Borkena River); land slide/land slip risks at steep slopes and at rugged topographic landform sites.

However, no significant disturbance to flora and fauna resources is expected as the major rail line route traverses intensively cultivated and settled areas. It is at some locations that patches of plantation tree forests exist; like plantation eucalyptus forest at the project origin, and acacia woodlands that encounter at intervals. The major potential adverse impacts of the project are discussed as here under.

The adverse impacts of the project will be experienced on environmental resources within the railway route ROW and at material production sites. These resources include bio-physical environment and socio-economic environments as well. Some of these are:

- The vegetation covered areas within ROW, especially plantation forests at both origin of the railway project, around Kemisse town and patches of forests at religious sites like churches and cemeteries falling in ROW width. Patches of

clustered fruit and plantation trees at homesteads and other dispersed tree hedges;

- Land prone for slide and soil erosion at steep mountainous areas;
- The land & vegetation resources at material production sites;
- The water resources at the river crossings and along the railway route, at downstream sides of material production sites and the adjacent lands;
- Farmlands & grazing grounds along the carriage way, detour roads and access roads to material sites; and
- Settlement sites like in towns and villages traversed by the rail line.

The land area to be occupied by the proposed railway width would be permanently removed from the stock of land that can be used for agriculture and animal husbandry. The removal of such productive land from the local economy can reduce the potential socio- economic benefits expected. However, the land size is not that significant as compared to the available land areas in the districts of project implementation. Areas of land temporarily occupied for the use of material production (quarry and borrow material), and for project detour road is also substantial.

For most of its length, the railway line follows mountain sides and at some locations there might be a need for tunnel crossings. Land slide/land slip risk is high at such sites both during construction and post construction of the rail line. This impact can have adverse consequences to both the natural as well as socio - economic environment. On the other hand, the impact on the rail line operation may also significant due to the land slide problem, by blocking the traffic flow as well due to damage to the physical infrastructure itself. The excavation at some of the steep slope and in the escarpments can cause land slide and slope instability. This may cause life risks and property loss both during the construction and operation phases of the railway project. Land slide can form gulley and further aggravates the erosion effect as well.

Impacts on vegetation cover that may be caused for the road will be due to the widths of the railway, due to quarry and borrow pit development for material extraction, due to camp site and garage construction, due to access to material production sites and due to detour roads. Major impacts to the vegetation cover would be caused during the construction phase of the project.

There is no major wild life habitat like parks and sanctuaries that fall in the right - of - way of the road project. However, smaller wildlife species common to the sparse vegetation covered areas are found in all of the woredas.

The major air pollution comes from dust particles during the construction phase. The dust particle of excavated soil can easily be exposed to wind action. The alignment follows unpaved new route for most of its length and no pollution impact is observed due to transport facilities; and there are no significant settlements along the alignment. Hence, dust pollution is not observable in the premises. However, with the improvement in the transport infrastructure, and connectivity with the major trunk roads, it is expected that both the number of vehicle and settlement density will increase substantially. Air pollution will also be caused by particles produced from crusher plants, smoke from vehicle and machinery motor exhaust, all can contribute to the adverse impacts. The air pollution effects can have significant adverse impacts in the relatively densely populated areas of the towns like Kombolcha and smaller villages crossed by the line.

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0.6.3 Impacts on Socio-Economic Environment

The construction of the proposed railway project has great role in the improvement of the transport system of the country. It is among the vital factor for economic growth and transformation endeavours undertaking in Ethiopia.

The project will encourage producing surplus for local and foreign markets since the areas where the railway line traverses through are very suitable for agriculture and livestock raising development.

However, the following major negative impacts would be caused due to the construction of the railroad project.

- Loss of farm and grazing land;
- Loss of houses and other infrastructures;
- Spreading of communicable diseases such as HIV/AIDS and STDs;
- Health treat due to pollution caused by the project construction;
- Adversesocial impacts due to immigrant workers;
- Traffic accidents, and
- Resource-use conflicts.

0.6.3.1 Project Affected Properties and Assets

The Consultants carried out census and inventory of losses along the selected route for the project right-of-way. Accordingly, 21,170 m^2 and1127 m^2 residential houses and commercial houses would be affected, respectively due to ROW widths of the selected railway route. Besides, about 357.8 ha of cropland and 44.9 ha of irrigation land will be lost due to the length of railway ROW. The detail identified major impacts are presented in the Table ES1 below.

Table ES- 1: Major Identified Project Impacts

No.	Loss of Properties	Households	PAPs	Unit	Quantity	Replacement/ Compensation Cost
1	Residential houses	412	2255	M^2	21,179.20	21,793,977
2	Commercial houses	14	169	M^2	1,127	1,308,871
3	Institution houses	-	-	M^2	1,867	6,022,942
4	Other Structure	Community		Various Types		302,100
5	Fences	12	-	Meter	1050	223,322
6	Cropland	2130	11,238	ha	357.8	
				Qtl	8,730	51,508,427
7	Irrigation land			ha	44.9	
				Qtl	2,070	113,456,633
8	Trees	1352	7,030	No.	311,205	86,999,000
9	Fruits and Cash Crops			No.	626,963	293,617,850
	Total	-	-	-	-	**575,233,122**

Source: Socio-Economic Impact Assessment Survey, 2011

0.6.3.2 Estimated Cost for Compensation, Socio-Environmental Mitigation and Management, and Project Monitoring

The estimated cost for compensation; socio-economic mitigation and management; and project monitoring will be presented in the draft report of the project following the completion of inventory of loss of properties. Cost estimate will be prepared for the items shown in the Table ES- 1 below.

Table ES- 2: Compensation; Socio-Environmental Mitigation and management; and Project Monitoring Cost

No.	Reference	Cost Items	Total
1	Table 9.1	Compensation cost [1]	575,233,122
2	Table 9.1	Socio-Environmental Mitigation, Management Cost	6,000,000
3	Table 9.2	Socio-Environmental Monitoring Cost	151,200
4	Table 9.3	Training Cost	130,000
Sub Total			581,514,322
10% contingency			58,151,432
Total			639,665,754

Source: Socio-Economic Survey, 2011

0.7 ANALYSES OF ALTERNATIVES

Selection of project route has been carried out by the Project Consultants to identify the best route from the possible alternatives in terms of the extent of adverse impacts that would bring on the social and environment conditions of the project influence areas. The possible project route is also analysed whether it is technically and economically feasible; and socially acceptable.

The analysis project route alternatives involved community members of the project area and other stakeholders so as to evaluate, weigh and select the best route among the possible alternatives.

The impacts of the routes in terms of affecting farm lands, residential houses and other assets are taken into consideration to compare each route; it is because the smaller resettlement impacts the route has, the higher the rank of the route.

[1] The estimated compensation cost will be included in the Resettlement Action Plan (RAP) of the railway project. This cost is mentioned in this ESIA report simply to show the magnitude cost required to implement the proposed Socio- Economic Mitigation Measures and other project activities.

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Therefore, the selected route for the project is assumed to be the most technically and economically feasible; socially acceptable and environmentaly amicable. Consequently, the selected project route gets approval from the Project Client.

Therefore, this socio-economic impact assessment study has been undertaken based on the selected and approved route for the project.

0.8 IMPACT MITIGATION MEASURES AND MONITORING PLAN

The proposed railrway line will not cause environmental effects of a degree that cannot be solved with normal good engineering practice together with integrating the necessary socio-environmental mitigation measures in the planning and execution of the project. In locating the alignment, besides the technical issues, socio-environmental considerations have been given due attention in order to minimize adverse socio-environmental effects. Mitigation measures that can help to avoid or reduce the potential negative impacts are proposed, as well as a management plan for their implementation.

The SEIA study has also proposed a monitoring plan to allow a close follow-up of the effectiveness of the implemented measures, timely detection of any unpredicted impacts, and effective implementation of corrective measures.

0.9 CONCLUSIONS AND RECOMMENDATIONS

The construction and operation of the Kemissie-Hayk Railroad Section Project will bring a variety of benefits at both local and national level. In particular, the impact at local level in increasing the reliability of road transport and the potential to develop the local economy through improved infrastructure and employment opportunities will be significant.

Discussions made with local authorities and community members revealed that there is huge potential for irrigation and livestock raising development along the perennial rivers of the project influence areas, but due to lack of access to local and foreign markets the development in such areas is limited. Implementing of this railroad project, therefore, would attract to bring agro-industry advancement to the project influence areas and promote economic development of the country since the railroad line will connect Ethiopia with alternate ports of neighbouring countries which would create conducive environment for import and export trade activities with such African countries and others. Construction of the project would also promote tourism industry development by providing low cost, fast and safe transport access for the incoming tourists.

On the other hand, the construction of the proposed railway project will bring several unwelcoming impacts to the natural and social environment. However, many of these inimical impacts will be short-term and reversible, but some will be permanent impacts. The potential significant impacts will include loss of properties including houses, cropland, trees, fruits and cash crops; spreading of communicable diseases such as STDs and HIV/AIDS, and dilution of culture. However, these impacts can be reduced to the acceptable levels with normal good engineering practice coupled with integrating proposed socio-environmental mitigation measures into the planning and implementation schedule of the railroad development. It can therefore be concluded that there are no severe impacts that cannot be mitigated to prevent the implementation of the proposed railway project.

To maximise the efficiency of the railway project and reduce the magnitude of the unwanted effects to acceptable levels, it is essential that the proposed mitigation measures are applied at the right time through the socio-environmental management plan, and by incorporating the relevant ones in the final engineering design for implementation. A close follow-up of the effectiveness of the implemented measures through a well-planned monitoring programme is also of critical importance. In addition, technical, operational and phasing procedures should be included in the tender documents for the contractor. Among the issues that should be given maximum attention are:

- Restricting land acquisition to what is absolutely necessary to reduce loss of farmland, grazing, trees, fruits and cash crops.
- Proper siting of construction camps and management of workforce and restoration of these camp sites as soon as the completion of the project construction works.
- Proper management of construction machinery and control of traffic would be important to minimize possible traffic accident on livestock and people.
- The proposed railway line will connect various societies having distinct cultures and ways of living. The planning, implementation and monitoring of the anticipated socio-economic impact mitigation management, therefore, requires respect and recognition of the local people and their beliefs, norms and values.

Therefore, active and whole-hearted involvement of the local community leadership and opinion-makers at all stages is of paramount importance for the project implementation.

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1. INTRODUCTION

1.1 GENERAL

The government of the Federal Democratic Republic of Ethiopia (FDRE) is committed to boosting the economy of the country. To this effect, the five-year Growth and Transformation Plan (GTP) aims to double the agricultural productions and have industrialization emerge with the production of machineries and spare parts as well as infrastructure development. The plan included public funded infrastructures like the laying down of 5,000km of railway lines to which Kemissie-Hayk Section (Lot 12) of the Shire-Awash Railway Project is a part and those roads and rail roads would create a very fast logistic system so that we would be able to connect the country from one end to the other. The GTP would also help to ensure food security at household and national level.

As it is evident that environmental resources are the foundation of social and economic development as they are the sources of goods and services needed for poverty reduction and economic growth in Ethiopia. However, environmental degradation and mismanagement of natural resources reduces the environment's ability to produce biomass for food, feed and household energy. It undermines prospects for fighting poverty and achieving sustainable development. Rapid and severe degradation can also lead to special circumstances in the society, such as migration, deterioration of the persons' health conditions, displacement of indigenous peoples or communities and lack of access to basic environmental services such as clean water, bio-fuel, etc. These changes put added stress on the lives of the people. Therefore, any development programs and projects should work alongside a framework of growth that seeks to maximize quality of life and minimize environmental costs.

Regardless of the fact that railway construction is the key for growth and transformation of a nation the proposed railway project will be among the major activities contributing for adverse socio-environmental impacts in Ethiopia. The construction and operation of railway network will usually be accompanied by significant adverse effects on the natural and social environment in which they are located. This, however, will be prevented or mitigated if the appropriate measures are applied promptly.

The key environmental problems associated to the project construction will be the removal of vegetation cover from road right of way; borrow areas, quarry sites, camp sites and accelerating soil erosion and soil compaction. Water and soil pollution, especially by construction spoils and other related waste from construction camps and workshops will also be serious challenges.

The need to incorporate environmental and social impact considerations during the planning and implementation phases of the project will become a pressing issue to minimise the anticipated adverse effects on the environment. Therefore, the Socio-Environmental Impact Assessment (SEIA) is a set of activities that will be undertaken to ensure that a railway development project enhances both the environmental context in which it is implemented, and the well-being of the communities that it is meant to serve.

Accordingly, The Ethiopian Railway Corporation (ERC) has entered an agreement with CWCE Consulting Firm to undertake detailed engineering design and construction supervision of Kemissie-Hayk Section (Lot 12) of the Shire-Awash Railway Project. Hence,

this report presents the SEIA report whose purpose is to ensure that impacts of the project will be adequately and appropriately considered and mitigation measures for adverse significant impacts incorporated when decisions are taken.

The report summarizes all the findings, analyses, results and recommendations of the study and contains all supporting materials. It includes, among others, a review of environmental policy and the legislative framework, a description of the existing environmental conditions, the anticipated impacts of the railway project, the proposed mitigation measures; a management plan for impact mitigation and monitoring plan.

1.2 PROJECT BACKGROUND AND JUSTIFICATION

1.2.1 Project Background and Location

The Kemissie-Hayk Railway project, about 100 km length, is part of the Shire-Awash Railway route traverses through four regional states namely, Tigray, Amhara, Amhara, Afar and Oromia. The Kemissie-Hayk section is located solely in Amhara Regional state within two zones, namely Oromia Zone and South Wollo Zone. The start of the project is located at about 325 km from Addis Ababa and ends at Passo Mille about 445 km away from Addis Ababa.

The railway project is aimed at improving the infrastructure network of the country. Besides the expansion and provision of a reliable, affordable and environmentally friendly railway transport system in the country, the construction of the railway will provide better access to markets as it connects the country from one end to the other, to neighbouring countries and to alternate ports. Construction of the railway will have meaningful and significant share in the implementation of GTP which aims at fast and sustainable economic growth in which the industry sector would play significant role.

However, railway construction does not always have high socio-economic benefits without causing adverse effects to the socio-environment. Serious disruption of the bio-physical resources, social structures and infrastructures can be resulted if a railway project designed and constructed without considering socio-environmental issues. Therefore, integrating socio-environmental concerns into development activities will be essential to ensure sustainable development. Since socio-environmental impact assessment as one of the environmental management tools facilitates the inclusion of principles of sustainable development aspiration well in advance.

Hence, the primary purpose of this SEIA is to ensure that impacts of the Kemissie-Hayk Section will be adequately and appropriately considered and mitigation measures for adverse significant impacts will be incorporated when decisions are taken.

To accomplish the objective of this task, field survey was conducted to collect the appropriate data to make the project socio-environmental assessment to the acceptable standard. The main approach used to undertake the detail study was to administer different types of questionnaires for socio-economic and household survey and carry out public consultations.

CWCE was commissioned by the Ethiopian Railways Corporation (ERC) to undertake the environmental and social impact assessment (SEIA) and detailed design and construction supervision for the Kemissie-Hayk Section.

This report presents all the findings, analyses, results and recommendations of the study and contains all supporting materials. It includes, among others, a review of environmental policies, guidelines and the legislative framework, a description of the existing socio-environmental conditions, the anticipated impacts of the project, proposed mitigation measures, a management plan for impact mitigation and a monitoring plan.

1.2.2 Project Location

The Kemissie-Hayk Section Railway Project starts at Kachur Kebele administration of Kebele Town Municipality Administration and ends at Passo Mille Town of Tehuledere Woreda Administration. The railroad line traverses two Woredas of Oromia zone (Kemissie Town Municipality and Chefa) and six Woredas of South Wollo Zone (Kalu, Kombolcha Town Municipality, Dessie Zuria, Tehuledere, Hayk Town Municipality, and Werebabu).

Photo1-1: Start of the Project

From the start of the project as shown in the picture above, the railroad route crosses about 2km of dense eucalyptus trees. It left the elementary school to the left-hand side and then it again crosses eucalyptus trees and croplands.

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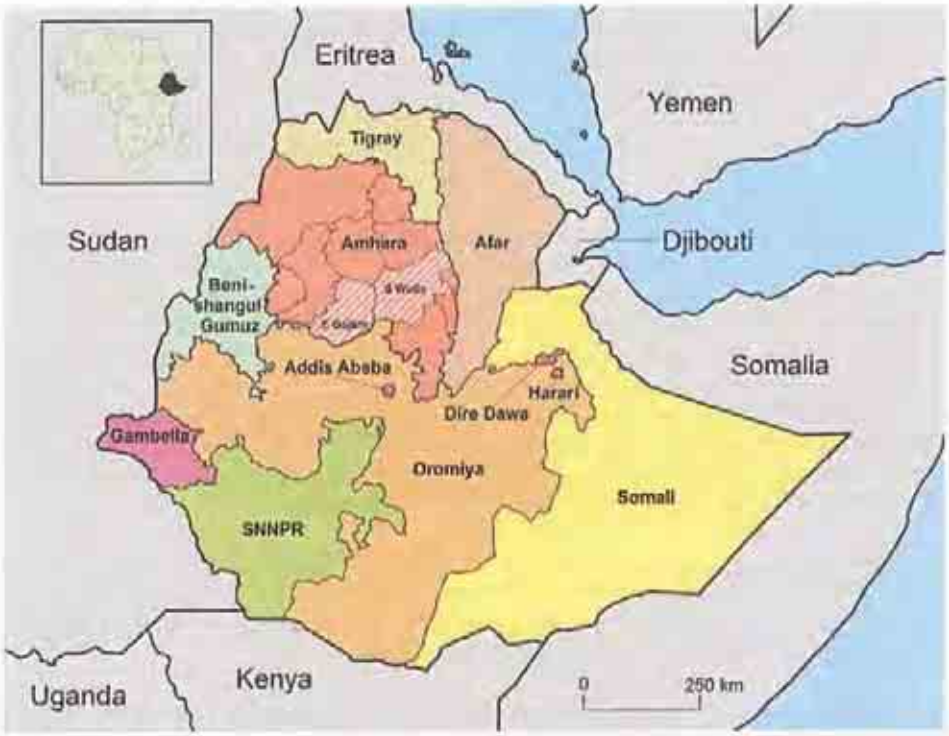
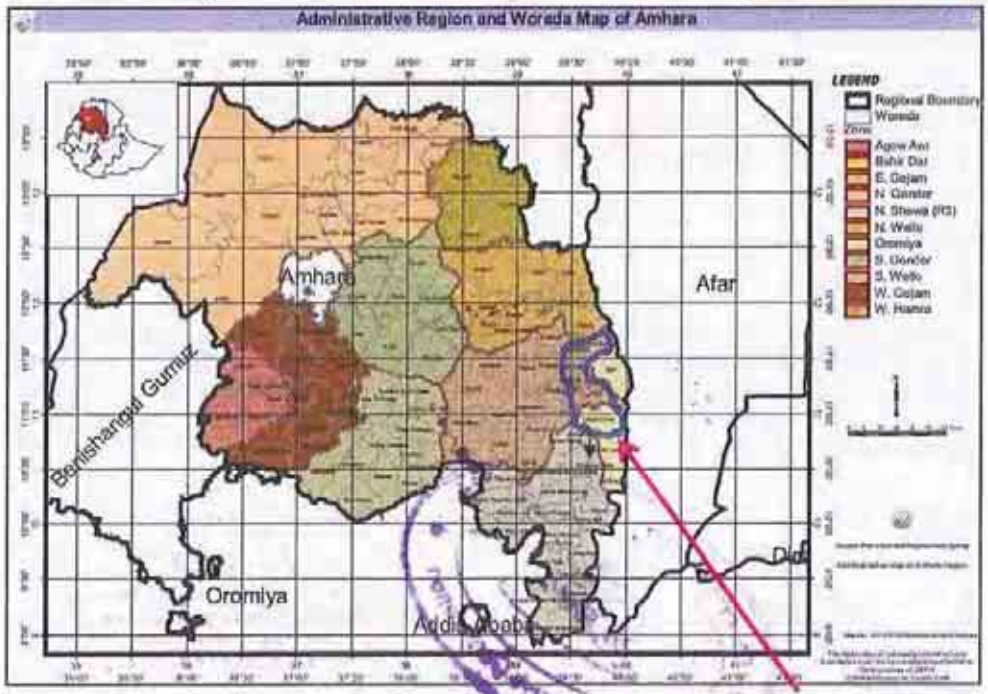
Figure 1- 1: Project Location





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1.2.3 Project Justification

The Shire-Awash Railway Project links regions to regions, zones to zones and Woredas to Woredas. It also connects to the neighbouring countries and alternate ports. The main impact zones of the Shire-Awash Railway project in which Kemissie-Hayk Section is its part will be Affar, Amhara and Tigray Regions. Particularly the main impact zones of Kemissie-Hayk Section (Lot 12) are Oromiya Zone and South Wollo Zone of the Amhara Regional State.

The project is expected to stimulate economic growth and development of social services in the impacted Zones. By connecting or leading to local markets and alternate ports of neighbouring countries, the railway transport will play an essential role to facilitate the economic, social and political development of the country at large. The railway project is also aimed at improving the transport networks of the country in both quantitatively and qualitatively. Besides increasing good access to the local people residing in the project area, the railway transport will provide better access to markets and this will in turn stimulate investors to engage in diversified agricultural and agro-industry developments to produce market oriented surplus products. This will in turn create various job opportunities to the local people, and consequently, their living standard will be improved.

However, railway construction does not always have high socio-economic benefits without causing adverse effects to the environment. Serious disruption of the bio-physical resources, social structures and infrastructures can be resulted if a railway project is designed and constructed without considering adverse socio-environmental issues.

Therefore, integrating socio-environmental concerns into the proposed railway design and construction activities appeared to be essential to minimize adverse impacts and to enhance benefits from the project.

This SEIA report therefore discusses environmental and social issues of the railway project and comprises environmental mitigation and management plans to be implemented so that the project would be environmentally feasible, socially acceptable and economically justifiable.

1.3 SCOPE OF SEIA STUDY

The Socio-Environmental impact assessment (SEIA) covers all the project influence areas while Inventory of Losses for the socio-cultural and economic Impact Assessment (SEIA) is limited to cover the first 42 Km of the project road length where the project right of way (ROW) has been determined so-far and assess the potential positive as well as adverse impacts of the project within its influence areas and to propose mitigation measures for adverse impacts.

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1.4 OBJECTIVES

1.4.1 Project Objectives

The prime objectives of the project are:

- To improve economic integrations among Ethiopian Regions and create access to neighbouring countries and alternate ports with improved links among major economic and trade centres;
- To induce economic development and generate employment;
- To enhance efficiency of transport networks within the country.
- To increase access of the local people residing in the project influence areas to social services such as markets; and
- To facilitate the development of tourist industry and other socio-economic development programs in the road project influence areas.

1.4.2 Objective of SEIA

The Socio-Environmental Impact Assessment sought to achieve the following main objectives:

- Present the environmental and socio-economic baseline conditions of the area;
- Assess relevant social aspects and predict the anticipated social as well as socio-economic impacts associated with the proposed construction of a railway line;
- Identify viable mitigation measures for the project adverse impacts and enhancement measures for the project benefits; and
- Prepare environmental management and monitoring program.

The purpose of the study is to ensure that the environmental effects of proposed activities are adequately and appropriately considered before decisions are taken for their implementation.

Further the SEIA is undertaken to ensure that:

- The most feasible road alignment will be selected;
- Negative environmental and social impacts will be identified and mitigated and positive impacts strengthened;
- Impacts will be monitored; and
- Collaboration between partners at different levels will take place and/or will be institutionalized.

The principle is that the environmental and social issues are considered together with the technical and economic aspects when selecting the most feasible alternative.

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1.5 BENEFITS OF SEIA

The SEIA is beneficial both for the implementation of the proposed Railway Section and for the protection of the environment of the project influence areas. The benefits of SEIA will include:

- It involves identifying and assessing the favourable and unfavourable effects of the Project on the environment prior to the Project's construction;
- It identifies migration measures that will help avoid or minimize to the extent possible any negative effect occurring during the Project's life cycle;
- It establishes a monitoring plan describing the monitoring and managing procedures required to ensure that the Project is not exceeding relevant standards and criteria and that migration measures are being implemented adequately; and
- It can be a source of warning signals in case of unanticipated or greater than expected impacts.

1.6 MAIN COMPONENTS OF SEIA

This SEIA will contain the following key components.

- Baseline data (to describe the project and the existing environment);
- Impact assessment;
- Mitigation measures;
- Social Management Plan (EMP); and
- Stakeholder Engagement and Public Consultation

1.7 METHODOLOGY OF ASSESSMENT

1.7.1 Sources of Data Collection

Data required for the environmental and social impact assessment of the project was collected from different sources using different data collection methods. The main sources of data include:

- **Other Project Components:** this included hydrology, soils and materials (geotechnical) investigations and engineering studies. From the data collected or generated by those teams, relevant information for social and environmental assessment were extracted and utilised for the baseline description and impact analysis. Besides, Important maps such as the 1:250,000 and 1:50,000 scale topographic maps produced by Ethiopian Mapping Authority (EMA) were also used.
- **Previous Studies and Documents:** Relevant documents on previous studies, policies, guidelines and legislations including those given in the list of references were collected from Federal and Regional organisations, personal holdings, etc.
- **Consultation with Stakeholders:** Pre-designed questionnaires were distributed to relevant government and non- government Organizations (NGOs) in the

project area. Formats used include; Site reconnaissance survey form to record existing environmental conditions of the road corridor, questionnaire format for collection of base line data on the physical as well as socio-economic profile of the woredas traversed by the railway alignment. Local administrations and relevant institutions were also contacted and involved in data collection, for coordination of Focus Group Discussions and during discussion sessions. Discussions and briefings on the project objective, the possible impacts that can result during the project implementation, cooperation needed from the Woreda administrations and from the community were raised and discussed at different stages and with council members of each Woreda administration. A list of these offices and persons consulted during the study is presented in Appendix 1.

- **Field Assessment:** Field investigations were conducted throughout the entire project road, and detailed data on the natural environment and socio-economic settings was collected using checklists and data collection sheets (see Appendix 2).
- **Public Consultations:** Formal group meetings as well as informal discussions with the local people and leaders were held in different localities along the railway route/alignment. Relevant information was obtained, including constraints related to the existing conditions of transport facilities, benefits and disadvantages of the proposed railway transport, and their overall opinion on the proposed project.

1.7.2 Data Analysis

The data and documentation collected was reviewed and analysed for three main purposes:

- To describe and assess the effectiveness of relevant policies and legislative frameworks within which the environmental assessment is undertaken;
- To describe the existing/baseline conditions of the physical, natural, social and economic environment of the area in which the road project is situated with giving particular emphasis to the road environment that will be impacted by the project construction activities; and
- To identify, analyse and evaluate the potential impacts of the road upgrading project, and to recommend mitigation measures for the significant negative impacts.

1.7.3 Impact Analysis and Evaluation

The EIA study process covers: environmental scoping; description of the proposed railway project works, assessment of baseline environmental conditions; analysis of potential environmental impacts; development of mitigation and compensation measures; preparing an environmental management and monitoring plans.

The EIA study was carried out at two levels as Scoping and detail EIA study. The scoping stage has produced preliminary findings as to the area of influence, valued environmental components and activities to be undertaken. The detail stage work has made assessments of the likely impacts and proposed mitigation management plans.

The EIA study began by environmental scoping process in which the limits and project influence areas are defined; activities to be undertaken are listed, and valued environmental components are identified and impacts to be studied during the assessment are preliminarily defined.

The scoping process involved consultation with stakeholders; including regional government institutions, NGOs, community representatives and the would be Project Affected People (PAPs). Meetings and discussions were held at different levels of the local administration; zonal and woreda levels.

Direct observations on site during fieldwork helped the consultant team to identify sensitive environmental components in the route corridor and influence areas, and preliminary observations of potential negative and positive impacts of the proposed projects were made. Questionnaires and site inventory forms had been developed and used to gather baseline environmental information as well as information regarding impacts. Possible changes to earlier proposed alignments for the route was discussed and evaluated together with the relevant Interested or Affected Persons (IAPs) as well as with the engineering design team of the consultant.

Valued Environmental Components (Vecs)

Categories of environmentally sensitive areas outlined by Ethiopian environmental regulations include:

- Land prone to erosion
- Land prone to desertification
- Areas which harbour protected, threatened, or endangered species
- Areas of particular scientific interest (e.g. fossil deposit)
- Areas of Outstanding natural beauty such as national parks
- Areas of Particular historic or archaeological interest
- Primary forest
- Wetlands of national or international importance
- Urban settlements

Normally, any area having the above listed characteristics can be considered environmentally sensitive. However, Environmentally Critical Areas (ECAs) in the influence area of the project roads should be ranked based on their relative sensitivity to disturbance or their value to the economic-environmental health of Ethiopia. Among those critical areas, the factors in the route corridor include;

Flood plains and seasonal wetlands at major rivers traversed by the rail line project, Steep slope mountain sides traversed and that are prone to soil erosion; the mountainous terrains traversed by the route, the dense settlement sites in towns and villages.

1.8 STRUCTURE OF THE REPORT

The report is organized as per the following structure:

- Executive Summary
- Introduction (Chapter-1)
- Review of Strategies, polices and Legislations (Chapter - 2)
- Project Description and Justification (Chapter-3)
- Description of the Project Environment (Chapter-4)

- Analyses of Alternatives (Chapter-5)
- Public Consultations (Chapter-6)
- Project Disclosure (Chapter-7)
- Socio-Cultural and Economic Impacts and Mitigation Measures (Chapter-8)
- Social Management and Monitoring Program (Chapter-9)
- Key Issues To Be Included In The Contract Agreement (Chapter-10)
- Conclusion and Recommendations (Chapter-11) and
- Reference

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2. LEGISLATIONS, REGULATIONS, GUIDELINES, POLICIES AND DEVELOPMENT PLANS & STRATEGIES

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.

Environmental management objectives in many countries, especially the developing countries, is achieved not only through environmental legislation, i.e. laws, regulations and rules which are enforceable in a court of law, but also through administrative provisions such as administrative orders, technical standards etc. which are applied through various administrative mechanisms.

The discussion in here concerns the National Development and Environmental Policies and Sectoral Strategies, legislations and guidelines, Institutional arrangements, land accusation, tenure rights and expropriation procedures are also indicated in the discussion.
Understanding of available policies and administrative structures, under which the project implementation and the environmental assessment and management study operates, would assist in the efforts made for sustainable development and natural resource conservation measures.

2.1 THE CONSTITUTION OF THE FDRE

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

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

The other important among the provisions of the Constitution is Art 44.2. It states "All persons who have been displaced or whose livelihoods have been adversely affected as a result of state programs, have the right to commensurate monetary or alternative means of compensation, including relocation with adequate state assistance".
Thus, persons who have lost their land as a result of acquisition of such land for the purpose of road works are entitled to be compensated to a similar land plus the related costs arising from relocation; assets such as buildings, crops or fruit trees that are part of the land etc. The Resettlement/Rehabilitation Policy Framework prepared by ERA also expressly and appropriately recognizes that Art. 44.2 of the Constitution of the Federal Democratic Republic of Ethiopia provide the basis for the compensation procedures and the legal framework for its resettlement and rehabilitation policy (ERA, 2008).

2.2 POLICIES, PROCLAMATIONS AND REGULATIONS

2.2.1 Development Policies

2.2.1.1 Railway and Road Sector Policies and Guidelines

The guideline on environmental assessment of Federal EPA, 2004 describes major environmental issues related to a road or railway Projects. The guideline highlights major issues and potential impacts that should be taken into account during the preparation and assessment phases. It emphasizes that appropriate enhancement and mitigation measures should be integrated as early as possible, preferably in the project design.

2.2.1.2 Land Policy and Tenure

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

The policy guiding principles include:

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

2.2.1.3 Environmental Policy

The overall policy goals of the Environmental Policy of Ethiopia is described as "...to improve and enhance the health and quality of life of all Ethiopians and to promote

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sustainable social and economic development through the sound management and use of natural, human made and cultural resources and the environment as a whole so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs".

The guiding principles of the EPE are:

- Every person has the right to live in a healthy environment;
- Sustainable environmental conditions and economic production systems are impossible in the absence of peace and personal security. This shall be assured through the acquisition of power by communities to make their own decisions on matters that affect their life and environment;
- The development, use and management of renewable resources shall be based on sustainability;
- The use of non-renewable resources shall be minimized and where possible their availability extended (e.g. through recycling);
- Appropriate and affordable technologies which use renewable and non-renewable resources efficiently shall be adopted, adapted, developed and disseminated;
- When a compromise between short-term economic growth and long-term environmental protection is necessary, then development activities shall minimize degrading and polluting impacts on ecological and life support systems. When working out a compromise, it is better to err on the side of caution to the extent possible, as rehabilitating a degraded environment is very expensive, and bringing back a species that has gone extinct is impossible;
- Full environmental and social costs (or benefits foregone or lost) that may result through damage to resources or the environment as a result of degradation or pollution shall be incorporated into public and private sector planning and accounting, and decisions shall be based on minimizing and covering these costs;
- Market failures with regard to the pricing of natural, human-made and cultural resources, and failures in regulatory measures shall be corrected through the assessment and establishment of user fees, taxes, tax reductions or incentives;
- Conditions shall be created that will support community and individual resources to sustainably manage their own environment and resources;
- As key actors in natural resource use and management, women shall be treated equally with men and empowered to be totally involved in policy, programme and project design, decision-making and implementation;
- The existence of a system which ensures uninterrupted continuing access to the same piece(s) of land and resource creates conducive conditions for sustainable natural resource management;
- Social equity shall be assured particularly in resource use;

- Regular and accurate assessment and monitoring of environmental conditions shall be undertaken and the information widely disseminated within the population;
- Increased awareness and understanding of environmental and resource issues shall be promoted, by government officials and by the population, and the adoption of a "conservation culture" in environmental matters among all levels of society shall be encouraged;
- Local, regional and international environmental interdependence shall be recognized;
- Natural resource and environmental management activities shall be integrated laterally across all sectors and vertically among all levels of organization;
- The wealth of crop and domestic animal as well as micro-organism and wild plant and animal germplasm is an invaluable and inalienable asset that shall be cared for;
- Species and their variants have the right to continue existing, and are, or may be, useful now and/or for generations to come;
- The integrated implementation of cross-sectoral and sectoral, federal, regional and local policies shall be seen as a prerequisite to achieving the objectives of this Policy on the Environment.
- The Policy further outlines both sectoral and cross-sectoral environmental policies. Sectoral environmental policies include:
- It further points out that; Preliminary and full EIA are undertaken by the relevant sectoral ministries or department if in the public sector and by the developer if in the private sector.
- Need for public consultation
- Environmental impact assessments consider not only physical and bio-logical impacts but also address social, socio-economic, political and cultural conditions;
- Need for environmental audit at specified intervals during the project implementation.

2.2.1.4 Water Resource Policy

The 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 to establish and institutionalize environment conservation and protection requirements as integral parts of water resources planning and project development.

2.2.1.5 National Policy on Women

The Federal Democratic Government of Ethiopia has declared its unequivocal commitment to the development of women with the announcement of the National Policy on Women in 1993. The Women's Policy primarily aims to institutionalize the political, economical, and social rights of women by creating an appropriate structure in government offices and

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institutions so that the public policies and interventions are gender-sensitive and can ensure equitable development for all Ethiopian men and women.

Consistent with the above policy, Article 25 of the new Constitution guarantees all persons equality before the law, and prohibits any discrimination on grounds of gender. In addition, Article 35 reiterates principles of equality of access to economic opportunities, including the right to equality in employment and land ownership. The democratization process the new constitution the women's policy and the institutional set up have created conductive atmosphere for the promotion and the advancement of women and the implementation of the plan of action.

The Policy states that the responsibility of ensuring the implementation of the National Policy on Women lies mainly with the Government. Besides, various women's organizations are formed to promote women issues in different areas.

All development programs at National and Regional levels should be able to integrate gender concerns in their plans and program to see that women participate, contribute, benefit and their effort is recognized and technologically supported. Thus the mainstreaming of gender in all development programs should focus at establishing a system where by each sector program would use gender as a measuring indicator to quantify project and achievements.

2.2.1.6 National Policy on HIV/AIDS

In view of the magnitude of the problem as well as the huge resources needed to combat HIV/AIDS, the Ethiopian Government issued a policy, which calls for an integrated effort of multi-sectoral response to control the epidemic of HIV/AIDS in 1998. The Ethiopian Government's HIV/AIDS policy urges communities at large, including government ministries, local governments and the civil society to assume responsibility for carrying out HIV/AIDS awareness and prevention campaigns. The main objective of the policy is to provide an enabling environment for the prevention and control of HIV/AIDS in the country. The policy introduces and outlines the large social, psychological, demographic and economic impacts that HIV/AIDS is causing 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 the further spread of HIV/AIDS,
- women, including women 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,
- the human rights of people living with HIV/AIDS needs to be recognized, and

- HIV/AIDS has the potential for catastrophic impact.

2.2.1.7 Sector Policy- HIV/AIDS Prevention and Control in the Work Places of ERA

ERA has prepared a sectoral policy for HIV/AIDS in the workplaces of ERA (June, 2004). In the policy ERA acknowledges the fact that the HIV/AIDS pandemic is a reality in the work place and may have detrimental effects on the goals and objectives of the authority. Therefore, the authority:

- Commits itself to create a supportive and non-discriminatory working environment through dispelling of myths and stereotypes and by ensuring that infected employees are treated in the same manner as other employees, Seeks to minimize the social, economic and developmental consequences to the authority and its staff,
- Undertakes that management will provide resources and leadership to implement program for the prevention and control of the HIV/AIDS and sexually transmitted infections (STI), Commits itself to offering support, counselling and education services to infected & affected employees; Commits itself to establish and maintain an employee assistance program, and
- Insures sustainable resources for the prevention and control of HIV/AIDS.

The ERA task force is responsible and accountable for all programs for prevention and control of HIV/AIDS in the authority. The ERA's environmental monitoring and safety branch through the HIV/AIDS program coordinators is responsible for coordinating, implementing, monitoring and evaluating the policy provisions.

2.2.1.8 Biodiversity Policy

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

2.2.1.9 Wildlife Policy

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

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

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2.2.1.10 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".
The general objectives of the population policy are:

- Closing the gap between high population growth and low economic productivity through planned reduction of population growth and increasing economic returns,
- Expediting economic and social development processes through holistic integrated development programmes designed to expedite the structural differentiation of the economy and employment,
- Reducing the rate of rural to urban migration,
- Maintaining/improving the carrying capacity of the environment by taking appropriate environmental protection/conservation measures,
- Raising the economic and social status of women by freeing them from the restrictions and drudgeries of traditional life and making it possible for them to participate productively in the larger community,
- Significantly improving the social and economic status of vulnerable groups (women, youth, children and the elderly).
- The economic, social and political status of women is seen to have a direct bearing on the level of fertility in society. Early marriage for girls is seen as one of the factors that contribute not only to high fertility rates but also to high maternal, infant and child morbidity and mortality.
- Implementation of the Policy is seen as dependent on the functions of other ministries and departments as on the Population Department and the responsibilities of key ministries are given in this policy document.

2.2.1.11 Health Policy of Ethiopia

The health policy of Ethiopia was issued in Sept. 1993. It was prepared through critical examination of the nature, magnitude, and root causes of the prevailing health problem of the country and awareness of newly emerging health problems. It accords appropriate emphasis to the needs of the less privileged rural population, which constitute the overwhelming majority of the nation.

In general, the policy states that health development shall be seen not only in humanitarian terms but also as an essential component of the package of social and economic development as well as being an instrument of social justice and equity.

The overall health policy among others incorporates the following basic components:

- Democratization and decentralization of the health service system;
- Development of the preventive and promotive components of the health care;
- Development of an equitable and acceptable standard of health service system that will reach all segments of the population within the limit of resources;
- Promoting and strengthen of inter sectoral activities;
- Promotion of attitudes and practices conducive to the strengthening of national self-reliance in health development by mobilizing and maximally utilizing internal and external resources;
- Assurance of accessibility of health care for all segments of the population;
- Working closely with neighbouring countries, regional and international organizations to share information and strengthen collaboration in all activities contributory to health development including the control of factors detrimental to health;
- Development of appropriate capacity building based on assessed needs;
- Provision of health care for the population on a scheme of payment according to ability with special assistance mechanisms for those who cannot afford to pay; and
- Promotion of the participation of the private sector and nongovernmental organizations in health care.

The policy gives priority to:

- Information, education and communications of health to enhance awareness and to propagate the important concepts and practices of self responsibility in health,
- The control of communicable diseases, epidemics and diseases related to malnutrition and poor living conditions,
- The promotion of occupational health and safety,
- The development of environmental health,
- The rehabilitation of the health infrastructure,
- The development of an appropriate health service management system,
- Appropriate support shall be given to the curative and rehabilitative components of health including mental health,
- Due attention shall be given to the development of the beneficial aspects of traditional medicine including related research and its gradual integration into modern medicine,
- Applied health research addressing the major health problems shall be emphasized,

- Provision of essential medicines, medical supplies and equipment shall be strengthened, and
- Development of human resources with emphasis given on expansion of the number of frontline and middle level health professionals with community based, task oriented training shall be undertaken.

2.2.1.12 World Bank EA Policies

2.2.1.12.1 Operational Policy 4.01

As of the Federal Government and African Development Bank, the World Bank has also requirements for EA. The World Bank Operational Policy 4.01 requires environmental assessment (EA) of projects proposed for Bank financing to ensure that they are environmentally sound and sustainable, and thus to improve decision-making. The Bank's EIA policy states that:

EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The Bank favours preventive measures over mitigatory or compensatory measures, whenever feasible.

EA takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and trans-boundary and global environmental aspects. EA considers natural and social aspects in an integrated way. It also takes into account the variations in project and country conditions; the findings of country environmental studies; national environmental action plans; the country's overall policy framework, national legislation, and institutional capabilities related to the environment and social aspects; and obligations of the country, pertaining to project activities, under relevant international environmental treaties and agreements. The Bank does not finance project activities that would contravene such country obligations, as identified during the EA. EA is initiated as early as possible in project processing and is integrated closely with the economic, financial, institutional, social, and technical analyses of a proposed project.

Based on the outcome of Bank's environmental screening, projects can be categorized as A, B, C or FI. The selection of the category is based upon the expected environmental impacts.

- Category A: A full EA is required. I.e. A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented.
- Category B: Although a full EA is not required, environmental analysis is required. A proposed project is classified as Category B if it's potential adverse environmental impacts on human populations or environmentally important areas—including wetlands, forests, grasslands, and other natural habitats—are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are

irreversible; and in most cases mitigation measures can be designed more readily than for Category A projects.

- Category C: No EA or environmental analysis is required. A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project.
- A proposed project is classified as Category FI if it involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts.

In addition to OP4.01, Environmental and Social Management Framework, (ESMF)/mid-term guidance has been reviewed. Conceptually, the ESMF/mid-term guidance uses the same approach for assigning the appropriate environmental category as OP4.01, but adapts it to the sub-project level to ensure speedy implementation of future projects. The main modification is that it sub divide category B of OP4.01 in to two sub categories, i.e. Category B1 and category B2. For category B1 projects, application of simple mitigation measures will suffice and no separate socio- environmental impact assessment will require. For category B2 projects, a separate socio-environmental impact assessment will be required which comprise identified adverse impacts, mitigation measures, environmental and social management and monitoring plans.

Based on the above EPA, AfDB and WB environmental policies, screening was mad to classify the proposed Kemissie-Hayk Section Railway Project and it is understood that the socio-environmental assessment process for the proposed project should be treated as equivalent to a Category I project of the AfDB or lays under the Category A of the World Bank or Schedule 1 of the EPA EIA Guideline.

2.2.1.12.2 Forestry OP 4.36

Bank lending in the forest sector aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty, and encourage economic development. The Bank expects governments to have adequate provisions in place for conserving protected areas and critical watersheds, as well as for establishing environmental guidelines and monitoring procedures. The Bank does not provide financing for logging in primary tropical moist forests.

2.2.1.12.3 Indigenous Peoples OD 4.20

This policy ensures that indigenous peoples (defined as social groups whose social and cultural identities are distinct from those of the dominant society, making them vulnerable to being disadvantaged in the development process), benefit from the project. It also ensures that potentially adverse impacts of Bank projects on indigenous peoples are avoided or mitigated. An indigenous people's development plan can be prepared, as appropriate, in tandem with the main investment project.

2.2.1.12.4 Involuntary Resettlement OP 4.12

Involuntary resettlement under this policy covers both involuntary displacement and the measures for mitigating the impacts of displacement. Any operation that involves land acquisition or is screened as a category A or B project for environmental assessment purposes is reviewed for potential resettlement requirements early in the project cycle to

protect the livelihood of people who lose their land, their houses, or both. The objective of the Bank's resettlement policy is to assist displaced persons in their efforts to restore or improve former living standards and earnings capacity. To achieve this objective, the Borrower is required to prepare and carry out resettlement plans or development programs.

In case of the proposed Kemissie – Hayk railway project (considering ROW 50 m width), the number of PAPs and level of impact is significant. Therefore, a full resettlement plan would be required.

2.2.1.12.5 Natural Habitats Policy OP 4.04

Under this policy the Bank promotes and supports habitat conservation and improved land use by financing projects which further the conservation of natural habitats. The policy requires that a project which has substantial impacts on natural habitat must include appropriate mitigation measures, including direct support for conserving an ecologically similar area. The Bank does not support projects that involve the significant conversion or degradation of critical natural habitats.

2.2.2 Proclamations and Regulations

2.2.2.1 Environmental Protection Organs Establishment Proclamation

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

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

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

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

2.2.2.2 Environmental Impact Assessment Proclamation

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

Assessment, outlines the contents of ESIAs, and determines the duties of different parties concerning ESIAs.

The general provisions of the Proclamation include:

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

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

2.2.2.3 Environmental Pollution Control Proclamation

The law on pollution control was issued in December 2002. It was issued mainly based on the principle that each citizen has the right to have a healthy environment, as well as the obligation to protect the environment of the country.

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

2.2.2.4 Proclamation on Ethiopian Water Resources Management

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

The Proclamation defines the ownership of water resources, powers and duties of the Supervising Body, inventory of water resources and registry of actions, permits and professional licenses, fees and water charges. According to the Proclamation, all water resources of the country are the common property of the Ethiopian people and the State. As

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provided in the Proclamation, the Supervising Body [the Ministry pertaining to water resources at central level, or any organ delegated by the Ministry] shall be responsible for the planning, management, utilization and protection of water resources. It shall also have the necessary power for the execution of its duties under the provisions of this Proclamation.

2.2.2.5 The Rural Land Administration and Land Use Proclamation

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

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

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

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

2.2.2.6 Amhara Environmental Protection, Land Administration and Use Authority

The Amhara National Regional State Constitutions has given due consideration to environmental issues. The constitution has demanded the recognition of environmental rights and obligations in line with regional/country development. Article 44 of the Federal Constitution also states among others that all persons have the right to live in a clean and healthy environment and all persons who have been displaced or whose livelihoods have been adversely affected because of state programs have the right to commensurate monetary or alternative means of compensation, including relocation with adequate state assistance.

Similarly, the National Environmental Policy, Conservation Strategy as well as the Regional Conservation Strategies (RCS) provide a number of guiding principles that indicate and require a strong adherence to sustainable development. Concerning the needs of EIA, the following basic issues are emphasized in these documents.

- An early consideration of environmental impacts in project and program design
- Need of public consultation in the process of EIA, including mitigation plans and contingency plans
- Need of auditing and monitoring

The Environmental Impact Assessment Proclamation (federal proc. No. 299/2002): has made it mandatory that development projects should be subjected to EIA scrutiny. It means that EIA is a legal requirement.

In Amhara region the legal authority to monitor compliance and where need to apply enforcement action is the Amhara National Regional State Environmental Protection, Land Administration and Use Authority (EPLAUA). This Regional Authority was established by proclamation No. 47/2000 in response to the institutional demand for implementing Regional Conservation Strategy.

In order to discharge the responsibilities the regional EPLAUA has prepared EIA guidelines which are based on the Federal EIA guideline. In these guidelines among others responsible bodies and stakeholders concerned for environmental issues have been identified.

In general, its responsibilities include;

- Formulate policies and strategies, programs or guidelines pertinent to environmental protection and follow up its implementation up on approval.
- Implementation of the land administration and use proclamation.
- Collection, making analysis and keeping record of data on natural resources and rural lands including social and economic situation of the region.
- Regulate and follow up that any development activity is planned and implemented without damaging the environment and disturbing its balance.
- Initiates laws and guidelines pertinent to the environmental protection for the government, and up on approval regulate, follow up and evaluate their implementation.
- Monitors any damaging effects on habitat and divers living organisms.
- Conducts capacity building and awareness creation programs as regards to environmental and natural resources conservation, development and protection.

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2.2.2.7 Proclamation on Expropriation of Landholdings for Public Purposes and Payment of Compensation

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

Regarding displacement compensation, the proclamation states that a rural landholder whose landholding has been permanently expropriated shall, in addition to compensation paid for property situated on the expropriated land, be paid displacement compensation, which shall be equivalent to ten times the average annual income he secured during the five years preceding the expropriation of the land. Accordingly, the compensation for the Kemissie - Hayk railway Project affected people should be effected according to this proclamation.

2.2.2.8 Regulations on Payment of Compensation for Property Situated on Landholdings Expropriated for Public Purposes

Regulations No. 135/2007 came into effect 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 with an objective of not only paying compensation but also to assist displaced persons to restore their livelihood.

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

2.2.2.9 Research and Conservation of Cultural Heritage Proclamation

The following objectives have been given to the Research and Conservation of Cultural Heritage Authority by the proclamation no. 209/2000:

- Carry out scientific registration and supervision of Cultural Heritages so that, cultural Heritage as bearing witnesses to history, may be handed down from generation to generation;
- Protect Cultural Heritage against man-made and natural disasters;
- Enable the benefits of cultural Heritage assist in the economic and social development of the country; and
- Discover and study cultural Heritage.

Regarding the registration of Cultural Heritage, the proclamation states that:

- Any person who holds Cultural Heritage in ownership shall get registered it in accordance with the directives issued by the Minister,
- The Authority shall register Cultural Heritage using codes appropriate for their custody and preservation; and expense incurred in connection with the registration of Cultural Heritage shall be born by the Authority.

Regarding conservation and restoration of Cultural Heritage, the proclamation states that:

- Any conservation and restoration work on Cultural Heritage shall be carried out with the prior approval of the authority and
- Where the expenses required for the conservation and restoration are beyond the means of the owner, the government may grant the necessary assistance to cover part of such expenses.

Concerning to removal of Cultural Heritage, the proclamation states that:

- Any immovable cultural heritage may not be removed from its original site without the prior written approval of the Authority,
- Any person shall notify the authority before removing registered movable cultural Heritage from its original site, and
- About trading Cultural Heritages, it says that: no person may engage in the purchase and sale of cultural heritage for commercial purposes.

Concerning fortuitous discovery of Cultural Heritage, it states that:

- Any person who discovers any Cultural Heritage in the course of excavation connected with mining explorations, building work, road construction or other similar activities or in the course of any other fortuitous event, shall forthwith report it to the Authority, and shall protect and keep it intact until the Authority takes delivery thereof, and the Authority upon receipt of report submitted, shall take appropriate measures to examine, take delivery of, and register the Cultural Heritage so discovered
- Where the Authority fails to take appropriate measures within six months, the person who has discovered the Cultural Heritage may be released from his responsibility by submitting a written notification with a full description of the situation to the regional government officials.
- The Authority shall ensure that the appropriate reward is granted to the person who has handed over a Cultural Heritage discovered fortuitously and such person shall be entitled to reimbursement of expenses, if any, incurred in the course of discharging his duties.
- Any person who holds permit to conduct construction works in a reserved area and who discovers Cultural Heritage in the course construction activities shall stop construction and shall forthwith report it in writing to the Authority.

Accordingly, if any cultural and archaeological resources are encountered during the construction process of Kemissie – Hayk railway, the construction contractor should

immediately report it to the nearest responsible office and protect and keep it intact until responsible body handles it.

2.2.2.10 Proclamation to Promote the Development of Mineral Resources (Proclamation No. 52/1993)

The Proclamation No. 52/1993 is proclaimed to ensure the conservation and development of the mineral resources for the benefit of the people, and to ensure that prospecting, exploration and exploitation of mineral resources are carried out in accordance with the appropriate technology and sound principles of resource conservation and develop national expertise in the mining industry.

Among others, the proclamation gives provision about construction minerals in sub Article 1, 2 & 3 of Article 21. It states a legitimate of land, may produce and use for non-commercial purpose, free of charge and without permission of the Licensing Authority, construction minerals from the area he occupies, provided that the area is not reserved or excluded areas and that he does not disturb or damage the adjacent occupant's land or property.

It further states that any person produce and use for non-commercial purpose without charge and with prior permission of the Licensing Authority, construction minerals for the construction and maintenance of roads, dams, airports, schools, hospitals and other non-commercial public works. However, the licensee shall take proper precaution not to interfere with the other legitimate occupants of the license area, the land covered by a lease and adjacent land.

If the licensee's mining operations require that the other occupant be displaced, the licensee shall attempt to negotiate the compensation payable to such occupant. If the occupant refuses to be displaced or to agree on the amount of compensation, the Licensing Authority may cause the expropriation of immovable property if any, and the eviction of such occupant on behalf of the licensee's mining operations, subject to the licensee's payment of compensation determined by the Licensing Authority.

2.3 DEVELOPMENT STRATEGIES

2.3.1 Agricultural Development Led Industrialization Strategy (ADLI)

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

2.3.2 Industrial Development Strategy

Giving a lead attention to manufacturing sub sector, the strategy recognizes the importance of other related areas including construction. It has acknowledged the private sector as an engine of development in realizing the growth of the industrial sector. Moreover, the strategy has taken on board the importance of integrating the national effort with the global agenda in attaining competitiveness in the sphere of product quality pricing and timing. The strategy gives due considerations to conducive and stable macroeconomic environment to encourage

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private sector. Furthermore, establishment of rural finance institution, provision of land, drinking water, as well as other infrastructures are seen as important elements of the strategy.

2.3.3 Conservation Strategy of Ethiopia (CSE)

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

2.3.4 Amhara Regional Conservation Strategies and Policies

Following the approval of the 1994 conservation strategy of Ethiopia, the Amhara Regional Government has prepared & endorsed 'The Amhara Regional Conservation Strategy' in July 1999.

The regional conservation strategy has formulated thirteen regional sectoral strategies and twelve cross-sectoral strategies. Environmental Impact Assessment of the application of policies, programs and projects are discussed in the document as cross-sectoral strategy.

2.4 DEVELOPMENT PLANS AND PROGRAMS

2.4.1 Growth and Transformation Program (2010/11 to 2014/15)

The main policy tool of the government for the coming five years is the Growth and Transformation Program (GTP). It has been formulated based on the lessons learned from the last five years Plan for Accelerated and Sustained Development to End Poverty (PASDEP).

GTP has been developed in a participatory manner with public, national and international stakeholders under the auspices of the Ministry of Finance and Economic Development (MOFED). The final draft was shared again with line ministries and regional authorities, before being adopted by the parliament as a legal document guiding national development and transformation until 2015.

The program has two alternative tracks. These are base case scenario and high case scenario. The base case scenario holds the minimum growth 11% that should be expected by the execution of the growth and transformation plan. In other words, continuing the growth rate of the past five years. The other alternative is high case scenario, which represents the maximum growth of 14.9 % annually coupled with the expected double growth in agricultural productivity. Moreover, the plan is targeted at increasing the efficiency of the industrial sector and finalizing already started works that enable the latter take the leading role in the economy.

It also contains factors that enhance growth such as expansion of education, health service, capacity building and good governance; and improving the capability and benefits of women and the youth.

The plan also gives emphases for road sector development. In the coming five years, increasing road network and building road infrastructure is given high attention. It is planned to increase the capacity of road agency in human resource and required technology. The focus of the plan is to continue implementing already started main high way roads, construction and improving of rural roads and constructing all weather roads to connect all the Kebeles in the country to all-weather roads that serve in both dry and wet seasons.

Based on the federal road sector strategy, in the coming five years upgrading of 728 km main high way roads, improving of 1,089 km high way roads, upgrading of 3,934 km link roads, construction of 4331 km new roads and rehabilitation of 4700 km and routine maintenance on 84649 km roads will be carried on.

In general the goal of the road sector program is reducing 3.7 hours that currently required reaching the nearby all-weather road by foot to 1.2 hours in 2015; and at the same time to reduce the current 64% of areas which are 5 km away from all-weather road to 29% at the end of program year.

Regarding environmental protection, the plan gives emphasis to reduce climate change and develop an economy that produce less carbon dioxide emission into atmosphere. The plan indicated that Ethiopia being highly dependent on natural resources would be more vulnerable to climatic change. Therefore, the five years Growth and Transformation Plan concerning the environment protection will focus on ways to reduce climatic change and how to cop up and adapt possible impacts.

2.4.2 The 4th Road Sector Development Program (RSDP)

The objective of the RSDP lies on restoring the country's road network, which has become an obstacle to sustainable economic development, and to develop institutional capacity of the road sector to manage their road network properly. As a result massive road construction activities have been undertaken and considerable achievements are exhibited.

During the past 11 years, over 70,000 km of road, including rural access roads, have been constructed or rehabilitated, while upgrading was done on the country's major connectors.

The second phase included the rehabilitation of 988 km of roads upgrading of 1758 km, and construction of 628 km of new gravel roads while heavy or emergency maintenance was carried out on 4199 km of asphalt and gravel roads. In addition to these, with the participation of Woredas and local people, over 70000 kms of community roads that can serve in dry season were constructed. However, linking all regions, Kebeles and Woredas in all-weather could not be achievable. Thus in order to link all Kebeles and Woredas with standardized all-weather road networks, the government has set new directives and has extended its road sector development programs to 4th phase.

The fourth phase rural road access program is designed based on the country's five years strategic plan. Expanding and upgrading the country's road networks, strengthening the capacity of regions, road networks and enhancing the road traffic safety. Moreover it will focus on interconnecting the country with the neighboring countries and making the construction industry competent and competitive.

The total road network before the launch of the first RSDP in 1997 was 26000km and the road density had not been more than 24km per 100 km2. Currently, including the maintained roads, the country's road network has reached to 49000 kms and road density has increased to 40.3 km per 1000 km2. The federal government has built over 37000 km of roads while regional states have built 86000 km of rural roads with low grades.

The 4th phase RSDP is expected to raise the country's road network from 49000 km to 136000 km in five years. In this regard, over 700 kms of major roads will be constructed, 1089 km will be upgraded and over 3900 km linking roads will be renewed. In addition over 4300 km of new linking roads would be constructed and upgraded while maintenance would be carried out on over 84000kms of roads.

The total cost of the fourth phase road development program is estimated to be over 121 billion Birr. The program apart from alleviating the burden of the rural communities in the road transport would improve the federal and regional roads status and enables the country to have quality road networks.

2.5 ENVIRONMENTAL IMPACT ASSESSMENT AND COMPENSATION GUIDELINES

2.5.1 EPA Environmental Impact Assessment Guidelines

The EPA has issued a Guideline Document for ESIAs. The document provides a background to environmental impact assessment and environmental management in Ethiopia. The document aims at being a reference source to ensure effective environmental assessment and management practice in Ethiopia for all parties who engage in the process.

The long-term objectives of the ESIA system as set out by the EPA are:

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

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

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

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

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

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

However, projects located in environmentally sensitive areas such as land prone to erosion, land prone to desertification, areas of historic or archaeological interest, scenic landscape, religiously important areas etc. should be treated as equivalent to schedule 1 activities irrespective of the nature of the project.

An initial screening of the project roads has been undertaken using the EPA ESIA guidelines. According to the guidelines the Kemissie – Hayk railway project falls under schedule 1, requiring a full ESIA. The main reason being that the project is traverses through some areas categorised in the guidelines as 'environmentally sensitive areas'. These include areas with erosion-prone soils and areas prone to desertification. Also the size and scale of the project requires full scale ESIA.

2.5.2 ERA's Environmental Management Manual

The environmental monitoring branch EMB of ERA has prepared Environmental Management Manual (2008). The prepared manual is a major revision and update of the 2001 Environmental procedures manual. It provides a framework for undertaking environmental and social impact assessment for road development projects and integrating the outcomes of the assessment processes into the planning, design, procurement, construction and on-going operational and maintenance phases of the complete road system.

The manual specifies the requirements and procedures for the conduct of an ESA for road sector projects. The environmental screening in the project prioritization phase determines the level of ESA that must be undertaken during the feasibility study phase. It establishes the key issues that are likely to be encountered and allow judgment to be made on the severity of impacts that may arise subsequent to the project.

According to the manual, projects classified in three groups or impact levels.

Level 1 Projects

Level 1 projects are those projects which are unlikely to have any significant environmental or social effect. In ERA's case these include routine maintenance activities carried out by ERA or its contractors. Specific maintenance items that are confined to the road surface, shoulders and drains are also included in this category, as long as they do not change the engineering design of the road. For example, resurfacing and drainage reinstatement works would be specific maintenance items, described as "minor' or level 1 projects.

Level 2 Projects

Level 2 projects are defined as "projects whose type, scale or other relevant characteristics have the potential to cause some significant environmental impacts but are not likely to

warrant an ESA". For the road sector, these include upgrading/rehabilitation of major rural roads. These projects would fall under Schedule 2 of the EPA Schedule of Activities.

Level 2 projects are likely to require an Initial Environmental Examination (IEE) when funding of the project has been approved and prior to the commencement of the pre-feasibility study, to determine if there are environmental factors in the project, which warrant referral or advice from the Ethiopian EPA. The need for such referral would be based on the assessment and advice received from the Environmental Monitoring and Safety Branch (EMSB).

Funding agencies may require an ESA/PESMP to be prepared for Level 2 projects. However, these ESA and PESMP would not have to undergo the level of formal public review and approval by the EPA as required in Level 3 projects. This level of assessment would require ERA to correspond with other interested government and non-government agencies to ensure all the requirements of supporting environmental legislation are satisfied.

Level 3 Projects

Level 3 projects are identified as projects which may have significant environmental impacts, and may, therefore, require a full ESA. For the road sector these include major urban roads, rural road programs and inter-regional and trunk roads. These projects would fall under Schedule 1 of the EPA.

The formal public review process undertaken for Level 3 projects must also meet the disclosure requirements of funding agencies.

Regarding environmental monitoring, the guideline emphasizes that Prior to giving the contractor possession of the site, the supervising engineer should undertake a comprehensive environmental monitoring program which focuses on the essential physical elements of the site – air, water and soil vegetation– to provide a pre-construction baseline from which the performance of the contractor can be judged and to ensure those criteria that exceed the existing regulatory criteria are identified.

The manual clearly states that monitoring will be conducted on two levels. These are:

1) The supervising engineer shall monitor the activities of the contractor and ensure that the requirements of the contract are fulfilled.

2) The supervising engineer shall also monitor the socio-economic issues that may arise from the project and report any representations from the community to the contractor or themselves to the project engineer in ERA within 24 hours of the representation being made.

Similarly the supervising engineer, as part of their inspection activities, shall note and act to have mitigated any environmental non-compliances or environmental incidents that may occur on the site. The supervising engineer should maintain records of all non-compliances and their mitigation as well as the monitoring undertaken by the contractor to ensure mitigation has been successful.

2.5.3 AfDB Environmental Impact Assessment Guideline

Initial Environmental Examination (IEE) represents the earliest stage in formal environmental impact assessment by the African Development Bank (ADB). IEE is a process for identifying and evaluating the ways in which a proposed project is likely to affect its environment.

At the outset of the study, environmental screening was carried out for the road project in accordance with environmental impact assessment (ESIA) laws and the ESIA guideline document of Ethiopia and the ADB IEE checklists. The main aim of the screening is to ensure that the road project is subject to the appropriate extent and type of environmental assessment.

The purpose of the IEE is to assign the proposed project to one of three categories, I, II or III. These categories differ as follows:

- Category I requires a comprehensive environmental impact assessment;
- Category II requires a less detailed environmental impact assessment, but a comprehensive Environmental Management Plan (EMP); and
- Category III requires no further study.

According to the ADB IEE Checklist, the project Railway would fall into either ADB Environmental Category I or II type projects. More specifically, Road Construction would fall into Category I and Road Rehabilitation into Category II. However, if a category II project is located in or close to environmentally sensitive areas it should be treated as equivalent to a Category I project.

Question	True or False
The project is not located in or close to an environmentally sensitive areas	False
The project is listed under category II of figure 1 (IEE checklist)of the ADB Environmental Assessment Guidelines	True
The project has no major physical interventions in the human and natural environment	False
The project is a small scale project	False
The project is a low cost project	False

After all these screening with the relevant guidelines, it is understood by the Consultant that the environmental assessment process for the Kemissie-Hayk Railway Project is adopted like Category I of the ADB Guideline or Schedule 1 of the EPA ESIA Guideline, i.e. the road projects would require a full ESIA. Concerning the relevance to environmentally sensitive areas, that the project is located in some areas categorised as 'environmentally sensitive areas' in both the ADB IEE Checklist and the EPA Guideline. Among the environmentally sensitive areas listed in the guidelines, areas with erosion-prone soils and areas prone to desertification are the most relevant to the proposed road project. Further, ADB's environmental and social assessment procedures have been used to compile the report.

2.5.4 Standard Technical Specifications of ERA

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

2.5.5 ERA's Environmental Procedure Manual

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

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

This may include:

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

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

It is understood by the Consultant that according to ERA's Environmental Procedure Manual the environmental assessment process to be adopted for the Kemissie – Hayk railway Project is a full ESIA or the project is environmentally critical project.

2.5.6 Guideline No.ES2 – Resettlement Action Program

Construction and upgrading of roads invariably requires the involuntary acquisition of land which result in physical relocation, loss of shelter, loss of other assets or access to assets, and/or loss of income sources or means of livelihood whether or not those affected must move to another. Unless these risks are consciously countered, it often giving rise social and economic risks.

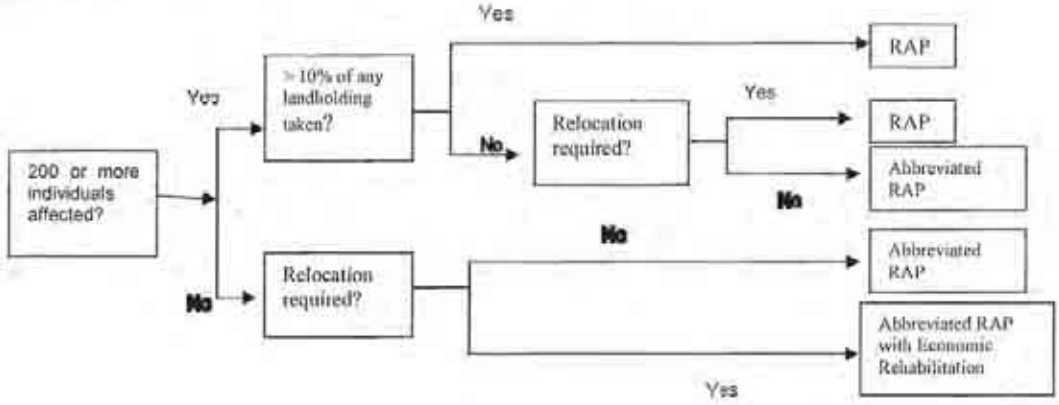
The Ethiopian Roads Authority (ERA) is the responsible body authorized for ensuring that involuntary resettlement is identified, where appropriate, for each road development project, and that a RAP or Abbreviated RAP is accordingly prepared, implemented and monitored. On the other hand, the Environmental Protection Authority (EPA) holds the responsibility of evaluating an environmental impact study report and the monitoring of its implementation.
ERA as the developer, considers the incorporations of international best practices of resettlement action plan which can minimize risks to be caused by involuntary acquisition of land. To this effect, ERA has prepared Guideline No. ES 2 Resettlement Action Program in 2008.

The Resettlement Action Program Guideline of ERA made emphasis on the need for preparing either Full RAP or an Abbreviated RAP for construction and upgrading of roads depending on the magnitude and complexity of the resettlement of a project. The preparation of resettlement action plan will consider policies, legal laws and regulations of the country, international guidelines/international agreements to which Ethiopia is a party and donor's policy requirements which are relevant to the issues of loss of assets, or access to assets or reduction in livelihood of PAPs and compensation and resettlement measures.
The major components to be incorporated in the preparation of project resettlement action program as thoroughly discussed in the ERA Guideline No. ES 2- Resettlement Action Plan are the following.

- Legal and Policy Framework;
- Potential Impacts;
- Socio-economic Studies;
- Eligibility Criteria;
- Entitlement Framework;
- Site Selection, Site Preparation, and Relocation;
- Housing, Infrastructure and Social Services;
- Host Communities;
- Public Consultation and Disclosure of Information;
- Institutional and Organizational Framework;
- Gender Mainstreaming;
- Monitoring and Evaluation;
- Grievance Procedures;
- Disclosure of the Instrument
- Resettlement Schedule; and
- Costs and Budget.
- Conclusion

The selection process to be followed in determining the appropriate resettlement instrument according to World Bank standards is outlined in Figure 3.1 below:

Figure 3.1: Resettlement Instruments: World Bank Requirements



According to the World Bank, a full RAP is required whenever land acquisition in a project:

- Affects more than 200 people, and
- Takes more than ten per cent of any landholding; and/or
- Involves relocation.

An Abbreviated RAP is acceptable if:

- Fewer than 200 people are affected; or
- If more than 200 people are affected, but all land acquisition is minor (10% or less of any landholding is taken) and no physical relocation is involved.

If fewer than 200 people are affected but some relocation is involved, an Abbreviated RAP is expanded to include an economic rehabilitation programme.

Likewise, for the World Bank, ERA is required to prepare a full resettlement plan (FRP) for any project that involves a significant number of people (200 or more) who would need to be displaced with a loss of assets, or access to assets or reduction in their livelihood. The FRP will be released as a supplement document to the Environmental and Social Impact Assessment (ESIA) for Bank-financed projects involving involuntary resettlement issues. For any project involving the resettlement of less than 200 people, an abbreviated resettlement plan will be prepared. The selection of the appropriate instrument determines the level of detail of information required during project preparation, which in turn determines the methodologies to be employed to obtain the information.

2.5.7 Amhara National Regional State's Guideline for Compensations

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

The necessary for the establishment of compensation committee based on the Proclamation Sub Art No.2 and No. 3 of Art10 is discussed in the guideline. The guideline is reviewed and presented below in brief.

Valuation of Houses and Compensation Payment:

- Valuation of houses for compensation purpose shall be determined based on the types of construction materials used for the building and bill of quantities for the construction as per the current market prices;
- Where the house is partially demolished and approved by the committee that the house is no more useful for dwelling, full compensation shall be given to the owner. However, if the affected person wants on his own will to use the remaining un demolished parts of the house, compensation shall be given only for the demolished parts of the house;
- Compensation payment shall be paid for all affected services connected with the demolished house;
- Compensation payment for project affected houses shall include other structures connected with the building/house and the valuation will be based on the current market prices requires for replacement;

Valuation of Fences: The valuation and compensation of affected fences shall be determined according to the current market price requires for replacement.

Valuation of Crops:

- The compensation for the loss of crops shall be determined based on the current market price per quintal and amount of cropyield produced per hectare;
- Despite the fact that project affected person is legal for compensation payment, the person shall get opportunity to harvest the crop if it is matured for harvesting;
- A rural landholder whose land has been permanently expropriated shall be paid displacement compensation based on Proclamation No. 455/2005 of the Federal Government which is equivalent to ten times the average annual income he secured during the five years preceding the expropriation of the land.

Valuation of Perennial Trees and Other Trees:

- The valuation of project affected trees shall be equal to the value of capital and labour costs to grow the trees;
- Where the affected trees are eucalyptus, the compensation shall be three times of the current market price; and
- If the owner of the affected trees, however, does not want to be compensated as stated above, s/he has right to clear and take the trees before the land has been expropriated.

Valuation of Protected Grasses:

- Compensation payment for the project affected protected grassland which has been used for cattle's forage, house roofing or as source of income shall be determined based on current market price and its valuation will be made by a concerned

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governmental body or the compensation payment will be based on sort of assessment findings that has been carried out for the valuation purpose; and

- If the affected person, however, does not want to be compensated as stated above, s/he has right to harvest and collect the grass before the land has been expropriated. If possible, ample harvesting time will be given to the owner.

Compensation for Permanent Improvement to Land: Compensation payment for permanent improvement costs for the project affected land such as clearing, levelling, tracing structures, water storages, irrigation structures, etc. shall be based on the current market value of capital and labour requires undertaking for same works.

Compensation for Installed Properties: Compensation payment for project affected installed properties will include costs for removal properties, transportation and costs for installation of the properties at designed places so as to pursue their services.

Compensation for Cemetery/ Graveyard:

- The compensation for cemetery shall be determined based on the cost to remove the skeleton bodies and cover the expenses require for the ceremonial arrangements;
- The compensation payment will be determined by the committee established for the purpose and the cost for relocation will be estimated based on current local market price for the required materials, transport and labour cost;
- Expropriation of the grave land will be after full consultation with the service beneficiaries and community religion leaders.

Compensation for Services:

- Compensation for services shall be determined based on the cost to demolish or remove the services; besides, the compensation shall include the cost to construct, install, and to remove the services.
- If the services are under the possession of the federal government or regional government or development agency, the compensation shall be determined based on the Federal Proclamation No. 455/2005 Article no. 6.

Establishment of Committee for Valuation and Compensation:

- As stated in the Proclamation No. 455/2005, Sub Article No.2 and 3 of Article No.10, the town administration shall assign a committee having members with relevant qualification for valuing properties.
- As stated above the committee will undertake the activities based on the stated guidelines. However, where the impact includes large sections of communities and if the property requires special knowledge for valuation, public consultation shall be carried out and the consensus reached shall be addressed to the town administration for decision.

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Valuation Methods of Affected Properties: According to the Proclamation and the Guideline of the Amhara National Regional State the following methods of valuation will be applied for compensation.

- Buildings and other infrastructures

1. Replacement cost = /building cost as per current market price (considering the existing condition of the building/infrastructure)/ + /other improvements undertaken on the land/ + /lease's repayment for the remaining lease period/.

2. The valuation of buildings and other infrastructures shall be undertaken with the following considerations.

a. Compensations for the building improvement and other additional constructions on the land shall be determined based on the cost required for the improvement during and after the construction of the building.

b. Repayment for the remaining lease period shall be estimated only for the land when it is found under lease agreement.

c. The amount of compensation payment for the loss property (such as house) shall be determined to cover the replacement costs of the property;

d. Valuation of crops/vegetation = land area **X** production in kg/ha **X** local market price/kg **+** costs for land improvement

e. Valuation of perennial crops is equal to [number of trees **X** price per tree + cost for land improvement] OR it is equal to [area of perennial crops **X** cost/ha **+** costs for land improvement].

Compensation for Perennial Crops:

- Compensation for perennial crops shall be 10 times the average annual income s/he secured during the five years preceding the expropriation of the perennial cropland. Where the income from the crops was below five years, the compensation shall be 10 times of the given service years.
- Where the crops do no start giving production and if the landholder has lost cropland permanently, the compensation shall be 10 times the average income gained during production period.
- If the landholder has get land as replacement, the compensation shall be equal to the value of capital and labour expended before the land has been expropriated.

Compensation for Protected Grassland:

- Compensation for communal grassland shall be provision of similar grass land as replacement;
- No compensation shall be given to the protected grassland where there is no possibility to provide similar grassland as replacement; and

- Compensation for individual grassland shall be equivalent to ten times the average annual income the affected person secured during the five years preceding the expropriation of the grassland.

Compensation for Government/Kebele Houses: Before the preparations of compensation payment, the following priorities shall be implemented.

- Valuation of the houses shall be estimated;
- Detail information about displaced persons shall be documented;
- Displaced legal renters shall be provided with other similar Kebele/government owned houses as replacement; and
- If Kebele/government owned houses are demolished for condominium, the displaced renters of the houses shall be beneficiaries.

Conditions for Demolishing Private Houses:

- Town municipalities/ administrations shall carry out displacement compensation payment based on Proclamation No. 455/2005 of Federal Government of Ethiopia and Guidelines of the Regional Government. Besides, the following activities shall take place.

  a. Provision of replacement land,

  b. Displacement compensation equivalent to the estimated annual rent of the demolished dwelling house or Kebele /government owned house for one year with free of charge shall be provided for the displaced urban household; and

  c. Besides, the displaced person shall be exempted from any related costs during the resettlement process such as engineering and technical service costs.

Compensation for Dislocated Farmers from Croplands: Compensation for landholder whose holding has been expropriated for public use shall be determined based on the Proclamation No. 455/2005 of Federal Government of Ethiopia and Guidelines of the Regional Government. Besides, the following measures shall be taken to rehabilitate the dislocated farmers.

- Provision of plot land for dislocated farmers for house construction and permission to use local construction materials for building;
- Involve the dislocated farmers in town administration's projects or in others development works to improve their livelihoods;
- Land provided for house construction shall be based on the laws and rules of the town administration.
- Land for house construction shall be also provided for household head living in the displaced compound that have legal right for rural farmland.

Grievances Redress Mechanism:

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- If the holder is dissatisfied with the amount of compensation, complaints might be lodged to grievance committee established by the town administration to hear grievances related to urban landholdings.
- If the holder is dissatisfied with the decision of the grievance committee the complaints might be lodged to the higher body organized at zonal level.

Properties Those Have Not Compensation: No compensation shall be given for any construction and activities done on the land after inventory and compensation works have been carried out based on proclamation of the federal government and regional government's guideline.

Duration of Clearing Properties for Acquisition of Land:

- The vacation time of landholders shall not be less than 30 days as stipulated on the Proclamation Sub Article No.4 of Article No. 4.
- The town administration shall extend vacation time if there is need to do so.

2.6 INTERNATIONAL CONVENTIONS

In addition to national environmental legislations, the Federal Democratic Republic of Ethiopia is also a party to a number of Regional and International Conventions and Protocols on Environment. The Government has established an Environmental Protection Authority, and this Authority is designated as focal point for the implementation of these conventions and protocols. These Conventions and Protocols are as follow:

2.6.1 Convention on Biological Diversity

The Convention on Biological Diversity has three goals. These are:

- Conservation of biodiversity;
- Sustainable use of the components of biodiversity and
- Fair and equitable sharing of the benefits arising from the use of genetic resources.

The convention was ratified by Ethiopia through proclamation 98/94 on May 31, 1994.

2.6.2 Framework Convention on Climate Change

Ethiopia ratified this convention through proclamation No. 97/1994 on May 2/1994. This convention takes into account the fact that climate change has trans-boundary impacts. The basic objective of this convention is to provide for agreed limits on the release of greenhouse gases into the atmosphere so as to prevent the occurrence of climate change. It also aims to prepare countries to minimize the impact of climate change, should it occur.

2.6.3 The Vienna Convention on the Protection of the Ozone Layer

The basic objective of the Convention is to combat the negative impact on the environment and human beings resulting from ozone depleting substances by reducing the amounts released and eventually banning their commercial use through internationally agreed measures. The Montreal Protocol entered into force in 1989 to facilitate the implementation of the convention.

Ethiopia ratified and become party to the Vienna Convention and the Montreal Protocol in January 1996. The National Meteorological Services Agency has been mandated for the coordination and supervision of implementation of this convention.

2.6.4 The United Nations Conventions to Combat Desertification

The objective of the convention is to combat desertification and mitigate the effects of droughts in countries experiencing serious drought and /or desertification, particularly in Africa. Ethiopia has ratified the convention through its proclamation no. 80/1997.

2.6.5 The Basel convention

The objective of the Basel Convention is to control and regulate the trans- boundary movement of hazardous wastes. The Bamako Convention of 1991 plays a similar role at the level of the African continent.

Ethiopia ratified the Basel Convention through its Proclamation No. 357/2002. Its amendment was ratified through Proclamation No. 356/2002. The country has also ratified the Bamako Convention through Proclamation No. 355/2002.

2.6.6 The Stockholm Convention

In the year 2002, Ethiopia fully accepted and ratified the Stockholm Convention on persistent organic pollutants by Proclamation No. 279/2002 designed to ban the use of persistent organic pollutants. The Environmental Protection Authority has the full mandate to implement the convention at the national level.

2.6.7 Convention on International Trade in Endangered Species of Fauna and Flora

The objectives of the convention are to control international trade in endangered species and to ensure that international trade in non-endangered species is carried out in a manner which ensures stable markets and economic benefits for the exporting countries as well as to control and regulate illegal trade in such non endangered species, fossils and/ or their derivatives.

Ethiopia ratified the convention through Proclamation 14/1970. The mandate to implement the convention at federal level is the responsibility of the Ethiopian Wildlife Protection and Development Organization.

2.7 ADMINISTRATIVE AND INSTITUTIONAL FRAMEWORK

Responsibilities of development activities are clearly demarcated between Federal and Regional Governments based on the scale, characteristics and magnitude of the investment to be undertaken. Accordingly, construction of highways and major roads crossing more than one regional government boundaries is the responsibility of the Ethiopian Road Authority (ERA), while the construction of roads, rural and urban roads, within a region is the duty of the respective regional governments.

2.7.1 Federal and Regional Administration

The Federal Democratic Republic of Ethiopia (FDRE) comprises nine member States and two Administrative Councils with their own legislative, executive and judicial powers. The FDRE has a parliamentary system of government, with two councils: the Council of Peoples' Representatives and the Federal Council.

Each of the nine States and two Councils has powers under the State Council for planning, determining and implementing social and economic programmes within its own region, and each is responsible for the development and protection of its natural resource base. For administrative purposes, the States are divided into Zones, which are in turn sub-divided into Woredas. Each Woreda is again sub-divided into Kebeles, which provide local level organization and administration.

For the day-to-day activities, the highest decision making organ at the Woreda level is the Woreda executive committee, which comprises of the Woreda chief administrator, vice administrator, chief secretary and others with varying responsibilities. The Woreda executive committee is accountable to the Woreda administration council, which is the elected political arm of the Woreda. Below the Woreda administration, at the grass-root community level in both urban and rural areas there are Kebeles. Kebele administrations are responsible for coordinating and organizing the community development activities.

2.7.2 Ethiopian Railway Corporation (ERC)

The Ethiopian Railway Corporation (ERC) was established through regulation Number 141/2007 of the council of Ministers of FDRE. The corporation reports to the ministry of transport and communications. The regulation mandates the corporation (ERC) to develop railway infrastructure and provide passenger and cargo rail transport services.

2.7.3 The Environmental Protection Authority

The Environmental Protection Authority (EPA) was re-established in October 2002, under Proclamation 295/2002, which repeals Environmental Protection Authority Establishment Proclamation No. 9/1995. The EPA is directly accountable to the Prime Minister. The objective of the Authority is to formulate policies, strategies, laws and standards which foster social and economic development in a manner that enhances the welfare of humans and the safety and sustainability of the environment, and to take the lead in ensuring the effectiveness of the process of their implementation.

Among the powers and duties given to the EPA under the above Proclamation and pertinent to the objectives are to:

- Co-ordinate measures to ensure that the environmental objectives provided for under the Constitution and the basic principles set out in the Environmental Policy of Ethiopia are realised.
- Prepare, review and update, or as necessary cause the preparation of environmental policies, strategies and laws in consultation with the competent agencies, other concerned organs and the public at large, and upon approval monitor and enforce their implementation.
- Promote or assist in the formulation of environmental protection action plans and projects and solicit support of such action plans and projects.

- Prepare directives to implement environmental protection laws and upon approval, ensure their implementation.

Thus all project proponents and executing bodies (agencies) in the country should operate in close co-operation with the EPA to ensure that proper mitigating measures are designed and implemented, especially for projects with an adverse effect on the environment. That is, an Environmental Impact Statement (EIS) should be prepared by project proponents and be examined, commented upon and approved by the EPA.

2.7.4 Sectoral Environmental Units

The establishment or designation of an environmental unit for every competent agency is provided for under the Environmental Protection Organs Establishment Proclamation No. 295/2002

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3. DESCRIPTION OF PROPOSED PROJECT

3.1 PROJECT CONTEXT AND JUSTIFICATION

The Kemissie-Hayk Railway Section (Lot 12) is part of the Makalle Awash Railway Route traverses through four regional states namely, Tigray, Amhara, Oromiya and Afar. The Kemissie-Hayk section is about 100 km in length and it is located solely in Amhara Regional State within Oromiya Zone and South Wollo Zone. The start of the project is located at about 325 km from Addis Ababa and ends at Passo Mille about 445 km away from Addis Ababa.

Kemmissie-Hayk Section railway project links six Woredas of the Southern Wollo Zone and two Woredas of Oromiya Zone. It is expected to stimulate the economic growth and development of social services of these areas and the country at large. Besides, the proposed railway project will connect and create access to alternate ports of neighbouring countries so that the project will bring significant development in international trade.

3.2 PROJECT COMPONENTS/ACTIVITIES

The railway project work comprises of design, construction, maintenance and operation activities. The design and feasibility study works mainly focus on site investigation and site surveying, material investigations, quarry and borrow site determination, assessment of existing socio-environmental conditions.

The construction work activities include site clearing for opening the railway route, excavation and grading, filling, compacting, rail line laying, structures construction, improvements in drainage structures, waterways crossing, paving, quarry and borrow material development, establishing camps, garage site and material storage sites, temporary detour roads construction and maintenance.

The selected ROW for the railway line and other project activities may have impacts on crops, grazing /bush land, buildings, etc. and social consequences such as disruption of social interactions, displacement and other social problems.

The construction phase activity deploys a number of workforce, machinery and transport vehicles. The worker community deployed during the construction work includes both people coming from within and outside of the project area. Skilled and semi-skilled manpower will be mainly from outside while unskilled labour force required will be recruited from the localities of the project area. The major part of the workers would be temporary residents of the project area.

This report attempts to address all specific impacts of the project those could bring on socio-environment effects in the communities reside along the railway route and its environs. To this effect the possible adverse impacts of the project are assessed and identified, and their mitigation measures are proposed to pay due attentions in the implementation of the railway section.

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3.3 RAILWAY ROUTE DESCRIPTION

The Kemissie-Hayk Railway Section is about 100 km and starts at Kemissie town which is about 325 km from Addis Ababa and ends at Passo Mille at about 445 km away from Addis Ababa. The railway section is solely located in South Wollo and Oromiya Zones of Amhara Region. It traverses through eight Woredas of the indicated Zonal administrations; namely Kemissie, Dawa Chefa, Kalu, Kombolcha, Dessie Zuria, Werebabu, Hayk and Tehuledere. The railway passes through or nearby the town sections of Kemissie, Kombelcha, Hayk and Paso Mille. Most of the project railway line passes on agricultural land and then to some extent on grazing and settlement areas.

The Right-of-Way environmental condition was inventoried and recorded during the site visit and assessments and briefly presented as in table below.

Table 3- 1: Project ROW environmental conditions

Chainage (km)	Environmental conditions	Potential Impacts	VEC environmental components
0+000 – 11 + 000	• Flat terrain land up to km 9 • Dense eucalyptus tree forest is traversed for about 2kms length (km 0 + 000 – km 2) • Qatchero school at km 0+500 • Route traverses Intensively cultivated farmland in the Borkena River flood plain • Borkena River is crossed at km 6 • Rail line crosses road to Meko town at km 8 +000 • Rout follows left side of the Borkena River course from km 6 up to km 11 +100 • Mountain side traversed from km 9 onwards	• Vegetation removal • Pollution impacts to water sources • Occupation of fertile crop fields • interference with the seasonal water inundated flood plain • Risk to the rail line by flooding • Traffic safety at Meko road crossing	 **Photo 3- 1: Plantation tree cover at project origin**

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Chainage (km)	Environmental conditions	Potential Impacts	VEC environmental components
11 +100 - 20	• Line traverses mountain sides, intensively cultivated land, with sparse vegetation cover. • Touche village is traversed at km 11+100 – 13 +000 • Houses, Plantation and fruit trees encounter with in ROW in touché village • Betcho River flood plain lies downstream of alignment at RHS. • Billida village at km 14 – 16 traversed • Chaffa farm state lies at offset distance of 1km on RHS (from km 14 – 20) • Koko village is traversed at km 17 – 18+800 is	• Soil erosion & Land slide risks • Crop field occupation • Lose of houses and properties In Touche village, Bilda village etc. •	
20 - 45	• Still Mountain side is traversed, with flood plains at downstream on RHS • Borkena River at downstream RHS is still followed • Intensively cultivated crop fields, no significant vegetation cover. • Selama village traversed at km 20 -21 some Houses and trees fall in ROW width with in the village • Dirma River is crossed at km 24 + 500 • Tekake village at km 23 +000 – 23+ 500 • Open intensively cultivated crop field, no dense settlement from km 24 up to km 45. • Line traverses between two hills around km 30	• Soil erosion and land slide risks • Water source pollution and siltation of river beds • Loss of houses and trees in Selam village	 **Photo 3-2: Borkena River at km km 20-24**

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Chainage (km)	Environmental conditions	Potential Impacts	VEC environmental components
45 – 50	• Kmbolcha town traversed (45 – 50), line lies mostly at out skirt of the town, but passes through new settlement at km 49). • Flat to rolling terrain within the town • Ambo river crossing with in Kombolcha town • Houses, utility service lines, etc encounter in ROW • Line traverse within the air field of the old air port at km-----, • The site is proposed for Rail way station in Kombolcha town • Asphalt crossing (Addis - Dessie Road) crossed at km 49 +900.	• Loss of houses and property in Kombolcha town • Traffic safety and accidents within the town section and at the asphalt crossing • over pass/under pass structure and fencing may be required at the asphalt crossing (Km 49 +900)	 **Photo 3- 3: Alignment within Kombolcha town km 49**

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Chainage (km)	Environmental conditions	Potential Impacts	VEC environmental components
50 - 75	• Line follows steep slope mountain side after the asphalt crossing and passes between two hills around km 50 +500 • Kospi factory compound and other establishments are found RHS of the alignment and at the foot of the mountain traversed by the rail line (km 50 +300). • Borkena River crossing at km 51 +300 • Line follows mountain side, sparsely covered with bushes and scrubs there after. • A newly under construction Air port is traversed at off set distances (500m – 2km from the alignment). • Series of mountain sides including Mesengo Mountain traversed. • Aba Kolba village at foot of Mesengo mountain at km 56 off set 500mts RHS • Mountain terrain continues all along up to Hardibo kebele at km 75	• Very rugged tyopografic land form, steep slopes and restricted corridor • Constrained working sites • Risk of land slide /land slip • Water source pollution and siltation • Crop field occupation • Interference with the new air field activities at offset distance	 **Photo 3- 4: Constrained Section between two mountains (km 50+500)**

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Chainage (km)	Environmental conditions	Potential Impacts	VEC environmental components
75 - 85	• Mountainous terrain • Line traverses beween Maount Gedera and Lake Hardibo around km 75 • Lake Hardibo at km 75 +500 offset distance RHS of the line • Ehud village Traversed at km 75 +700 • Flat to rolling terrain is traversed around km 75 – 80 • Intensively cultivated crop fields traversed • Rural houses at hill sides traversed • Habesha Tulu Muslim cemetery traversed at km 76 +600 • Ankarka River crossing at km 83 +000 • Line crosses Hyke – Bijituma Gravel road at km 85+400	• Hardibo Lake water pollution and siltation of the lake bed • Loss of houses and property in Ehud village • Crop field occupation • Musleum Cemetry l at Habasha Tulu	 **Photo 3- 5:Cemetery at Habasha Tulu km 76+600**
85 - 95	• Flat to rolling terrain • Line traverses Lake Hayk at off set 300mts LHS for about 9km length(km 85 – 94) surrounding the lake bank • Intensively cultivated crop field in the flood plain of the lake • Line crosses gravel road (Bijima – Hayk town road). • Mountain sides covered by wood land and bush cover is traversed towards the end	• Interference with Hayk lake recharge line • Siltation and water quality degradation • Pollution Risks to Fish population and other aquatic life of the lake • Siltation and water quality of Passo Mille River	 **Photo 3- 6: Bank of Hayk Lake traversed (km 85- 94)**

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Chainage (km)	Environmental conditions	Potential Impacts	VEC environmental components
95 - 100 +700	• Line follows Passo Mille River at offset distance LHS. The river is at downstream side of the rail way line. • End of the project at km 100 +700 just before crossing the Passo Mille River.	• Wood land tree removal • Siltation and water quality degradation of Passo Mille River	 **Photo 3- 7: Passo Michael Church in ROW width**  **Photo 3- 8: End of railway project (km 100+700)**

The land cover /land use of the route corridor for the project can be broadly categorized in to three as; i) Dense plantation forest at project origin and acacia woodland towards the destination of the project; ii) the intensively cultivated crop fields all along the route corridor, iii) the ettlement sites at towns and villages that encounter at several locations, including Kemisse town and Kombolcha towns at the origin and middle of the rail line segment respectively.

There are several sensitive environmental components including the seasonally water inundated flood plain of Borkena River, the Hayk and Ardibo Lake water bodies, intensively cultivated fields, the mountains and valley landscape and land slide prone sites, cemeteries and religious establishments, the dense vegetation cover etc are of significant ecological and environmental value.

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4. DESCRIPTION OF THE PROJECT ENVIRONMENT

4.1 Baseline Environment Conditions

The proposed rail route segment falls within in the rift valley system of Ethiopia, in the north eastern part of Amhara regional state. It follows new and unpaved alignment and falls mainly in intensively cultivated crop fields. The track alignment runs parallel to the Addis Ababa – Dessie – Makele highway, at some kilometres offset distances.

- The project origin is at out skirt of Kemissie town located some 325kms from Addis Ababa, while the end of the project is at a location some 12kms away from Hyk town of North wollo zone in the Amhara region. Hyk town is found at 445km from Addis Ababa. The length of the project rail line segment is estimated at 107km.

- The road route corridor falls mainly in the semi-arid (Kola) climatic zone for major rail lengths in the first and last sections, while segment between km53 to km 70 falls in Woina Dega climatic conditions.

- There are several densely settled sites including the industrial centre of Kombolcha town that are traversed by the rail route. The ROW issues and social impacts encountered at those settlement sites are expected to be significant.

4.1.1 Topography and Climate

The rail line crosses three zonal administrative areas of the Amhara Regional state; Oromo Zone, South Wollo zone & North Wollo zones as described above.
North and South Wollo zone are among the highland areas of Ethiopia that is dominated by mountains and hills. The Oromo zone also has similar character but with significant land area having flat topography.

Major rail length falls in the South Wollo zone administrative area. The elevation within the zonal area ranges between 150masl to above 3500masl. About 8% of the land area falls below 150masl, 58.5% lies between 150 – 2500masl, 31% lies between 2500 – 3500masl and 2 % lies above 3500masl. Elevation of the Oromo zone land ranges from 600masl up to 3,200masl.

The railway project falls in the highland areas of Ethiopia. The terrain characteristics are mountainous and hill dominated with flat terrain at the foot of mountains and in flood plains, and is found at intervals. The railway line follows mainly mountain sides at upstream of flood plains and river valleys at most locations. At the origin it falls in the flood plains of Borkena River for about 11kms. There after it follows mountain sides, as described under table - (ROW condition) above

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Table 4- 1: Topography and Climatic Conditions of Some of the Project Woredas

Woreda /zone Name	Terrain classifications (%)	Altitude ranges (masl)	Climate		
			Ecological zone (%)	Temperature (°C)	Av. Rain fall ranges (mm)
Oromo Zone	M = 32 R = 65 F = 3	600 - 3200	Q, WD, D	12 - 33	600 - 900
Dessie Zuria & Kalu	F = 20 R & V= 35 M = 45	1800 - 3500	Wu = 8 D = 47 WD = 45 K = 0	20	1200 - 1700
Dawa Chafa	-	1400 - 2500		24.5	900
Wora Babu	-	1000 - 2800	-	Min = 18 Max =35	-

Note: F= Flat, R = Rolling, V= Valley, M = Mountainous. W= Wurch, D = Dega, WD = Woina Dega, K = Kola

- The terrain characteristics of the route corridor are roughly classified as 35% flat, 13% rolling 35.3% mountainous. The flat lands traversed mostly fall in flood plains and seasonal wetland areas. This flood inundated areas are the most sensitive ecological sites from environmental points of view.
- The altitude along the route corridor ranges from 1400masl to 2480masl. At critical locations with steep slopes and rugged topography, the rail line either will follow foots of mountains or tunnel construction may be required. Accident and safety issue will be of concern at such locations like at km 51 - 68 where the route alignment follows relatively steep slopes and higher elevation, and where it reaches its highest altitude at km 58+010. The impacts at those risk prone sites will be identified and appropriate mitigation measures will be proposed.

Photo 4- 1: Flat Terrain Along Borkena Flood Plain (Beko Road Crossing(Km--)

Photo 4- 2: Steep Slope Mountainous Terrain Traversed at Upstream Of Passo Mille River (Km 100)

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The project area falls dominantly in the three ecological zones; Qola,Woina Dega and Dega ecological zones, however, Wurch climatic zone also prevails at few of locations of the woredas traversed. The mean annual temperature and rainfall recoded for the project woredas is as described in table-4.1above. In general land area in South Wollo zone is classified as 17% lying in temperature ranges of 20 – 27°C, 46.6% as lying in 15 – 20 °C, 33% in 10 -15 °C and 3% lying under 10 °C temperature ranges.

The Climate of the railway route corridor is mainly semi-arid (Qola) type of ecological zone, and has relatively hot climate.

The Qola climatic zone has been classified as those areas receiving annual rainfall between 400mm and 700mm. In those areas, rainfall occurs during two seasons; small rains during February – April, and main rain occurs during July to September.

4.1.2 Geology and Soils

The Project woredas fall in Mille and Dirma sub watershed. A watershed study (known as IWSMS) conducted for the sub watershed, has compiled and reported the following soil types and coverage .

The soil type characterization of the upper Mille & Dirma sub watershedes is descried as in table 4.2 below.

Table 4- 2: Type of Soils Constituting Upper Mille & Dirma Sub Watershed

Soil Type	%	
	Mille	Dirma
Regosols	29.68	29.64%)
Cambisols	25.52	38.77%
Fluvisols	17.85	-
Solnchaks	13.25	-
Leptosols	6.55	12.99%
Vertisols		6.67%
Others	7.15	12

Source: Mille & Dirma IWSM t soils report of Feb.2009

The soil type one of the railway project woreda (Warababu woreda) has the following distribution:

Black cotton soil.....19%
Red clay soil.....4
Brown soil.....9.7
Grey.....54
None vertices /black soil.....13

4.1.3 Water Resources

The other sensitive environmental component is the water resources. Water resource is abundant along the route and several perennial and seasonal rivers and streams are found both along the alignment and at offset distances. The flood plain and wetlands of the Cheffa plain following the Borekena River is among the most sensitive ecological sites of the project. The flood plain is traversed for substantial lengths (km 13 – km 27), as the rail line follows and runs parallel to the Borkena River bank. It also traverse shores of major lakes like Hayk Lake (for over 9kms distance) and Hardibo Lake shores.

Several other perennial and seasonal streams also encounter along the route.
Some of the reverse of the project area include;

- Borkena River over long stretch and crossed by rail line at 4 locations
- Etch River at km 9+900
- Dirma River at km 21+ 500
- Passo Mille River towards the destination of the project at km
- Lake Hyk at km
- Lake Hardibo at km

Photo 4- 3: Seasonal Wet Land of Borken Flood Plain

Photo 4- 4: Hardibo Lake Shore at km 75+600

The impacts on the water sources and the wetland areas falling within the project influence area will be critically evaluated and proper mitigation measures will be proposed.

4.1.4 Flora and Fauna Resources

The land along the route is intensively cultivated and no significant field left for protected and dense forest cover. The long standing annual crop cultivation in the area has significantly degraded the forest resources as well. There are only patches of plantation tree covered sites especially eucalyptus trees that encounter at the road origin around Kemisse town, and in chafa Dawa. Animal grazing grounds, bushes and scabs encounter at intervals with the farmlands.

The -fauna resources are also not expected to be significant, due to the limitation in wildlife habitat, mainly lack of forested land area. However, common wildlife resources such as Monkey, Ape, Hayena, Fox, Spring bok , Tiger, Warthog, Chameleon, Hedge hog are found in the area.

4.1.5 Land Use/Land Cover

The land use of the route corridor is dominantly cultivated and grazing land, while significant land area is also seasonally water inundated by over flooding of rivers and streams in the flood plain.

Table 4- 3: Land Cover /Land Use Type of Project Woredas (Ha)

Land cover/ land use type	Ormo Zone	Dawa chefa	Kalu	Wora Babu
Cultivated /cultivable Land	67,839.3	17,397	27,454	16,189
Grass Land	66,180.5	3,069	937	14,909
Natural Forest	41,916.05	11,924.25	4536	28,266
Plantation Forest	4,333.38	2,998.50	-	-
Wood Land	82,171.25	15,300.25	-	-
Shrub Land	136,135.8	4,888.50	47078	-
Water	5	ND	-	-
Swamp Area	7,117.75	3,603.75	-	-
Degraded land			3786	-
Others	12,550.8	ND	3732	11,136

Soil erosion is apparent due to the terrain characteristics being rugged and mountainous, sparse vegetation cover and due to the long standing intensive annual crop cultivation. At sloppy areas the soil erosion impact is significant. The project activities do expose the soil resources further to soil erosion unless proper mitigation measures are put in place along with the project implementation.

Photo 4- 5: Land Slip at Steep Slopes of Mountainous Terrains

Photo 4- 6:Typical Road Side Soil Erosion Problems in South Wollo Zone

4.2 Social and Economic Environment

This section discusses the socio-economic environment of the project influence areas.

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4.2.1 Administrative Divisions

The project influence Woredas where the railway line passes through are eight. Out of which six Woredas are from South Wollo Zone (Kalu, Kombolcha, Dessie Zuria, Hayk, Tehuledere and Werebabu) and two Woredas are from Oromiya Zone (Kemissie and Dawa Chefa). All project-influence-Woredas are in Amhara Regional State. They have a total of 153 rural and 22 urban Kebele Administrations.

Table 4- 4: Administrative Divisions of the Project Influence Woredas

Zone	Woreda	Admin. Centre	Rural Kebeles	Urban Kebeles	Total Kebeles
South Wollo	Kalu	Kombolcha	32	4	36
	Kombolcha	Kombolcha	6	5	11
	Dessie Zuria	Dessie	31	-	31
	Tehuledere	Hayk	20	2	22
	Hayk	Hayk	3	2	5
	Werebabu	Bistima	20	2	22
Oromiya	Kemissie	Kemissie	4	3	7
	Dawa Chefa	Kemissie	15	4	19
Total (Rural and Urban)			**131**	**22**	**153**

Source: Socio-Economic Survey, 2011

4.2.1.1 Kalu Woreda

Kalu is bordered on the west by Dessie Zuria, on the north by Werebabu, and on the south and east by the Oromia Zone. The administrative center for this Woreda was Harbu; but recently the administration centre is shifted to Kombolcha Town believing that it is a suitable place where the Woreda people will easily get administration services with no travelling long distance. The urban centeres in Kalu Woreda are Harbu, Ancharo, Degan and Gerba with total population of 10,871; 686; 4,575; and 3,678, respectively (2007 Population and Housing Census).

The altitude of the Woreda ranges from 800 meters above sea level in the lowlands bordering the Oromia Zone to 1,750 meters at the foot of the mountains north of Kombolcha. The climate of Kalu varies from dry sub-humid to semi-arid. Important rivers in the Woreda include Cheleleka and Borkana. Forested area includes Yegof forest, 180 square kilometers of native trees and plantations of exotic species covering the steep slopes of Mount Yegof northeast of Kombolcha.

Figure 4- 1: Map of Kalu Woreda

4.2.1.2 Tehuledere Woreda

Tehuledere is located at the eastern edge of the Ethiopian highlands in the South Wollo Zone, and bordered on the south by Dessie Zuria, on the southwest by Kutaber, on the northwest and the north by the Mille River, on the northeast by Werebabu, and on the southeast by Kalu. The Mille River separates Tehuledere from Ambasel to the northwest and the North Wollo Zone to the north. The administrative center for this Woreda is Hayk. Other towns in the Woreda are Sulula and Paso Mille with 942 and 1,193 population, respectively (*2007 Population and Housing Census*).

The altitude of Tehuledere ranges from 500 meters above sea level along the boundary with the South Wollo Zone to 2700 meters along its southwest border. The hydrology of this Woreda includes two lakes: Hayk, which lies entirely within it, and Ardibbo which lies to the south of Hayk, defining part of the border with Kalu. Other notable landmarks include the monasteries of Debre Egziabeher and Istifanos.

Figure 4-2: Map of Tehuledere Woreda

4.2.1.3 Werebabu Woreda

Werebabu is bordered on the south by Kalu, on the west by Tehuledere, on the north by the Mille River which separates it from the North Wollo Zone, on the east by the Afar Region, and on the southeast by the Mio River which separates it from Oromia Zone. The administrative center of Werebabu is Bistma; other towns include Arabati and Bokeksa. According to 2007 Census, the population of Bistima and Bokekesa is 4,053 and 2,673, respectively.

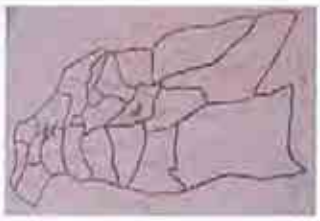

Figure 4-3: Map of Werebabu Woreda

Photo 4- 7: Bisitima Town

The western part of Werebabu lies in the Ethiopian highlands, with the eastern part stretching down to the lowlands of the Afar Region; elevations range from 700 meters above sea level where the Mille leaves the Woreda to 2700 meters at its southernmost point. Rivers in the Woreda include the Wakalo and the Burqa.

4.2.1.4 Kombolcha Town

Kombolcha is an industrial town. It is the home to Kombolcha Steel Products, a Metalworking Factory, Kombolcha Textile Factory and Brewery Factory that is part of

MIDROC, a conglomerate owned by businessman Sheikh Mohammed Al Amoudi. This city shares Kombolcha Airport with neighbouring Dessie.

It has a latitude and longitude of 11°5'N 39°44'E with an elevation between 1842 and 1915 meters above sea level.

Photo 4- 8: Kombolcha Town

4.2.1.5 Hayk Town

Hayk is the oldest town in northern Ethiopia. The town is named after Lake Hayk, which lies two kilometers east of the town and is the home of Istifanos Monastery, an important landmark in Ethiopian Church history. Located 28 kilometres north of Dessie in the South Wollo Zone of the Amhara Region, it has a latitude and longitude of 11°18'N 39°41'E and an elevation of 2030 meters above sea level. Its population is about 35,421 (*2007 Population and Housing Census*).

Notable landmarks include the churches Hayk Timhirt and Hayk Yohannis. Near the town is the church of Hayk Tekle Haymanot, founded according to tradition in 1862 by Saint Kalae Salama during the reign of king Dil Na'od. Hayk was formerly the capital of the Ambasel Woreda. Currently, it is the administrative centre of both Hayk Town Woreda and Tehuledere Woreda.

Photo 4- 9: Hayk Town

The town of Hayk is found to the west of the Lake hayk. Lake Hayk is one of two lakes in Tehuledere Woreda. It is 6.7 km long and 6 km wide, with a surface area of 23 km. It has a maximum depth of 88 m and it is located at an elevation of 2,030 meters above sea level.

4.2.1.6 Kemissie and Dawa Chafa Woredas

Kemissie and Dawa Chafa are located in Oromiya Zone nearly 315 km from Addis Ababa. Kemissie serves as an administration centre for the Zone and for Dawa Chafa and Kemissie Woredas.

Photo 4- 10: Kemissie Town

The Oromiya Zone shares boundaries with South Wello Zone in the west, with North Shewa Zone in the south and with Afar Region in the east and northeast. Astronomically, Oromiya Zone lies between 100 5' and 110 26' north latitudes, and between 390 48' and 400 25' east longitudes. The zone has the smallest area of all the zones in Amhara Region, with an area of 4434.53 km^2, which makes up about 2.79% of the area of the region. Towns in the Zone are Kammisie, Chafa Robit and Batti.

Dawa Chafa represent high potential cereal production zone. The upper valley of Borkena was previously under Chaffa State Farm, which at the present is partly leased to private investors and the remaining having been redistributed among the farmers.

4.2.1.7 Dessie Town

Dessie is a potential beneficiary of the railway line for the fact that the proposed railway station will be located at Kombolcha town section about 25 km from Dessie. The railway station at Kombolcha town will stimulant the growth and development of Dessie since it is a business centre and as well as home of museum.

Dessie is amongst the oldest town in the country which is over 100 years old. Geographically, the town is located 400 km away from Addis Ababa along the road to Mekele. It is surrounded by a chain of mountains which is claimed to be among the main reasons affecting its growth and development. Dessie is the capital city of South Wollo Zone in Amhara Region with a population of about 120,095; of which 57468 are males and 62,627 are females (*2007 Population and Housing Census*). This city has a latitude and longitude of 11°8'N 39°38'E with an elevation between 2470 and 2550 meters above sea level.

According to some literature, while Emperor Yohannes IV camping here (Dessie) in 1882, he was so impressed by his sight of a comet, which he interpreted as a wondrous event, and then he decided to found a city here, and named it Dessie (Amharic "My Joy"). Thereafter, Dessie increased its importance when Ras Mikael Ali, son-in-law to Emperor Menelik II, made it his base.

Moeover, Dessie became an important administrative center under the Italian occupation, and after the Second World War. The town continued being importance as the capital of the province of Wollo until 1995, the fall of the Deg Regime. At present, Dessie is the city of South Wollo Zone.

Photo 4- 11: Dessie Town

Dessie is the living home of peoples of different ethnic groups but the majority are Amhara and Tigrayan; and the majority of the inhabitants professed Ethiopian Orthodox Christianity, and Islam.

4.2.2 Population Size

Based on 2007 Ethiopian Population and Housing Census, the population of the project influence Woredas in the South Wollo and Oromiya Zone is 642,763; of which 50.16% are males and 49.83% are females. The detail information is presented in Table 4 -5 below.

Table 4- 5: Projected Population of Project influence Woredas

No.	Geographical area	Both sexes	Male	Female	Households	Hhold Size
1	Tehuledere Woreda[2]	117,877	59,300	58,577	28,780	4.1
2	Werebabo Woreda	100,530	50,459	50,071	23,910	4.2
3	Kalu Woreda	186,181	94,187	91,994	41,648	4.5
4	Dessie Zuria	166,366	81,850	84,516	35363	4.5
5	Kombolcha Town Woreda	85,367	41,968	43,399	22,765	3.7
6	Dawa Chefa Woreda	133,388	66,746	66,642	29,159	4.6
7	KemiseTown Woreda	19,420	9,782	9,638	5,226	3.7
	Total	**809,129**	**404,292**	**404,837**	**186,851**	**4.3**

Source: 2007 Population and Housing Census, Ethiopia Population Census Commission

4.2.3 Household Size

The household size (family size) in the project influence Woredas ranges from 3.6 to 4.6. The household size in the rural areas is higher than that of urban areas since extended family is very common in the rural settlements.

Table 4- 6: Household Size in the Project Influence Areas

No.	Geographical Area	Urban + Rural	Urban	Rural
I	**South Wollo Zone**	**4.2**	**3.4**	**4.4**
1	Tehuledere Woreda	4.1	3.1	4.3
2	Werebabu Woreda	4.2	3.4	4.3
3	Kalu Woreda	4.5	3.7	4.6
4	Kombolcha Town Woreda	3.7	3.5	4.4
5	Dessie Zuria Woreda	4.5	-	4.5
II	**Oromiya Zone**	**4.5**	**3.7**	**4.6**
1	Dawa Chefa Woreda	4.6	3.1	4.6
2	Kemise/Town/-Woreda	3.6	3.6	0.0

Source: 2007 Population and Housing Census, Ethiopia Population Census Commission

4.2.4 Population Density

According to Table 4-7 shown below, the average population density of the Woredas is about 226 persons per km^2. Particularly, the urban Woredas which are Kombolcha and Kemissie have highest population density.

Table 4- 7: Projected Population Density for Project Influence Areas

	Zone & Woreda	Total	Area in Sq. km	Density
I	**South Wollo-Zone**			
1	Kalu	196,992	851.54	231.3
2	KombolchaTown	90,067	132.15	681.5
3	Tehuledere[3]	124,387	405.37	306.8
4	Werebabu	105356	714.28	147.5
5	Dessie Zuria	157,295	937.32	177.5
	Total	**674,097**	**3,041**	**222**
II	**Oromia - Zone**			

[2] It includes the population size of Hayk Town.
[3] It includes the population size of Hayk town.

	Zone & Woreda	Total	Area in Sq. km	Density
1	Dawe Chefa	140,749	652.39	215.7
2	KemisieTown	20,491	3.75	5,461.70
	Total	**161,240**	**656.14**	**245.74**
	Total I and II	**835,337**	**3,697.14**	**225.94**

Source: Statistical Abstract 2009, Federal Central Statistical Agency

4.2.5 Population Settlement

As shown in Table 4-5 about 12% and 11% of the population live in urban areas of South Wollol and Oromiya Zone, repectively.

According to the survey conducted by Gegefa Tolossa (2000), two types of settlements (scattered and irregular-shaped villages) have been identified in rural Oromiya Zone. The scattered dwellings mainly occupy the relatively gentle plains and valleys. Regarding the types of dwellings for the sample households, 85% lived in thatched grass/straw huts with a considerable variation in the quality of the tukuls. Almost the same number of farmers' houses did not have any form of internal partition. According to the report, out of which some 33% of the households have to share their dwellings with their livestock such as cattle, sheep, goats and camels during night hours.

Photo 4- 12: People settled in villages (Dawa Chefa- Bilida Koko)

However, as it is observed during the socio-economic survey of this railway project, the majority rural peoples of Dawa Chafa and Kalu are settled by villages and some of them are compacted. Regarding with the settlement nature of Tehuledere and Werebabu, as this socio-economic has identified, about 20% of the population settled in villages and the remaining are scattered. The significant residential houses in the settlements are corrugated iron roofed and wood wall. At least the houses have two partitions, one for store and the other one will serve for both dining and bed room. It is observed that most households do not share their house for cattle shed. Cattle sheds are separated but they are very close to their residential houses for security purpose.

It has been also observed that people settled in villages have opportunity to have access for the established social services such as health post, water supply and school.

The place of residence type of the population of the project influence Woredas is presented below.

Table 4- 8: Population Place of Residences (in %)

No.	Geographical Area	Urban	Rural
I	**South Wollo Zone**	**11.7**	**88.3**
1	Tehuledere Woreda	12.2	87.8

2	Werebabu Woreda	6.6	93.4
3	Kalu Woreda	10.6	89.4
4	Kombolcha/Town/Woreda	68.3	31.7
5	Dessie Zuria	-	100
II	**Oromiya Zone**	**11.1**	**88.9**
1	Dawa Chefa Woreda	2.2	97.8
2	Kemise/Town/-Woreda	100	0.0

Source: Summary of Statistical Report of the 2007 Population and Housing Census

4.2.6 Age Structure

The share of percentage for the young age group in Amhara Region where the proposed railway project is located is very significant. The proportion of children under the age of 15 is about 29% of the total population whereas the proportion of the population at the age of 15 to 64 years is about 68%. With regard to the proportion of the population aged 65 & above is only 2.7%.

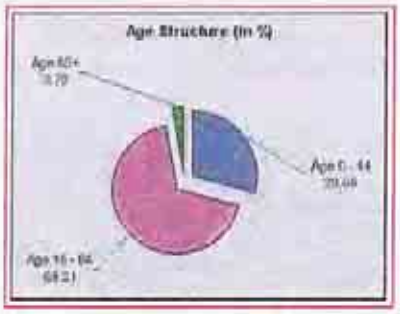

Figure 4-4: Population by Age Structure

With regard to project influence Woredas, the proportion of the population under the age 15 ranges from 33 to 43.8%; 15-64 years 52 to 63%; and population aged 65 and above is 3 to 7%. The age structure of some Woredas is briefly shown in Figure 4-11 below; and its detail is presented in Annex 6.

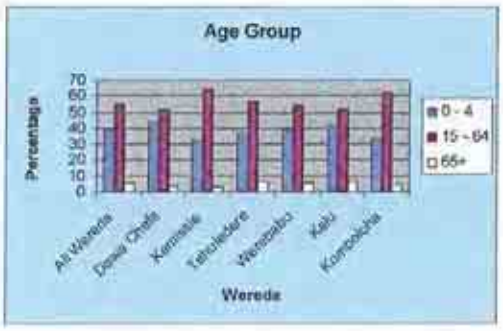

Figure 4-5: Age Group of Project Influence Woredas

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4.2.7 Dependency Burden

It is assumed that those aged between 15-64 years are considered the working age populations while those less than 15 years and above 64 years are dependent. Thus, according to the data in Table 4-9 below, the dependency ratio for the Amhara Region (based on age group) as of 2007 Population and Housing Census is about 47. This implies that every 100 persons at economically productive age group are responsible to take care of themselves and additional 47 persons. However, in the actual case with regard to the project influence areas, it has been observed that some people under the age of 15 and above 64 will be involved in some kinds of activities and contribute for the household income.

Table 4- 9: Dependency Ratio of the Amhara Region (2007)

Sex	Youth Age	% share	Old Age	% Share	Economically Active Age	Dependency Ratio
Age	0 - 14		65+		15 - 64	
Male	3,722,675	21.6	372,590	2.2	8,636,875	23.8
Female	3,616,398	21.0	309,664	2.2	8,577,181	23.2
Total	7,339,073	42.6	682,254	4.3	17,214,056	47.0

Source: Summary of Statistical Report of the 2007 Population and Housing Census; FDRE Population Census Commission

As Shown in Table 4-10 below, the dependency ratio of the project influence Woredas is higher than that of the Amhara Region. It ranges from 55.1% to 91.8%. The average dependency ratio of the Woredas is about 81.3%. The dependency burden in the project influence Woredas will be severe if we consider the unemployment population of the working age group. Of course, young dependents constituted the largest ratio (50.5 to 84%). The detail is presented in Annex 6: Dependency Ratio of the Project influence Woredas.

Table 4- 10: Dependency Ratio of the Project influence Woredas

No.	Woreda	Age Group		Total
		0 - 4	65 & above	
1	Dawa Chafa	84.1	7.7	91.8
2	Kemissie	50.5	4.6	55.1
3	Tehuledere	63.7	12.3	76.0
4	Werebabu	72.0	11.6	83.6
5	Kalu	78.6	12.7	91.3
6	Kombolcha	52.6	6.9	59.5
	All Woreda	70.9	10.3	81.3

Source: 2007 Population and Housing Census

4.2.8 Ethnic Groups

According to the 1994 national census, the largest ethnic group reported in Kalu and Tehuledere was Amhara 99.4%; the largest ethnic groups in Werebabu were Amhara 97.76%, and the Oromo 2.18%; all other ethnic groups made 0.06% of the population. Three largest ethnic groups in Kombolch town were observed - the Amhara (41.34%), Tigrayan (15.85%), the Oromo (45.29%); and all other ethnic groups made up 0.52% of the population. As of the year 2000, the majority (about 65%) of the people in the Oromia Zone belongs to Oromo ethnic group; the second largest group belongs to Amhara. The Zone comprises negligible numbers of Argoba, Afar, Weyito, Tigraway and other ethnic groups.

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Table 4- 11: Ethnic Groups in Project Influence Woredas by Rank of Order

No.	Woreda	1	2	3	4
1	Dawa Chefa	Oromo	-	-	-
2	Kemissie	Oromo	Amhara	-	-
3	Kalu	Amhara	Oromo	-	-
4	Kombolcha	Amhara	Tigre	Afar	Oromo
5	Tehuledere	Amhara	-	-	-
6	Hayk	Amhara	Tigre	Gurage	Oromo
7	Werebabu	Amhara	Oromo	Afar	Tigre

Source: Socio-Economic Survey, 2011

4.2.9 Language

The major language spoken in Kalu, Kombolcha, Dessie Zuria, Tehuledere, Kemissie and Worebau Woreda is Amharic. Moreover, some people in Worebabu and Kombolcha Woreda will speak Oromiffa; and significant number of people in Kombolcha town will speak Tigrigna.

Despite the fact that the working language in the Oromia Zone is Oromiffa no problem has been observed for the project study team members to communicate with the local people and Woreda offices using the national language, Amharic.

4.2.10 Religion Affiliations

According to the 2007 Population and Housing Census the religion of the Amhara Region population is Orthodox (82%); Muslim (17%); Protestant (0.18%); Catholic (0.02%) and Traditional and others (0.11%). The religion affiliation of the urban and rural population of the region is also presented in the table shown below.

Table 4- 12: Religion Affiliation of Amhara Region Population

Religion	Urban + Rural		Urban		Rural	
	NO.	%	NO.	%	NO.	%
Orthodox	14,208,067	82.54	1,667,487	78.94	12,540,580	83.04
Protestant	30,240	0.18	21,416	1.01	8,824	0.06
Catholic	4,270	0.02	1,107	0.05	3,163	0.02
Muslim/Islam	2,952,775	17.15	414,476	19.62	2,538,299	16.81
Traditional	5,667	0.03	679	0.03	4,988	0.03
Others	13,037	0.08	7,055	0.33	5,982	0.04
All Persons	**17,214,056**	**100**	**2,112,220**	**100**	**15,101,836**	**100**

Source: Summary of Statistical Report of the 2007 Population and Housing Census; FDRE Population Census Commission

With regard to project influence Woredas, according to Statistical Report of the 2007 Population and Housing Census, the majority of the inhabitants are Muslims following by Ethiopian Orthodox Christians, Protestant and Catholic. The detail is presented in the Table 4-13 below.

Table 4- 13: Religion Affiliation of Population of Project Influence Woredas

No.	Woreda	Orthodox	Protestant	Catholic	Islam	Traditional
1	Tehuledere	9.35	0.13	0.04	90.43	0.04
2	Werebabu	2.01	0.03	0.02	97.88	0.06
3	Kalu	1.17	0.04	0.01	98.73	0.05

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4	Dessie Zuria	1.39	0.02	0.05	98.51	0.04
5	Kombolcha	23.44	2.31	0.09	73.92	0.13
6	Dawa Chafa	0.22	0.16	0.01	99.58	0.01
7	Kemissie	21.24	2.37	0.01	76.29	0.07

Source: Summary of Statistical Report of the 2007 Population and Housing Census, FDRE Population Census Commission

4.2.11 Occupation and Source of Income

Mixed agriculture is the predominant economic activities of the project influence rural areas of the Woredas. Small trade activities are undertaking as supplementary sources of household income. People in the Oromiya Zone are significantly pastoralists; and livestock is overwhelmingly the basis for their livelihood.

Crop farming is, in fact, confined to using rain and production depends on the availability of rain during the season. Significant numbers of households in Dawa Chafa undertake irrigation since the area is suitable to use the available rivers flows in the area.

The main source of income for the urban people of the Woredas is small trade. Kombolcha town is exclusively an industrial town and business centre where the source of the town dwellers' livelihood depends on trade and employment.

Table 4- 14: Source of Livelihoods of the Woredas

No.	Woreda	Source of Livelihoods by Rank of Order		
		1st	2nd	3rd
1	Dawa Chefa	Agriculture	Small trade	-
2	Kemissie	Small trade	Agriculture	-
3	Kalu	Agriculture	Small trade	-
4	Kombolcha	Trade	Employments	Agriculture
5	Tehuledere	Agriculture	Small trade	Fishing
6	Hayk	Trade	Agriculture	-
7	Werebabu	Agriculture	Small trade	-

Source: Socio-Economic Survey, 2011

A survey conducted on the Livelihood Profile Amhara Region particularly on the South Wollo and Oromia Eastern Low Land Sorghum and Cattle Livelihood Zone (July, 2007) has described that Dawa Chafa, Kalu and Werebabu are among the Woredas situated in the extreme eastern low land part of Amhara Region to the South Western part of Afar Region. Their economy is based on crop production but livestock rearing has a special importance amongst wealthier farmers. Crop production is highly dependent on rainfall and the main rain is received in the kremt (July-September). On average the area receives the lowest rainfall of all the livelihood zones in Amhara, with a long-term mean of 726 mm per annum. But it is the frequency of irregular precipitation and rain shortage that helps to make the zone chronically food insecure.

The main cereals grown in the areas are sorghum, teff and maize, and vetch is the main pulse. Land preparation is done by oxen plough. Men do the ploughing while both men and women participate in weeding and harvesting. Important inputs in this zone are home-produced compost as fertilizer and improved maize seed from Bureau of Agriculture and Rural Development. As in other areas stalk borer, bollworm and grasshoppers are the main crop pests affecting the cereals.

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The same survey assessed and identified cattle, goats and sheep are the major livestock in order of importance, but there are also a few camels kept by wealthier people for burden. The Zone is particularly known for its cattle population nevertheless grazing still limits numbers. Both cattle and small stock are sold, but mostly the latter for slaughter particularly during Christian and Muslim holidays. Crop and livestock sales bring the wealthier farmers most of their cash, but the poorer rely heavily on paid work and selling firewood.
The study has identified that some people seek work in the main towns - Kemissie, Bati and Kombolcha; some others go into Afar region for work on the irrigated plantations, and a few travel as far as Djibouti or Saudi Arabia. The firewood is from the natural bush and tree cover and is collected by both men and women and taken to the nearest towns for sale. Local employment of the area is linked with the period of weeding and harvesting. Migratory labor mainly occurs in July-August and February-March. Food purchase is mainly in April-September and the peak hunger season is from July - September.

According to the study, wealth in the Zone is determined by the possession of livestock (cattle, small stock and camels) and cultivated land. The very poor only have chickens and some are landless. The middle and better off do own higher numbers of livestock including transport animals - camel and donkey. It further discussed that the very poor only grow sorghum while the other groups also grow variously Teff, vetch and maize.

According to the study among the major problems of the area, lack of oxen, money and lack of ability to cultivate properly even the modest land they have are the major problems faced by the poor households in crop production. For the wealthier who own oxen there is a shortage of land in relation to their productive capacity, and also a lack of improved seed and poor market access during the rainy season. Wealthier farmers overcome the problem of access to land by renting from the poorer households in return for half of the crop i.e. a crop sharing agreement. Farmers who have no oxen rent them from those who do and usually pay one day labor for one day of oxen use.

Photo 4- 13: Agriculture, the main source of income in rural communities (Dawa Chefa)

4.2.12 Gender Issues

4.2.12.1 Division of Labour

Men are usually responsible for decision-making and planning of activities, while women have little power and seek their husbands' permission before they commit family resources or make decisions on different important matters.

However, rural women play a key role in natural resource management and achieving food security. They are generally responsible for small livestock, vegetable garden and collecting fuel, fodder and water, and cooking food. They have vital role in weeding and harvesting crops, and milking goats and cows, as well as carrying out their traditional reproductive role.

In the area where livestock rearing is the main livelihood, men are responsible for looking after cattle while women keep the small stock and children help with both.

4.2.12.2 Harmful Traditional Practices

The Socio-Economic Survey team has made consultations with Woreda Administration officials including Woreda Women, Children and Youth Affairs to discuses about the possible benefits and adverse impacts of the project and the mitigation measures to alleviate the problems. Discussions were held about harmful traditional practices and gender related problems in the Woredas. It is understood form the discussions carried out that there are many problems due to gender related issues and practicing of harmful traditional activities. The major problems mentioned in the discussions were abduction, female genital mutilated (FGM), rape and domestic violence.

It is palpably clear that abduction is a violent means of settling marriage. It takes place with out the consent of the girl and her parents. The girl would be seriously beaten while she is forced to go to her abductor's home where she will be expected to be a wife. Soon after the abduction, the abductor usually raped the girl. As some studies revealed, the possible reasons for practicing abduction would be inability to pay bride dowry, refusal of families for marriage due to economic stand and social class or other. Effects of abduction would be physical injury as the victims are beaten when abducted, constant marital conflict leading to unstable marriage. The victims will be denied from education opportunity and to remain as house wives. Besides, serious conflict can also arise between the families of the abductor and the abducted and this will lead to community conflict. Most abduction cases do not come to courts but are settled by arbitrators who usually do not consider the best interest of the woman.

FGM is a practice involving the cutting and removal of part, or all of the female genital causing grave damage to the organ itself. As some studies revealed, the reasons for practising FGM include initiation to be part of the community, for her to well behave, to be sexually less active and hence less aggressive, to maintain her virginity until marriage. Effects of FGM on the victims include immediate complication such as infection that could lead to death, shock, long-term complication such as problems during child bearing and childbirth, fistula, sexual problem, etc.

The other form of harmful traditional practice in the Woredas is early marriage. It involves the marriage of girls at an early age that is before they attain maturity both in physical and psychological. Such number of marriages would be arranged by parents of the two sides – the bride and the groom. They decide when their daughter will marry and whom she marries. Her consent does not have place for the marriage decision. In most cases the girl marries while she is too young to shoulder the responsibilities that come along with marriage.

The reasons why parents force their daughter to marry at their early age are that they consider marriage as family-building strategy, an economic arrangement or a way to protect girls from sexual related problems. A girl unmarried at an early age will be given a status which will ridicule her personality and diminish her dignity. Early marriage would cause to increase the rate of maternal mortality and morbidity. It leads to become young mothers usually bring complications and even death in pregnancy and childbirth of wives too young to safely bear children. In such case if the mothers survive, they usually sustain fistula. The fistula hospital in Addis Ababa is a telling examples of young girls forced to early marriage and early pregnancy.

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Some studies on such issues have revealed that early and forced marriages are usually practiced not only in Ethiopia but also in some countries of Asia and Africa leads to girls as young as 7 years to marry older man. *"I never liked my so-called husband because he was forcing me to do things I did not want to"* said a young divorced girl who found her self in the capital city of Ethiopia. *"I run away from my family"* (Berhane Ras-Work, 2006).

The education statistics of the project influence Woredas has disclosed that many children, particularly girls, will be school drop-outs due to early marriage. Early marriage is widely practiced in the rural parts of the Woredas and they will result in low living standard.

Rape is another form of violence against women. Its victims constitute very young as well as elderly females. But the most victimised groups are the young females. Victims are usually blamed and ostracised from their communities and bring shame to their families or communities. For this reasons victims and their families do not usually report the case to police/court.

Domestic violence is also another form of gender-based violence that many women face at their homes. Punishing spouse and children (both females and males) is considered as the right action in the name of to make them 'disciplined' people. This would expose the victims to physical and mental (psychological) injury. It threatens, humiliates, demoralises and lowers the self-esteem of women and children. The repetition of violence on the children and woman at home can turn them into fearful and confused persons, and their confidence will be depleted and become helplessness. In most cases this form of violence is considered as a private matter and victims do not usually come in time to seek help and the victims do not address the cases directly to the police.

To summarise the main gender related problems in consulted Woredas, Table 4-15 is presented below.

Table 4- 15: Harmful Traditional Practices in the Woredas

Woreda	Harmful Traditional Practices and Other Gender Related Problems
Dawa Chefa	• Rape; • Early marriage; • Female genital mutilation (FGM); • Abduction; • Domestic Violence • Butter swallowing the child at birth;
Kalu	• Abduction; • Rape; • Early marriage; • Female genital mutilation (FGM), etc
Hayk	• Early marriage; • FGM • Quit working on holly days; • Migrate to abroad in search of job;
Tehuledere	• Female genital mutilation (FGM) • Early marriage; • Quit working on holly days; • Migrate to abroad in search of job;

Woreda	Harmful Traditional Practices and Other Gender Related Problems
Werebabu	• Early marriage; • Removal of milk teeth of the lower jaw

Source: Socio-Economic Survey, 2011

4.2.12.3 Possible Measures for Gender Based Problems

The respective Women, Children and Youth Affairs of the consulted Woredas believe that the prevalent gender related problems would be improved through gradual provisions of awareness creation endeavours to societies which are designed to bring attitudinal and behavioural changes towards protection of women and children's rights. The public and all concerned bodies should pay attentions to make access for childhood learning and education and to provide appropriate support for their wellbeing. There should be common understanding and appreciation that all children (girls and boys) are valuable members of society rather than economic burdens. The consulted people believe that intensifying awareness raising and education is the only way to bring attitudinal changes in society and effective development.

Some studies (Berhane Ras-Work, 2006) proposed the possible measures to reach zero tolerance to harmful traditional practices; among which the main include:

- Action research to identify the best approaches to apply to specific situations with regards to traditionally condoned forms of violence;
- Ensure government engagement both at the policy and program levels in order to make a sustained intervention that reaches the entire population;
- Intensify the education of the girl child;
- Introduce subjects such us gender equality in schools and universities;
- Train law enforcing agents on violence prevention and management;
- Mobilize traditional and modern media on violence against girls;
- Encourage a coordinated approach among institutions, agencies, and organizations; and
- Involve the community, especially those affected groups in decision making for designing programs.

4.2.13 Agricultural Development

The mainstay livelihood of majority people of the Woredas is agriculture. Livestock production is the other principal source of income to farmers. Since their topographic setup is very diverse in nature, the agricultural activities vary from Woreda to Woreda. In general, the Woredas are characterized by subsistence mixed farming system; and the majoriy people get their livelihoods by cultivating a variety of crops and rearing livestock simultaneously.

4.2.13.1 Land Tenure and Use

In Ethiopia, the right to ownership of rural and urban land, as well as of all natural resources, is exclusively vested in the State and in the peoples of Ethiopia. The Ethiopian Constitution

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states that land is a common property of the nations, nationalities and peoples of Ethiopia and shall not be subject to sale or to other means of exchange.

The Ethiopian peasants have right to obtain land without payment and the protection against eviction from their possession. Besides, the Ethiopian rural farmers and pastoralists have the right to free land for grazing and cultivation as well as the right not to be displaced from their own land.

Rural farmers' right to the land is a kind of usufracturay right, which merely gives peasants possessory or "holding" prerogatives, including the rights to use and enjoy, rent, donate and inherit the land. In urban areas, its dwellers may obtain land on 15-99 years lease agreements depending on the purpose for which the land is needed and such right may be freely transferable.

To secure such rights, the Constitution prohibits eviction of holders of the land without just cause and payment of compensation. Without prejudice to the right to private property, the government may expropriate private property for public purposes subject to payment in advance of compensation commensurate the value of the property.

Land holds a significant place in the lives of the rural people of the project influence Woredas. It is the primary source of economic welfare whereby farmers and pastoralist of the project influence Woredas can afford to obtain food, education and healthcare. Besides, possession of land is a source of pride and dignity in the society. Agriculture in the Woredas is the mainstay of economy in terms of income, employment and food security.

According to the study conducted by Abate Shiferaw & K.L. Singh, Addis Ababa University land use is the end product of activities on land resources by the human population inhabiting the area. It is the end product of the interaction between man and land. The kind and extent of land use are primarily determined by the basic physical and economic needs of individual inhabitants and conditioned by the social norms adopted by the community in which they live and in turn facilitated by prevailing economic and social institutions and physical infrastructures.

The socio-economic survey of the railway project, as shown below in Table 4-16, has revealed that, in most cases, farming land takes the highest share of land use coverage in the Woredas.

Table 4- 16: Land Use Pattern in the Project Influence Woredas (in %)

N.	Land use type	Kalu		Kombolcha		Tehuledere		Werebabu	
		ha	%	ha	%	ha	%	ha	%
1	Farm land	24,734	61.52	6,065	47.96	21539	47.03	16989	24.10
2	Grazing land	937	2.33	2,144	16.95	662	1.45	13641	19.35
3	Forest & bush land	9,814	24.41	4,438	35.09	14308	31.24	38340	54.38
4	Water coverage	-	-	-	-	3800	8.30	-	-
5	Waste land	3,786	9.42	-	-	1000	2.18	1410	2.00
6	Others	937	2.33	-	-	4491	9.81	120	0.17
	Total	40,208	100	12,647	100	45,800	100	70,500	100

Source: Socio-Economic Survey, 2011

As some studies identified, land holder farmers would have access to land through three major ways: inheritance from parents, land reallocations and sharing from relatives. Some

farmers will also get land through transactions such as illegal land purchase, cash rental and share cropping.

However, as Table 4 -17 below shows, there is land scarcity in the Woredas. One constraint for this problem could be the direct outcome of the population expansion. It is true that overpopulation will be among the main causes for the diminishing of holding size for individual farmers; this partly will be a constraint to produce sufficient food grains. Under such circumstances, the farmers will have very limited scope to give up land as fallow. Besides, when holding sizes shrink, farmers do normally keep large numbers of livestock on a small grazing area which results in considerable overgrazing and low productivity.

According to the data collected from Woreda agriculture and land use offices, the landholding size of the household is very small. With considering an average family size of four or five, one can understand how small the per capita landholding is in the Woredas.

Table 4- 17: Household Landholding Size in Project influence Woreda

No.	Woreda	Household Landholding Size (ha)			Average Household size
		Minimum	Maximum	Average	
1	Kalu	0.25	1.0	0.63	4.5
2	Kombolcha	0.25	2.0	0.67	3.7
3	Tehuledere	0.75	7.0	0.85	4.1
4	Werebabu	0.01	0.7	0.4	4.2

Source: Socio-Economic Survey, 2011

4.2.13.2 Land Use Within the Road Right of Way

The land use within the proposed railway line right of way is presented in Table 4-18 below.

Table 4- 18: Land Use within the Selected Right of Way

Land Use Type	%
Settlement area	0.22
Farm land	95.61
Bush and grazing land	4.17
Total	**100**

Source: Losses of Inventory Survey, 2011

4.2.13.3 Crop Production

As it has been observed, most of the farmers employ traditional methods of farming which have not changed for generations and which led to topsoil run off. Consequently, these lead to greatly reduced crop productivity.

Some Woredas are suitable to grow varieties of crops but the major common crops in the Woredas are maize, sorghum, Teff and wheat.

According to some studies, use of fertilizer in the Woredas is very low because it is either not available in many cases or it is very expensive. Though the community has various valuable indigenous knowledge and skills, in most cases, the production techniques have a lesser amount of yield and, even more, have detrimental effect on fertility level of the soil and

environmental subsistence. Therefore, it is believed that better access to and more adoption of modern farm inputs may contribute to better yields.

According to the findings of this socio-economic survey, the productivity of land in the Woredas varies from place to place (see Table 4-19). The amount of Sorghum yield per hectare ranges from 12 to 34 quintals; Teff from 8 to 16 quintals; Maize from 18 to 50 quintals; and wheat from 20 to 22. Several factors ranging from environmental to socio-economic features may explain the difference in crop yields.

4.2.13.4 Current Crop Price

The Socio-economic survey has assessed the current market price of various crops per quintal in Birr and identified that it differs from Woreda to Woreda.

Table 4- 19: Major Crops and Yields/Hectare

No.	Major Crops	Yields per hectare				Current market Price per quintal in Birr		
		Kalu	Kombolcha	Tehuledre	Werebabu			
1	Sorghum	34	17	18	12	600	550	400
2	Teff	16	12	15	8	1000	800	840
3	Maize	50	20	23	18	500	400	430
4	Wheat	22	21	20	-	600		
5	Barley	14	-	17	-	450	500	
6	Bean	-	-	13	-	1000		
7	Chickpea	-	-	12	-	900		
8	Potato	-	-	180	-	1500		
9	Carrot	-	-	200	-	550		
10	Onion	-	-	100	-	800		
11	Orange	-	-	-	40	120		

Source: Socio-Economic Survey, 2011

4.2.13.5 Food Insecurity

4.2.13.5.1 General

Food security refers to food availability and/or the ability to households to acquire food. To have access to adequate food, households either have to be to produce enough food themselves or have the means to generate the cash to purchase in the market place. In the areas where there is dearth of income generating opportunities, irregular rainfall and unsuitable agro-pastoral nature for the local economy, it is obvious that there would be food insecurity problems in such areas.

The main indicators for the magnitude of the problem of food insecurity at national level include: i) sharp decline in per capita food available for consumption, in response to the rapid population growth on one hand, and the stagnant or very slow growth in agricultural production; ii) the considerable increase of the volume of imported food both through purchase and in the form of aid; iii) the prevalence of energy deficiency among adults; and iv) high rate of children malnutrition (*Degefa Tolossa, 2000*).

Subsistence, mixed smallholder agriculture is the dominant farming system in the highlands of Ethiopia, while agro-pastoral and pastoral systems play an important role in the lowland

areas of Ethiopia. Both lowland and highland economic systems are the corner stones of the rural economy of Ethiopia. The development of both highland smallholder mixed farming and the lowland agro-pastoral/pastoral systems is paramount to the development of the economy of the country, contributing to food and livelihood security of the majority of the population of the country. This is also true for the project affected Woredas.

Livestock is an important sector in both highland mixed smallholder farming and low land agro-pastoral systems in Ethiopia. The contributions of livestock include food production, input for crop production and soil fertility management, raw material for industry, power source, cash income, saving, fuel, social functions and employment (*Workneh Nigatu, 2004*). This is also true for the major areas of project influence Woredas.

4.2.13.5.2 Food Insecurity in South Wollo Zone

A study conducted in 2000 by Albertien Van Der Veen, a nutritionist from WHO/ORHC, has revealed that food security in South Wollo is precarious due to a high population density, small land holdings per household, heavy reliance on (often erratic) rain and decreasing soil fertility. He further discussed that many farmers supplement subsistence agriculture with cash income from seasonal labour, the sale of firewood or charcoal and, the less poor, hiring out animals for transport or ploughing. In times of stress, coping mechanisms include the sale of small livestock, productive assets such pack animals and oxen and seasonal out-migration.

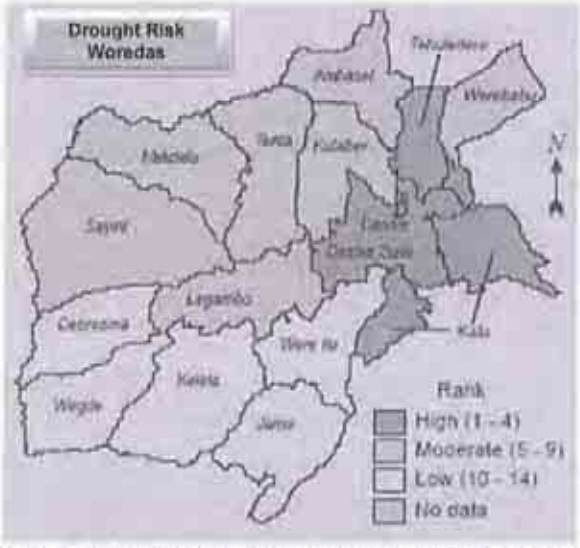

Figure 4-6: Drought Risk Woredas of South Wollo Zone

The same study has indicated that, of all Woredas of South Wollo, five Woredas situated in the highlands are mainly belg producers, six Woredas in the lowlands rely on meher harvests, while farmers in the remaining four Woredas cultivate both meher and belg crops. In addition there are two urban Woredas. In the highlands, belg rains are used to plant wheat, barley and pulses between January and April. Also, some villages in the lowlands take advantage of belg rains to plant teff. Belg rains are also important for farmers in the mid-highland and lowlands for planting long maturing crops of teff, sorghum and maize. If the belg rains are (too) late or do not arrive at all, these farmers plant short term maturing, lower

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yielding crops of cereals inter-cropped with pulses during the kremt season. Even the mainly belg farmers in the highlands do not entirely depend on belg production, as they will delay planting if belg rains fail and attempt to profit from kremt rains for a late harvest of belg crops. Such harvest might be (greatly) reduced due to frost and/or hail. Eventual success is largely a matter of luck, depending on when exactly crops were planted and how these were affected by the weather.

Other study on 'The Struggle for Water Drought, Water Security and Rural Livelihoods (2002)' identified that South Wollo Zone is not food self-sufficiency due to many reasons. According to the report, South Wollo exhibits many of the key stresses and strains of the wider Ethiopian agricultural economy, principal amongst which is the ever-increasing population pressure on highland agricultural land. This is exhibited in decreases in per capita yields and increasing movement of sedentary agriculture down the escarpment into kolla regions.

There is also severe land degradation in some areas through over-cultivation, exacerbating loss of topsoil. This contributes to a near chronic emergency situation in many parts of the zone. Most of South Wollo's farmers are belg dependent, relying on the shorter belg rains (March-April) for cultivation rather than the longer keremt season (July – September).

4.2.13.5.3 Food Insecurity in Oromiya Zone

A study that has been conducted on the causes of seasonal food insecurity in Oromiya Zone of Amhara Region (*Degefa Tolossa, 2002*) observed that Oromiya Zone is characterized by subsistence mixed farming system. The great majority of the zone's populations get their livelihoods by cultivating a variety of crops and rearing livestock simultaneously. The importance of crop cultivation, however, decreases with the drop of altitude as the people in the extreme lowlands largely depend on pastoralism. A few numbers of farmers in highland parts of Dawa and Artuma practice double cropping during *meher* and *belg* growing season.

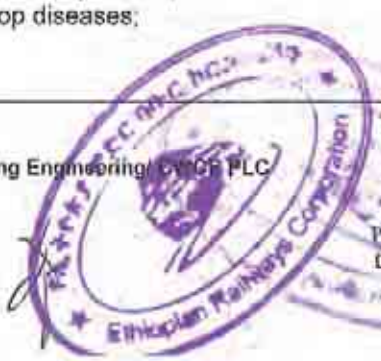
Under normal circumstances, harvest and immediately post-harvest periods (November, December and January) are generally the times when food supply is adequate. On the other hand, planting and pre-harvest times, those are July, August and September, are seasons of food shortage. July is found out to be the worst month since almost all households faces severe food shortages.

In general, the overwhelming majority of farm households do regularly face seasonal food shortages. In fact, household vulnerability varies with certain demographic and socio-economic factors.

Households headed by the women, the young and the illiterates and those with large family size were found out to be more vulnerable to seasonal hunger. By contrast, farmers with fertile farmlands, those who own relatively large number of livestock, those who got farm credit and those who utilized irrigation for crop cultivation were identified to be less affected by seasonal food shortage.

In the study report, it is identified that the following factors which have relevance with related environmental, demographic, economic, infrastructural and social issues have contributed to the seasonal food insecurity in the Oromiya Zone of Amhara Region.

- Drought, erratic rainfall patterns;
- Livestock and crop diseases;



- Dependency on single (meher) harvest per year, and pests;
- Rapid population growth and the resultant diminishing land holdings;
- Lack of investable surplus cash and shortage of draft power;
- Dependency on rain for crop cultivation;
- Lack of sufficient veterinary services; and
- Health problem and poor saving traditions.

4.2.13.5.4 Ground for Take-Off for Food Security

According to the study conducted on South Wollo by Workneh Nigatu, 2004, the following measures are proposed for the food-self-sufficiency endeavors. These include:

- Land size and livestock is an important factor that set the ground for take-off for food security;
- Improving land access (market) and credit supply may play an important role in alleviating the asset constraints;
- Motivation and work discipline are important personal psychological behavior that may contribute to achieving food security goals;
- Culturally embodied traditional values and attitudes to work, time management, capital accumulation and profit are relevant factors that affect livelihood activities and management;
- Technological innovations in management of water (irrigation), pests, cropping pattern (crops types, commercialization/ specialization, diversification) and soil fertility management (fertilizers and soil conservation) and their accessibility by farm households are crucial in improving farm productivity and profitability, and hence household food security;
- Food secure farm households are engaged substantially in non-staple cash enterprises like livestock rearing, cash crops, and trading, implying that diversification, based on local resources and market opportunities, is an essential component of food security;
- The capital requirement for non-farm cash enterprises may need to be provided in the form of credit; technical knowledge and advice in order to promote non-farm activities;
- Farmers group work (cooperatives) could facilitate diversification out of staple crop production into non-conventional income activities;
- Institutional facilitation of formation of voluntary cooperative groups could be beneficial; and
- Risks of rainfall failure, pests, land tenure, property rights, product prices, and missing product, input and credit markets are crucial constraints that inhibit farm households from engaging in innovative and productive income activities. Technological and institutional interventions need to be envisaged to curb risks and mal-effects of risks.

Finally, as same study concluded, in order to break the vicious poverty/food insecurity trap and induce rural and agricultural transformation, changes are required in: some social values/norms; incentives; market and credit services; research and extension services;

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cooperative/group works, and; the nature and operation of property (land) institutions (rules) and public agencies/organizations.

The implementation of the proposed railway line is expected to accelerate the development of Woredas (since they are direct beneficiaries of the project) and the project will also contribute for the poverty reduction endeavours at local and national level so that the country to reach at medium level income countries.

4.2.13.6 Water Resources

The landscape of South Wollo is dramatic. There are high mountains (over 4000 m) in the west, and an escarpment falling into the Awash River plains to the east. The rainfall of the area is controlled by the variation in topography. In the highland areas, average annual rainfall can be in excess of 2000 millimetres (mm); in the lowland areas it declines to below 750 mm.

The rivers on the tablelands in the west of South Wollo form the headwaters of the Blue Nile. An escarpment forms the edge of the highland massif. The escarpment is dissected by deep valleys, which lead down to the lowland plains of the Awash Valley.

With regard to the situations of Oromiya Zone, the entire landmass of Oromiya Zone falls in the Awash River Basin. Due to the inclination of the slope eastwards, all streams that originate from the zone as well as those from the neighboring highlands west of the Zone and flow across the zone constitute the tributaries of the Awash River. According to their arrangement from the northern part of the Zone in Batti through the southern margin of Artuma Woreda, the major river valleys include Cheleka, Borkena, Jerra, Alela and Nejeso.

Cheleka, with headstreams such as Kersa, Abaha, Abonsa and others, rises roughly from the hills northwest of Batti town. Some small-scale irrigation is practiced by the farmers in certain communities crossed by this river. Borkena is the major river that flows across the Zone. The Borkenna Basin is about 1,735 km^2 in area and it is potential for irrigation agriculture. The wetland in this valley is still under traditional grazing even during the dry seasons when water logging problem is not severe.

Photo 4- 14: Ankara River

The Jerra River is another important river valley in the Zone. It rises from Antsokia Mountains and flows eastwards. It is a relatively more irrigated valley producing both food crops and cash crops. Jera joins Borkena before flowing into Awash. South of Jera, we find Alela River Valley of which Ataye forms its major tributary. The southern part of the Zone is drained by Nejeso River, which has tributaries such as Siwir, Jewiha and Robi.

Generally, the Oromiya Zone is endowed with certain potential for irrigation. The Zone's low altitude partly results in low annual rainfall and unreliable patterns of rain distribution, which clearly shows the risks of crop production under rain-fed situations. However, despite the availability of irrigation potential, the farmers grow crops using irrigation is not significant, thus necessitating special consideration by agricultural extension services and to raising farmers' awareness of the benefits of irrigation.

Among others, some rivers which will be crossed by the railway line are listed below.

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Table 4- 20: Rivers within the Project Influence Woredas

No.	Chainage at km	Name of Rivers
1	6+200	Borkena River
2	11+000	Betho River
3	13+200	Chaga River
4	21+500 and 23+400	Duben River
5	24+500	Dirma River
6	29+400	Filana River

Source: Socio-Economic Survey, 2011

4.2.13.7 Potential Developments in the Woredas

According to Woreda Administration Offices, project influences Woredas have various development potential resources in the areas of agro-industry, fishery and tourism.

Photo 4- 15: Irrigation practice: Dawa Chefa, Kombolcha, Tehuledere (left to right); fishery (Tehuledere & Hayq)

They believe that the project construction would contribute to accelerate the endevours taking and encourage producing market oriented surplus products of different types.

Table 4- 21: Potential Development in the area of Agriculture

Woreda	Potential Development Areas			
Dawa Chefa	Livestock development	Irrigation farm	Tourism industry	-
Kalu	Agriculture	Tourism industry	-	-
Kombolcha	Industry	Agro-industry	-	-
Tehuledere	Irrigation farm	Fish	Fruit, vegetables and chat	Tourism industry
Werebabu	Irrigation farm	Fruit, vegetables and chat	-	-

Source: Socio-Economic Survey, 2011

4.2.13.8 Livestock

Livestock is among the main livelihood sources of the local people of the consulted Woredas. Livestock provide mainly milk and milk based products to the family and serve as sources of cash income/security. Livestock have also a strong cultural significance. The people keep livestock as a source for prestige and for the purpose of traction (as source of draft power).

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However, as it has beeb observed that the livestock production faces severe constraints. The livestock management suffers from a combination of genetic stock adapted to survival rather than production, inadequate quantity and quality of forage, seasonal water shortages, disease problems, and cultural attitudes towards livestock that emphasis numbers rather than quality.

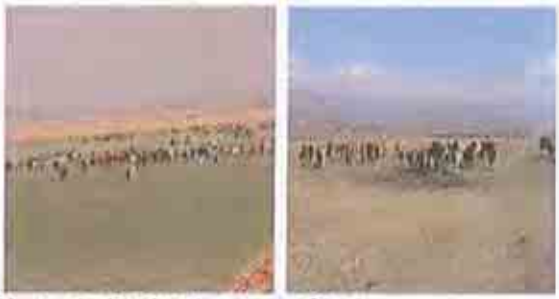

Photo 4- 16: Cattle, Dawa Chafa

The livestock population of Kalu, Kombolcha, Tehuledere and Werebabu is shown below in Table 4 – 22.

Table 4- 22: Woreda Livestock Population Size

No.	Livestock type	Kalu	kombolcha	Tehuledere	Werebabu
1	Cattle	118,480	17,329	55,698	62,000
2	Sheep & goats	86,490	16,810	42,814	48,000
3	Camel	2,799	308	-	2,500
4	Horse	1,076	346	267	200
5	Mule	1,077	74	889	800
6	Donkey	8,419	1,466	6,795	
	Total	**218,341**	**36,333**	**106,463**	**113,500**
7	Poultry	14,940	22,380	2,195	62,400
8	Bee hives/ colony	5,148	538	3,005	-

Source: Socio-Economic Survey, 2011

4.2.13.9 Livestock Health

Livestock diseases in the Woredas are among the bottle-necks for livestock development. They have direct negative effects on the improvement of quality and quantity of livestock products and also have adverse effects on the domestic animals by increasing mortality rate.

Information obtained during consultations has indicated that the project influence areas have problems regarding with various livestock diseases, feed shortage, insufficient veterinary services and shortage of skilled manpower. The major livestock diseases of some Woredas are presented in the Table 4 -23 below.

Table 4- 23: Livestock diseases in the project influence Woredas

Woreda	livestock diseases reported in the Woreda			
Kalu	Black leg	Pasteurellosis	Anthrax	Internal & external parasites
Kombolcha	Lumpy skin disease	Black leg	Pasteurellosis	others
Tehuledere	Internal & external parasites and infestation	Lung disease	Pasteurellosis	Lumpy skin disease

Woreda	livestock diseases reported in the Woreda			
Werebau	Black leg	Pasteurellosis	Lumpy skin disease	Internal & external parasites

Source: Socio-Economic Survey, 2011

4.2.13.10 Animal Health Clinic

According to the consulted Woreda offices, at present the veterinary services have not adequate capacity to render sufficient services. The reasons are: existing veterinary clinics are not fully equipped with medical equipments and lack or shortage of trained health personnel.

4.2.13.11 Livestock Marketing

Livestock and livestock products marketing in the Woredas is mostly traditional and lacks basic infrastructures like feeding and watering facilities, weighing scale, marketing information systems, etc. The price is normally dictated by the force of supply and demand and the season of the year. Livestock in most cases transported on hoof which lead to a considerable weight loss and even death.

Photo 4- 17: Open Cattle Market in Kemissie Town

During the feield survey, it has been observed that the livestock market located in Kemissie Town is well separated, fenced and protected. As it is shown in the picture above the market gives serves for selling and purchasing of cattle, sheep and goats. Tax collectors assigned from Kemissie town municipality are always on duty at the gate of the livesock market during market days.

4.2.13.12 Major Constraints of Agriculture Development

The major constraints for agriculture development in the Woredas can be attributed to all or some interrelated factors indicated below.

- Unreliable rainfall,
- Erosion and land degradation,
- Crop pests and diseases,
- livestock pests and diseases,
- shortage of farm land,
- scarcity of animal feed,
- lack of improved and appropriate technologies, and
- Poor marketing and low terms of trade.

The cumulative effect of all these problems would contribute for low productivity of the agricultural production.

The implementation of this project would have positive impacts that will contribute to ameliorate the constraints observed in agricultural developments, particularly in the suppy of inputs and improvement of market access.

4.3 Social Services and Infrastructure

4.3.1 Social Development Support Institutions and Services

Kebele Administration is the lowest organized governmental body in Ethiopia. Under Kebele administration there would be many villages and settlements. Each settlement would have some social groups or associations to address public common problems. Moreover, there are agricultural extension services known as DA centres within the Kebeles that are run by corresponding officers of agriculture. The major services provided by each of the DA centres would include veterinary services, crop production demonstration, and community sensitization.

Besides governmental institutions, there would be some NGOs involved in social development support. The nongovernmental organizations will play great roles in the endeavours to poverty reduction and to improve the living conditions of the community. As the consulted Woreda offices have discussed, some NGOs have played active roles in some kinds of development interventions.

At present, the available NGOs who have shares in development interventions are indicated in Table 4-24 below.

Table 4- 24: NGOs in the Project Influence Woredas

Woreda	NGOs	Areas on Interventions
Dawa Chefa	World Vision Ethiopia	Water supply; children aid, health
	EMRDA	Support the poor to generate income sources
Hayk	Agri -service Ethiopia	Agriculture development
	Mekane Yesus	Support poor people
	Unicef	Support Children, women and disabled people
	R-Wash	Sanitation and hygiene
	Y-chose	Prevention and control of HIV/AIDS
Tehuledere	Agri-service	Agriculture development
	Hope Organization	Support the poor
	ORDA	Agriculture and infrastructure
	OSSA	Prevention and control of HIV/AIDS
	Family Planning	Women health and reproduction
Werebabu	ADB	Water and sanitation service development
	Unicef	Support Children, women and disabled people
	Food Security	Support farmers in food self sufficiency

Source: Socio-Economic Survey, 2011

4.3.2 Community Based Organizations

People of the Woredas are organized into Kebele Administrations, which are the smallest units of local government. Under Kebele there would be numbers of villages. Communities dwell in villages nearby agricultural land and/or grazing.

A village or group of villages in the rural areas have some type of indigenous organizations such as 'Mahiber'[4], 'Idir'[5] and 'Debo'[6] those will offer mutual socio-economic support for members. These social institutions will have good capacity to mobilize communities and resources since they could involve both men and women and have strong influence on their members. They are vital to maintain traditional values of the communities and their contribution is very decisive for poverty reduction. The leadership of these traditional institutions is selected by the local people themselves. Their bylaw will be either in written or oral defining the procedures of their functions.

Regarding urban areas, 'Idir' and 'Iquib'[7]' are very common and they have bylaw in written form defining the conditions of membership, contribution, payment and the measures on the members who do not abide by the rules of the organizations.

Moreover, there are Women and Youth Associations organized at different levels down to Kebele Administration. These social organizations or associations are among the main development actors in the political, economic, and social affairs of communities. They would contribute much in the awareness creation and development activities to improve the living conditions of communities. As these community based organizations are the immediate stakeholders of the proposed project, their contribution would be also significant during project construction and operation phases.

4.3.3 Education

Education is a fundamental and has great contributions for political, cultural and socio-economic development. With giving attention to this fact, the government has given great place for the improvement of education quality and education coverage across the country. Consequently, according to education bureau of the consulted Woredas, the coverage of education in those Woredas is getting improved from time to time.

4.3.3.1 Distribution of Schools

The distribution of schools and their level and standards has direct influence or impacts on the quality of education and number of enrolments and school attendants.

Table 4- 25: Distribution of Schools in Woredas

Woreda	Level of Schools						
	Kg	Alternative	1 to 4	1 to 8	5 to 8	9 to 10	11 to 12
Dawa Chafa	-	-	18		32	1	-

[4] Mahiber is a non-profit and non-governmental association organized with the main objective to solve such as social service problems of communities to which they are belong.
[5] IDIR Association is a non-profit self-help organisation whose main objective is to provide members with financial and socio-psychological support in the event of a member's or his/her relatives death.
[6] Debo is a social association which its main objective is to provide labour for its member in time of need.
[7] Iquib is an association established by a small group of people in order to provide substantial rotating funding for members in order to improve their lives and living conditions.

Woreda	Level of Schools						
	Kg	Alternative	1 to 4	1 to 8	5 to 8	9 to 10	11 to 12
Kalu	4	28	36	42	-	-	2
Kombolcha	13	-	18	-	18	1	1
Werebabu	1	-	23	31	-	2	-

Source: Socio-Economic Survey, 2011

4.3.3.2 Education Coverage

The coverage of primary education in the Woredas is 78% and above. On the other hand, the coverage of secondary education in Dawa Chafa is reported to be only 2%.

Table 4- 26: Education Coverage at Woreda Level (Percentage)

Woreda	Dawa Chefa	Kalu	Kombolcha	Werebabu
Primary Education	98.3	78.0	98.2	82.4
Secondary education	2.0	NA	88.0	NA

Source: Socio-Economic Survey, 2011

With regard to the share of attendants/students in elementary education, 43.4% are females and 56.6% males. With regard to attendants in secondary education, 45% are females and 55% are males.

Table 4- 27: Number of Students by Different Levels of Education (2010/11)

Woreda	1 to 8			9 to 10			11 to 12		
	Female	Male	Total	Male	Female	Total	Female	Male	Total
Dawa Chafa	1,413	13,092	14,505	242	296	538	NA	NA	NA
Kalu	18,054	18,412	36,466	960	1,191	2,151	NA	NA	NA
Kombolcha	9,082	9,258	50,971	1,579	1,703	3,282	423	466	889
Werebabu	10,584	10,299	20,883	651	1,007	1,658	63	166	229
Total	**39,133**	**51,061**	**122,825**	**3,432**	**4,197**	**7,629**	**486**	**632**	**1,118**

Source: Socio-Economic Survey, 2011

4.3.3.3 Student-Section and Student-Teacher Ratio

The student-section and student-teacher ratio will show the situations of the teaching-learning process of schoos (both primary at secondary schools).

Table 4- 28: Student-Section and Student-Teacher Ratio of the Woredas

Edu. Level / Woreda	1 to 4		5 to 8		9 to 10	
	Student-section ratio	Student-teacher ratio	Student-section ratio	Student-teacher ratio	Student-section ratio	Student-teacher ratio
Dawa Chafa	76	48	76	42	68	42
Kalu	51	50	50	36	53	22
Kombolcha	50	50	50	50	52	38
Werebabu	48	47	47	35	50	23

Source: Socio-Economic Survey, 2011

4.3.3.4 Dropouts of Students

The socio-economic survey has identified there were some problems which forced students to quit learning. The common causes for dropouts of female and male students in the Woredas include:

- Economic problem;
- Marriage cases;
- Family problems (not interested to teach their children);
- Discipline problems at school;
- Migrate to outside their locality;
- Illness;
- Quit schooling and attend Quran studies (male students); and
- Evacuate schooling to keep cattle and to support in harvesting works (male students).

The following Table 4-29 would illustrate the extent of the problems in some Woredas.

Table 4- 29: Enrolment and Dropouts of Students (2009/10)

Woreda	Level of Education											
	1 to 4				5 to 8				9 to 10			
	Enrolment		Dropouts		Enrolment		Dropouts		Enrolment		Dropouts	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Dawa Chafa												
Male	8,845	50.4	594	3.4	4,197	43.7	522	5.4	296	55	54	18.2
Female	8,720	49.6			5,417	56.3			242	45	19	7.9
Total	17,565	100		3.4	9,614	100	522	5.4	538	100	73	14
Kalu												
Male	12,314	51.7	572	4.6	,6523	48.2	572	4.6	1,191	61	89	7.5
Female	11,493	48.3	380	3.3	7,018	51.8	380	3.3	760	39	82	10.8
Total	23,807	100	952	4	13,541	100	952	4	1,951	100	171	8.8
Kombolcha												
Male	4,727	51.47	198	4.2	4,873	49.7	207	4.2	1,852	53.1	149	8
Female	4,457	48.53	142	3.2	4,942	50.4	210	4.2	1,639	47	60	3.7
Total	9,184	100	340	3.7	9,815	100	417	4.2	3,491	100	209	6
Werebabu												
Male	5,826	52	102	1.8	4,473	46.2	100	2.2	1,007	60.7	101	10
Female	5,372	48	111	2.1	5,212	53.8	101	1.9	651	39.3	60	9.2
Total	11,198	100	213	1.9	9,685	100	201	2.1	1,658	100	161	9.7

Source: Socio-Economic Survey, 2011

4.3.4 Health

4.3.4.1 Health Service Coverage

The health policy of the Country is mainly focused on prevention strategy. Based on this course of action, the health service coverage of the project influence Woredas is at an encouraging level. According to the report of the Woredas' health offices, the health coverage of Dawa Chafa is about 94%, Kalu 83.3%, Kombolcha 100%, Tehuledere 79.3%, and Werebabu 100%. However, the problem of HIV/AIDS and other diseases are common in those Woredas (see Table 4-31 and Annex 7, respectively for the detail).

It is evident that the health centre to population ratio would be practically irrelevant as the population is dispersed and if there is great distances between Kebeles and the health centre. This situation will create problems that the health centres will not be accessible to most of the population living in the Woredas. Basically, only the inhabitants of where the health services are found nearby can use the health centres adequately.

4.3.4.2 Distributions of Health Institutions

With regard to the distribution of health institutions, there is only one hospital at Kombolcha town. However, all the consulted Woredas have numbers of health posts and health centres situated in different Kebele Administrationss.

Table 4- 30: Distributions of Health Institutions

Woreda	Health Posts	Clinics	Upgrading H Centre	Health Centre	Hospital
Dawa Chefa	22	5	2	3	-
Kalu	26	-	-	9	-
Kombolcha	7	-	-	-	1
Tehuledere	3	2	-	4	-
Hayk	-	3	-	1	-
Werebabu	15	-	3	2	-
Total	**73**	**10**	**5**	**19**	**1**

Source: Socio-Economic Survey, 2011

4.3.4.3 Health Professionals-Population Ratio

The health coverage of the Woredas is found good but the health professionals-population ratio indicates that there are shortages of health personnel in all consulted Woredas. It is to mean that the existing health professionals are not adequate to provide health services at Woreda level.

Table 4- 31: Health Professionals - Population Ratio of Woredas

Woreda	Health Assistant		Health Officer		Nurse		Health Ex. Worker	
	No.	Ratio	No.	Ratio	No.	Ratio	No.	Ratio
Dawa Chafa	-	-	4	1:32500	29	1:4400	46	1:2800
Kalu	-	-	7	1:28524	40	1:4992	50	1:3993
Kombolcha			10	1:9775	46	1:2125	11	2 per Kebele
Tehuledere	2	NA	6	1:21000	38	1:3500	53	1:2500
Hayk	-	-	-	-	-	-	5	1:7000
Werebabu	-	-	4	1:25000	35	1:50000	-	-

Source: Socio-Economic Survey, 2011

4.3.4.4 Ten Top Diseases

The major human health problems of the Woredas areas are pneumonia, URTI, malaria, AFI, fever, diarrhoea, msculo-skeletal system diseases, genitourinary system and helminthes. 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 ten top diseases of the project influence Woredas as registered by the Woreda health offices is presented in Annex 7.

Table 4- 32: Five Top Diseases of the Woredas

Woreda	Five Top Diseases of the Project Influence Woredas				
	1st	2nd	3rd	4th	5th
Dawa Chafa	Malaria	Pneumonia	Diarrhoea	URTI	Arthritis
Kalu	AFI	Msculo-skeletal system disease	Diarrhoea	Pneumonia	Malaria
Kombolcha	Gastritis	Pyrexia of unknown organic fever	Genitourinary system	URTI	Malaria
Teheledere	URTI	AFI	Pneumonia	Malaria	Helminiths
Werebabu	URTI	Msculo-skeletal system disease	Pneumonia	AFI	Trachoma

Source: Socio-Economic Survey, 2011

4.3.4.5 Incidence of Malaria

The low areas of the project influence Woredas are prone to malaria problems. The incidence of malaria cases would be at the highest peak in the months of October, November and September in Dawa Chafa and Kalu Woredas; in the months of November, October and June in Kombolcha; in the months of November, December and May in Tehuledere; and in months of February, September and October in Werebabu Woreda.

The railway line construction activities particularly use of quarry and borrow areas would create stagnant water storage places, which could serve as a potential breeding site for mosquito, the vector of malaria. If prompt measures were not be taken, the existence of stagnant water due to quarry and borrow areas would exasperate the incidence of mararia problem in the project area.

Table 4- 33: Incidence of Malaria (2010/11)

No.	Months	Dawa Chefa	Kalu	Kombolcha	Tehuledere	Werebabu
1	September	1689	2618	90	351	165
2	October	2358	3394	168	302	139
3	November	1706	2187	203	489	131
4	December	901	1689	81	422	79
5	January	1031	1114	43	257	65
6	February	776	1640	37	323	169
7	March	754	1305	82	285	72
8	April	804	903	100	265	79
9	May	948	1133	90	401	71
10	June	596	1178	124	372	60
11	July	1040	1658	0	294	35
12	August	1152	1603	18	277	16

Source: Socio-Economic Survey, 2011

The frequency of occurrence of malaria is common in all the above indicated Woredas though the magnitude problem will vary from area to area.

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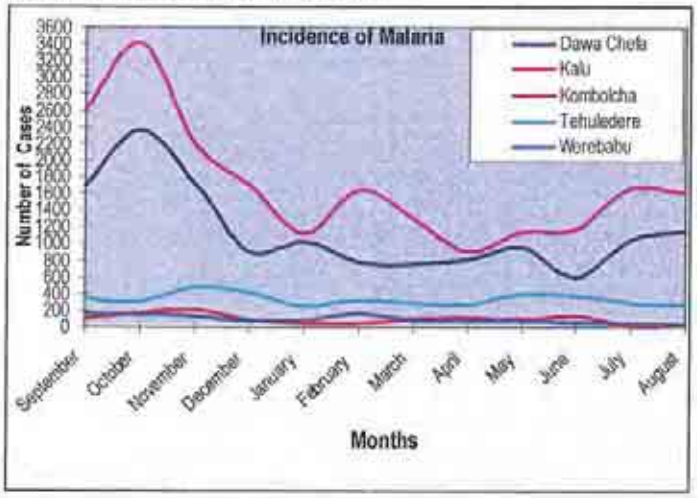
General Manager

Figure 4-7: Incidence of Malaria



4.3.4.6 Incidence of HIV/AIDS and STDs

The future health implication of the project influence area that related to the construction of the proposed project will be communicable diseases like HIV/AIDS and STDs. Despite the fact that the incidences of these communicable diseases like HIV/AIDS are not among the list of ten top diseases, the problem is common in the project influence Woredas.

Table 4- 34: HIV/AIDS Positives in Woreda

Year Eth, Ca.	Dawa Chefa			Kalu			Tehuledere		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
1997	-	-	-	18	25	43	-	-	-
1998	-	-	-	64	87	151	-	-	-
1999	-	-	-	121	127	248	-	-	-
2000	-	-	-	189	282	461	-	-	-
2001	-	-	-	157	273	430	-	-	-
2002	13	25	38	167	211	378	-	-	-
2003	16	26	42	-	-	-	99	129	228

Source: Socio-Economic Survey, 2011

4.3.5 Water Supply and Sanitation

According to the information gathered from the Woreda Sector Offices, the water supply sources of the Woredas are mainly from groundwater. Moreover, significant populations of the Woredas use springs and nearby rivers as alternative sources of drinking water.

In general, even though the water supply coverage of the Woredas needs to be improved, the status level is an encouraging. The water supply coverage of Dawa Chafa is 72.6%, Kalu 83%, Kombolcha 97%, Hayk 86% and Tehuledere 57%.

The water supply coverage for rural areas is much lower than that of urban areas. For instance, the water supply coverage of urban areas in Werebabu is 70.85, while in rural areas is only 56%. It is understood from the discussions with the health offices of the Woredas that use of unsafe water sources for drinking is one of the main causes for intestinal parasite diseases of the people.


Photo 4- 18: Source of Drinking Water, Tehuledere (left); Dawa Chefa (right)

With regard to sanitation, the situation is worst in some Woredas like Dawa Chafa. 56% of Dawa Chafa people use any available open areas for defecation. On the other hand, 88% and 97.5% of the population Kalu and Werebabu use private dry pits, respectively.

Table 4- 35: Toilet Facilities in the Woredas

No.	Woreda	People users in percent		
		Open available areas	Private dry pit	Private flush toilet
1	Dawa Chefa	65%	30%	5%
2	Kalu	12%	88%	-
3	Werebabu	2.5%	97.5%	-

Source: Socio-Economic Survey, 2011

In rural areas it is very common to use available rivers located nearby settlments for washing clothes and taking bath. It is observed during the filed survey that some children of the Old Air Port of Kombolcha were washinig thir body.

Photo 4- 19: Children wash their bodies nearby Kombolcha Old Air Port

4.3.6 Market Facilities

It is evident that small and medium size markets in rural areas play key roles in the lives of the peoples. As the majority population of the project influence areas are farmers their main source of income is depending on farming and livestock productions. Hence, lack of development of efficient agricultural markets in the rural areas has great adverse impacts on the economic opportunities of rural households. As in many parts of Ethiopia, markets in the

project influence areas are far and few in between and most of them are situated in the urban areas.

Photo 4- 20: Weekly Open Market in Kemissie (left) and Dawa Chefa (right)

The rural population reside nearby those markets will have better opportunity to sell and purchase in good price than of the people living at distance. Farmers and pastorals are encouraged to produce surpluses for commercial gains if they do have access to transport and market. It is known from the discussions that pastorals or farmers living far from access road and markets tend to sell smaller shares of their outputs for the reasons that they have only small amounts to sell or they are making long-distance travel to sell their production.

Photo 4- 21: Camels and vehicles main transportation (Kemissie Market)

As it is was described in some studies (***Survey Report conducted in July 2007 on the Livelihood Profile Amhara Region particularly on the South Wollo and Oromia Eastern Low Land Sorghum and Cattle Livelihood Zone***), market access is good in the dry season, but movement is limited during the rains by a lack of all-weather roads.

Sorghum, maize and teff are the major crops traded out of the zone, moving from local markets into Afar, and to the markets of Dessie, Kombolcha and sometimes to Addis Ababa. Cattle and goats mainly go via main-road collection markets to be finally sold Addis Ababa, while sheep from Bati and Kemissie markets are traded to Dessie and Kombolcha. The staple cereals maize and sorghum are brought from local markets, but as local supplies fade during the year supplies reach local markets from as far as Nekemti in western Oromia.

Therefore, the implementation of the project will contribute for the development of local and foreign markets and it will also enhance social, cultural and economic relationsips among communities within Ethiopia, and between Ethiopia and neighbouring countries.

The main local open weekly markets located within the project influence Woredas are presented Table 4 - 36 shown below.

Table 4- 36: Local Open Market Places within the Project Influence Woredas

Woreda	Location (Kebele)	Market name	Market day & freq.	Market attendants	Means of transport	Major market items
Dawa Chafa	Shekela	Shekela	weekly	2,457	On foot, horse, bus	Agricultural & Indus. products
	Haro Bakelo	Meto	weekly	3,802	"	"
	Tuche	Rufuse	weekly	7,741	"	"
	Weledi	Weledi	weekly	9,887	"	"
	Sitor	Sitor	weekly	6,106	"	"
	Dodo	Dodo	weekly	7,711	"	"
Kalu	Ancharo	Ancharo	weekly	20,000	"	Chat, fruits, wheat and other commodities
	Harbu	Harbu	weekly	30,000	"	"
	Degan	Degan	weekly	15,000	"	Agricultural and indus. products
	Adamea	Adamea	weekly	10,000	"	"
	Gerba	Gerba	weekly	5,000	"	"
Tehuledere	Hayq	Hayk	Weekly; Tuesday, Friday and Sunday	35 to 40 thousands	Donkey, Camel, Vehicles	Cattle, agricultural products, and industrial commodities.
	017	Segel	Saturday, weekly	Three neighbouring Woredas	"	Agriculture products, livestock and their products, and other commodities
	01 Sulula	Thursday, weekly	7 kebeles including Dessie town	NA	"	Agricultural, livestock and other commodities
Werebabu	01 Kebele	Bistima	3 times weekly	12000	On foot, vehicle	Vegetables, cattle, chat and coffee
	01	Bokekisa	weekly	600	"	"
	09	Goha	weekly	1000	"	Vegetables, sorghum, teff, maize, egg, etc
	015	Arebatti	weekly	500	"	"
	020	Ajerssa	weekly	300	"	"
	010	Gerebabo	weekly	300	"	"

Source: Scio-Economic Survey, 2011

4.3.7 Houses and Housing Facilities

Most of the rural residential houses are wood wall and corrugated iron sheet roof; while houses in the urban areas are either wood wall or hollow-blocks or bricks wall and most of their roofs are corrugated iron sheets. In most project influence Woredas, it is understood that animal sheds are constructed nearby but separated from human residential houses.

The rural housing units, as it was observed during the socio-economic survey in Dawa Chafa, they have at least two partitions; one room to serve as storehouse and cooking room, and other room for both salon and bedroom.

Despite the fact that it is common in rural areas to use homesteads, open fields and/or available bush lands for defecation/ sanitation, as socio-economic survey has identified, significant households use private dry pits in their compound.

Firewood and in some cases crop straw are the sources of household energy for both cooking and light. Kerosene is the common energy to use for light.


Photo 4- 21: Common residential houses of rural households-Dawa Chefa, Koko area

4.3.8 Telephone Service

At present telephone services is expanding across the country. Not only in the urban areas but also in the Ethiopian rural areas telephone service users are increasing. Besides, the introduction of cell phones encourages peoples from all walks of life to be beneficiaries.

As socio-economic survey identified, majority of all Kebele administrations of the projet influence area have wireless telephone services.

However, some problems have been observed with regard to network coverage in the project influence Woredas. For instance, there is problem to use cell phones in Kemissie town - the Oromiya Zone Administration Centre. There is same problem in three urban areas of Kalu Woreda.

4.3.9 Energy

Electricity is one of the modern sources of energy. It will use as a source power in industries, in residents and as a fuel replacing wood and cow dung. According to the information collected during public consultations, towns of project influence Woredas have access to electric services from inter-connected grid system.

The population of those Woredas mostly depend on traditional energy sources such as fuel wood for cooking food. The rural people use kerosene lamps and firewood as a source of light.

Generally as it is discussed during public consultations, there is strong demand for modern wood and so as to prpotect the environment.

According to Woreda a dminitration offices, the electric light service coverage in the Woredas is summraized in Table 4.37 below.

Table 4- 37: Electric Light Coverage

No.	Woreda	Coverage Status
1	Dawa Chafa	Electric light coverage is only 26%; it needs improvement.
2	Kalu Woreda	Only 12 kebeles have electric light service, which include: Gerba, Degan, Harbu, Ancharo, Charita, Kedida, Abicho, and ketetake.
3	Tehuledere	Except two; but all Kebeles have access to electric light.

No.	Woreda	Coverage Status
4	Hayk	All Woreda Kebeles have access to electric light.
5	Werebabu	100% coverage for urban areas; the Woreda Administration has plan to provide electric light service to rural settlements.

Source: Scio-Economic Survey, 2011

4.4 Hotels and Tourism

Ethiopia has rich natural and cultural heritages to offer tourists. It is one of the world's most ancient civilizations with a breath taking range of landscapes and natural endowments. Greater emphasis has now given by the government towards the improvement of infrastructures and constructions of new roads, highways, airports and rail lines. The government considers tourism to be an industry with great potential for the country.

Even though the country has huge potential for tourists, forinstance, it ranks 40th in Africa with only 85,000 people visiting the country with tourist visa in 2005. When it is compared with our nearest neighbour Kenya ranks 16th with 300,000 tourists visited the country which is almost 4 times the number of tourists who visiting Ethiopia the gap becomes very clear.

Tourism is a good form of foreign export. It brings in hard currency which is one of the things our country needs. This is a good means of alleviating poverty. As the country is potentially wealthy with many tourism resources the sector can be effective way of opening up that potential and bringing in foreign investors as well as tourists. However, as a sector the country needs to work on promoting the existing potential (The Ethiopian Herald, Vol. LXV, No.216; May 20, 2009).

Amhara Region as one of the country's regional state is known by its ancient civilization (such as Gondar and Lalibela) and it is endowed with extremely attractive natural and cultural features such as mountains, valleys, rivers, lakes, forests, hot and cold springs, mineral waters, and ethnic compositions. Each ethnic group has its own culture, reflected by their hairstyle, body decoration, dressing, jewellery, religion and cultural ceremonies. The region has also many lower & medium and some star hotels which give sufficient service for local and out comers. It also has enormous tourism investment opportunity potentials.

The South Wollo and Oromiya Zone of the Amhara Region where the project is located is so much affluent in tourist attractions of which the main are presented briefly below.

4.4.1 Natural Potential Resources of Tourism

Amhara Regional State in which the railroad line project is located is known by its natural tourist attraction areas. The project influence Woredas also has natural potential resources for tourism development. The identified and registered natural tourist attraction sites of Dawa Chafa, forinstance, are presented in Table 4-38 below.

Table 4- 38: Natural Tourist Attraction Sites in Dawa Chefa

No.	Natural Tourist Attractions	Kebele	Specific Location	From Woreda/ Zone Town
1	Finchiftu Water fall	Bedeno	Finchiftu	22 km
2	Rike protected forest	Rikr Gelana	Rike	12 km
3	Tig Cave	Gur	Tig Cave	32 km
4	Hima Mountain	Gur	Key Afer	32 km

Source: Scio-Economic Survey, 2011

4.4.2 Man –Made Tourist Attractions

The project influence Woredas have man-made tourist attraction sites which will be very important for tourist development. The identified man-made tourist attraction sites in Woredas are presented below in Table 4-39 below.

Table 4- 39: Man-Made Tourist Attraction Sites in the Woredas

No.	Man-Made Attraction Sites	Est. Year	Kebele	Specific location	From Woreda/ zone town
I	**Dawa Chefa Woreda**				
1	Shoke village and mosque: it is unique in its building architecture and ancient artifacts	13 century	Jirota	Shonke	42.5 km
2	Turisina Mosque: A special traditional religious building used for undertaking cultural celebration	Established 1954 Eth. ca.	Harro Bakelo	Turisina	38.5 km
3	Mosque of Toleha: An ancient mosque with its special building style	12 century	Jirota	Toleha	38.5 km
4	Palace at Woledi:	1968 Eth. ca	Woledi	Woledi	20 km
5	Kidaneimihret Church at Woledi: an ancient religious building	1940 Eth. Ca	Woledi	Woledi	20 km
6	Key Afer Gebreal Church: an ancient religious building	1875 Eth. Ca	Gur	Gerbe Beteho	32 km
7	Palace of Dejach Mengesha: An ancient artefact	Not known	Bilida Koko	Addis Alem	30 km
II	**Tehuledere Woreda**				
1	Mo'a Hayk Gedam	-	-	-	-
2	Lake Hayk and LakeHardibo	-	-	-	-
III	**Werebabu Woreda**				
1	Chale mosque	-	-	-	-

Source: Scio-Economic Survey, 2011

4.4.3 Lake HayK and Lake Hardibo - Tourist Attraction Sites

Lake Hayk and Lake Hardibo are among the tourist attraction sites found in the project influence areas. It is a freshwater with 6.7 km long and 6 km wide, with a surface area of 23 km². It has a maximum depth of 88 m and it is at an elevation of 2,030 meters above sea level. The other Lake Hardibo is also a freshwater and it is 10km long at an elevation of 800 to 1000 m above sea level located about five km southeast of Lake Hayk. Both lakes are found in Tehuledere Woreda.

According to a local legend, the Lake Hayk was created to avenge a pregnant woman was wronged by a princess. God was greatly angered by this injustice, and in his wrath turned all of the land surrounding the woman (except the ground she was sitting on) into water forming a lake, destroying the princess along with her friends and family in the process. Where the

pregnant woman was sitting became an island (now a peninsula) where Istifanos Monastery, founded in the middle of the 13th century by Iyasus Mo'a, is located.

A former student of Iyasus Mo'a, Tekle Haymanot went on to found the monastery of Debra Asbos (renamed in the 15th century to Debre Libanos) in Shewa. Tekle Haymanot was one of five bright young religious students who became the "five lights of Christianity" for the south of Ethiopia. Iyasus Mo'a also played a role in Yekuno Amlak's overthrow of the Zagwe dynasty, and helped restore the Solomonic dynasty. Upon Yekuno Amlak's ascension to the throne, Istifanos Church became Istifanos Monastery.

The church was established around the 8th century during the Axumite era and was the first one in what was then the Amhara province. The events surrounding its establishment, however, are not clear. Some legends suggest that there was an Aksumite palace in Ambasselle opposite the modern Istifanos monastery, located on the opposite side of the Lake Hayk. Imam Ahmad Gragn looted and burned this church in November, 1531. The ruins of the church are still visible, and the legend states that the kings and princes who lived in that palace established the church.

Photo 4- 22: Lake Hayk (top) and Lake Ardibbo (Left); Lake Hayk during sunset (right)

The first known European to view the lake was Francisco Álvares, who passed near it 21 September 1520; he mentions the lake had hippopotamuses and catfish, and the land around it were planted in lemons, oranges and citrons. Just prior to his accession in 1606, Susenyos I made his way to the lake Hayk area, where he expelled a group of Oromo who had infiltrated into the vicinity of Istifanos Monastery.

It is understood from public consultations that Hayk Town was established in 1928 Eth.Ca. Tehuledre Woreda in which the town is located has an area of 432 ha of which 8% of the area is water body. It has 20 churches and 37 mosques in the area which will be potential for tourist attraction sites. Besides, Gishen Mariam Church, the known tourist attraction area in the country is located nearby Hayk town.

Hence, the consulted people believed that the implementation of the railway project has versatile positive effects to enhance tourism developments in Tehuledere and in other project influence areas.

4.5 Major Problems of Woredas

During consultations, major existing problems of the consulted Woredas were discussed. Major problems of some woredas are discussed below.

4.5.1 Kalu Woreda

The major existing problems of the Woreda are: lack of budget; unemployment of young people; no access roads from Kebele to Kebele; minimal of electric light coverage; some Kebeles have problems of communicable diseases; and poor network cell phone service coverage.

4.5.2 Tehuledere Woreda

The major existing problems of the Woreda are: scarcity and erratic nature of rain fall; and inadequate health services for some Kebele administrations.

4.5.3 Werebabu Woreda

The major existing problems of the Woreda are: no ambulance service; shortage of water supply service; inadequate transport service; No postal service; noo public library; and no hospital.

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5. ANALYSES OF PROJECT ROUTE ALTERNATIVES

Selection of project route has been carried out by the Project Consultants to identify the best route from the possible alternatives in terms of the extent of adverse impacts that would bring on the social and environment conditions of the project influence areas. The possible project route is also analysed whether it is technically and economically feasible; and socially acceptable.

The analysis project route alternatives involved community members of the project area and other stakeholders so as to evaluate, weigh and select the best route among the possible alternatives.

The impacts of the routes in terms of affecting farm lands, residential houses and other assets are taken into consideration to compare each route; it is because the smaller resettlement impacts the route has, the higher the rank of the route.

Therefore, the selected route for the project is assumed to be the most technically and economically feasible; socially acceptable and environmentaly amicable. Consequently, the selected project route gets approval from the Project Client.

Therefore, this socio-economic impact assessment study has been undertaken based on the selected route for the project.

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6. PUBLIC CONSULTATIONS

6.1 Public Consultations during the ESIA Process

Public consultations is useful for gathering socio-economic data, understanding likely impacts, determining community and individual preferences, selecting project alternatives and designing viable and sustainable mitigation and compensation plans.

Public consultation in the SEIA process is undertaken to disseminate information to interested and affected parties, solicit their views and consult on sensitive issues.

6.2 Government's Policy on Community Consultation and Participation

Public consultations and community participation are entrenched in the Constitution of the Federal Democratic Republic of Ethiopia through Articles 43 and 44.

Article 43 on the Right to Development states that "*Nationals have the right to participate in national development and, in particular, to be consulted with respect to policies and projects affecting their community*"

Article 44 on Environment Rights states that "*All persons have the right to live in a clean and healthy environment*"

The overall objective of the Government is to involve communities in policy formulation and implementation at the local level. The Environmental Policy seeks to ensure the empowerment and participation of the people and their organisations at all levels in environmental management activities, and to raise public awareness and promote understanding of the essential linkage between the environment and development.

6.3 The Consultation Process

The objectives of the public consultation process were as follows:

- To inform the public about the details of the proposed railway line construction;
- To ask local officials and residents about the possible problems and benefits they anticipate due to the proposed project and how these proms can be overcome and enhance the benefits; and
- To identifiy their feelings and support during project construction and operation.

The consultation process at the design stage was an initial consultation. More consultations are envisaged prior to project start up and during the project implementation and operation phases. Government encourages public consultations being carriedout with community members and stakeholders through local administrations during planning and implementation of development projects.

The stakeholders for the proposed project were categorised as follows:

1. National level stakeholders – relevant policy makers;
2. Regional, Zone and Woreda level stakeholders – relevant policy and project implementers; and
3. Local community in the affected Woredas.

The list of persons and organisations met is presented in Appendix 1.

6.4 Methodology for Public Consultation

To obtain the opinions of the communities and local government officials towards the proposed railway project, consultations have been undertaking at the administration centres of project influence Woreda which include Kemissie, Harbu, Kombolcha, Hayk and Bistima towns; and besides, at some villages and farming areas. The minutes of meetings and lists of participants are presented in Appendix 3 and Appendix 4.

The consultations took place in co-operation with and facilitated by Offices of Woreda Administrations. The consultation participants were heads or representatives of Woreda Sector Offices which include: Human Resources Development and Management; Administration & Security, Land Administration and Land Utilization; Education; Health; Women, Children & Youth Affairs; and Agriculture offices with giving due attentions their social status and representative views. An open-ended checklis have been used to undertake consultations, and these are summarized as described below.

- Opinions about the project;
- Expected benefits from the project;
- Possible adverse impacts of the road project and their mitigation measures to manage /ameliorate the negative impacts; and
- Participation to support the implementation of the railway project.

6.5 Results of Consultation Meetings

All members of consultation meetings were very interested to participate in the discussions and share their views and opinions on the points of discussions. All the members participated in the discussions have mentioned that the construction of the railway line is very useful to accelerate socio-cultural interaction and economic growth of the project influence areas and the country at large. However, loss of properties such as croplands, residential houses, trees and fruits will take place due to the construction of the project rail line and establishment of railway stations, project construction camps and project associated works.

The summary of the results of consultation meetings are discussed in the sections below.


Photo 6-1: Consultation with community members at Koko area, Dawa Chefa

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6.5.1 Expected Outcomes from the Project

The main expected outcomes mentioned during the consultations include:

- Improved the distributions of agricultural and industrial inputs for there will be suitable access to import;
- Increased accessibility to foreign markets since the railway will create access to the ports of neighbouring countries and the railway transport is low-cost and speedy;
- Improved foreign trade of the country for there will be suitable access to export ;
- Developed diversified agro-industrial market oriented surplus products;
- Improved public transport system in the country;
- Increased transportation capacity in the country;
- Increased peoples' mobility;
- Developed local and national economy; and
- Developed foreign trade, political and socio-cultural relations with neighbouring countries.

6.5.2 Expected Benefits from the Project

The main expected benefits to the local society that were mentioned during public consultations were:

- People will have cheap and speedy transportation to markets;
- The railway line will encourage people to produce surplus products for market;
- It will create job opportunities during the construction of railway line and operation;
- It will enhance the development of socio-cultural, business and trade relationships among peoples;

Photo 6-2: Consultation with Tehuledere and Hayq Woreda Officials (left & right)

- It will connect towns with towns of different regional states of the country;
- Supply of goods and inputs will be improved as the result of the railway line operation;

- It will save time for passangers and business people since the railway transport is speedy;
- It will encourage surplus production of cash crops for marketing;
- Farmers will be beneficiary for marketing their surplus products if the railway station is easily accessible to them;
- It will encourage the establishments of urban settlements along the railroad line and contribute for urbanization;
- It will enhance the growth of Kombolcha so as to be a strong dry port area in the region;
- Women will get opportunities to earn additional incomes through the provision of services to the project workforce (such as tea, food and local beverages);
- Knowledge transfer will take place while the local youth are working in the project;
- Skilled local youths will get chance for employment and to be engaged in the project construction activities; and
- Urban areas which the railway line passes across (such as Kemissie, Hayk and Passo Mille) will be developed to be important business centres in the region.

6.5.3 Expected Negative Impacts

The possible expected negative impacts of the project that were raised and discussed during consultation are briefly presented below.

- Increase in flow of illegal groups and/or individuals during project construction;
- Increase in illegal and/or immoral acts such as theft, robbery, adultery and woman or child abuse;
- Loss of farmland, structures, trees, fruits, houses and other assets due to project construction;
- Increase in car and other accidents on people, livestock and property during project construction and operation;


Photo 6-3: Consultation with Werebabu & Kombolcha Officials (left & right)

- Increased pressures on scarce resources, mainly during project construction;

- Spreading of communicable diseases such as HIV/AIDS and STDS in the project influence areas due to the influx of people searching for job opportunity;
- Waste and pollution problems in construction sites and in the areas of railway stations;
- Increase population growth in the towns where railway stations are established;
- Loss of investment areas allocated to investors and other assets due to the proposed railway station site (Kombolcha Old Airport;
- Disruptions of community footpaths and roads that would serve both human and cattle;
- There would be unfair compensation and delay in payment of compensation; and consequently, stumbling block that would curb the construction speed;
- Misuse of project properties by irresponsible project workers; and consquently low quality of work and delaying;

Photo 6-4: Consultation with Dawa Chefa& Kalu Woreda officials (left & right)

- Cultural diffusions in the local society will take place since the flow of people of different origins in cultural background either being tourists or incoming people searching for job opportunity will increase in the project influence areas. This will cause either negative or positive impacts;
- Demolition of bench marks and others constructions materials and equipments due to inadequate awareness of communities;
- Dissatisfaction and unwelcoming feelings of communities due to unfair compensation and delay of compensation payment; and
- Conflict of interest will take place between local labour workers and contractor if the labour payment is not based on the current local market.

The consultation participants have concluded that these problems will take place when there is lack of awareness about the project. Therefore, we have to be conscious about these and unforeseen problems ahead of time and be ready to solve them on the spot or before they occurred.

6.5.4 Measures of Managing Negative Impacts

The main possible means of managing negative impacts suggested by the consulted people are summarized below.

- Public consultations with all localities in respect of their customs and tradition is very essential;

- Maintaining a strong relationships with local administrations and the communities;
- Compensation payment before the start of project construction;
- Priority for job opportunities to be given to community members who may lose properties due to the project;
- Participate local people in project implementation such as in identification of construction material resources and get consensus to use for project;
- Establishment of program as sub component of the project to prevent and control HIV/AIDS and other sexual transmitted diseases (STDs)

Photo 6-5: Consultations with Kemissie council members and rural people members

- Encourage inter-community relationships and joint conflict-resolving process;
- Respect customes and norms of local communities;
- Provide awareness to protect the people from traffic accident;
- Establish waste disposal management system to protect pollutions;
- Provide reasonable compensation payments for losses before the start of construction;
- Prepare easily accessible crossing paths (either under pass or over pass) to replace disrupted crossing footpaths and roads;
- Provide proper attentions to protect infrastructures, institutions and cemetery during project construction;
- Develop fair work environment with project stakeholders and labour force.

Photo 6-6: Consultations with Kombolcha water supply enterprise head (left) and with office head at Hayk town (right)

7. PROJECT DISCLOSURE

One of the mechanisms to disclose the project is conducting public consultations with the project affected peoples and relevant stakeholders. The public consultation is part of the SEIA study and it should be conducted at project screening and feasibility study phases of the project. Public consultations at these levels of the study are vital to disclose the type and nature of the project to directly affected peoples and to incorporate the public concerns, feelings and advices in the design of the project. Projects designed through such a public participation are well recognized by the public and induce the feeling of ownership.

Timely disclosure of the project to the public is also important to empower the community and involve them in a project implementation process. This eventually will make the project sustainable and socially acceptable.

After the completion of the study, the summarized reports of the project study can be disclosed to the public through mass media such as radio, television and news papers. The other possible way to publicize the project is putting the report on ERC's Website.

Conducting workshop on the draft report could help to disclose the project for concerning stakeholders and interested experts. Besides, distributing copies of draft and final reports to the public relation offices at the project influence Woredas could play important role in disclosing the outcome of the project to the directly affected communities and Woreda level officials.

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8. SOCIO-ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The railway project construction provides several benefits, particularly in terms of increasing the reliability of transport and the potential to develop the local economy. There will nevertheless be some adverse impacts on social, economic and environment.

The socio-environmental and economic impacts of the railway construction were assessed to identify the possible impacts. To this effect different methods were used including collection of data from different relevant government offices, public consultations and a review of related studies to identify and characterize both positive and negative impacts.

The objectives of the mitigation measures in relation to eliminating or reducing impacts are included below.

Preferred ↓	**Avoid** - Activities that could cause adverse impacts
	Prevent - Measures that impede the occurrence of negative impacts
	Preserve - Preventing future actions that may negatively impact a resource or attribute
	Minimize - Limiting or reducing the degree of an impact
	Rehabilitate - Repairing or enhancing affected areas
Less Preferred	**Restore -** Restoring an affected resource to how it was prior to the impact
	Preferred Compensate - Create or enhance a resource to compensate for what is lost

As it is evaluated, most of the negative effects will be short-term and reversible, stemming from ground disturbance, operation of equipment, construction camps and construction materials processing and storage. But, some impacts such as loss of structures and land acquired for the ROW will be permanent. In this section, potential positive and negative impacts have been identified and, where possible, quantified.

8.1 Positive Impacts

The implementation of the proposed railway enables the transport system of the country to be improved. The role of railway transport in the Growth and Transformation Plan of the Country is vital since it creates access to local and international markets to import and export inputs and surplus products.

The existence of railway transport will encourage the development of agriculture and agro-industries to produce various types of market oriented products and generate numerous job opportunities for the local people.

The positive imacts of the proposed railway project are many; of which the major impacts include:

- reduced car dependency;
- reduced public transport journey times;
- air quality benefits; and Other social and economic impacts.

Some benefits of the proposed railway project are elaborated below.

8.1.1 Benefits for the Transport System

According to some studies, comparing rail traffic with other traffic modes, the rail traffic is undoubtedly the most reliable traffic mode. This reliability does not only result from a lower number of traffic accidents, but it will prevent the occurrence of casualties, injuries and human losses. At the same time, rail traffic disburdens overburdened network of highways and primary roads.

Railway transport is a smooth and safe road transport which ensures better prevention from damages and losses on transported goods. It also reduce the journey times by large that would have been spend to cover the distance by car and requires only shorter waiting times for border crossings. Consquently, a reduction in travel times will enhance the quality of life for those travelling to and from.

With regard to improvement of transport system, the implementation of the proposed railway line, in general, will have the following benefits:

- Public transport system will be improved;
- Safety reliable transportation of goods and passengers;
- Significant reduction in travel time;
- Improved accessibility to foreign markets;
- More efficient transit services; and
- Reduce car dependency and decreased car congestion.

Enhancement Measures

To enhance the benefits discussed above, the following measures could be taken:

- Aware the local people to be beneficiaries of the railway transport for both freight and passengers.
- Make available access roads to the proposed railway stations and encourage local people to be the railway transport users. Dessie will be the main potential beneficiary as it is located about 25 Km from the Kombolcha railway station. Kombolcha is an industrial town located in Amhara region of the South Wollo Zone which is expected to be a dry port centre in the north Ethiopian regions.

Photo 8 - 1: Dessie, South Wollo capital (left); Kombolcha, industrial town (right)

8.1.2 Increase Transportation Capacity and Improvement of Price Conditions

In growth of national economy, the proposed railway line has its specific and irreplaceable position. It enables and facilitates transportations of bigger quantity of goods on long or medium distances in which a different traffic mode would be too expensive and therefore inefficient.

Besides, the introduction of railway transport increases mobility. Mobility is one of the most fundamental and important characteristics of economic activity as it satisfies the basic need of going from one location to the other, a need shared by passengers, freight and information. It is the fact that reduced mobility impedes development while greater mobility is a catalyst for development.

8.1.3 Lower Transport Restrictions

In comparison with road carriers, the important advantage of railway transport can also be lower transport restrictions. As it is known, the road carriers must respect several regulations, such as limitations in utilizing highways and primary roads, limitations in traffic peaks, or obligations to keep safety breaks. There are no such problems in connection with railway transport.

Enhancement Measures

Encourage people to be beneficiaries of the railway transportation by introducing quality and efficient services for beneficiaries. This will in turn contribute for the growth of mobility in the country.

8.1.4 Benefits for Local Employment

One of the major positive impacts of the project during the construction stage is the creation of employment opportunity. The railway project will employ significant number of people during the project construction and operation phases. The benefit collected from the project in terms of wage will be supplimentary cash income as it is needed in rural household for various purposes such as to pay for debts, manufactured goods, education and cloths.

To some extent such employment opportunities may check out migration of the area and promote in migration. In this sense the employment opportunities contribute to poverty alleviation in rural areas despite the fact that the impact depends on the timeframe of the construction phase of the project.

Enhancement Measures

The following enhancement measures to maximize the benefit discussed above have been proposed; these include:

- Unskilled job opportunities should be afforded to the people from the project and local neighbouring areas particularly for those who are going to be affected by the project construction. Contractual obligations should be put in place that obliges the construction contractor to give priority to use local labour requiring for unskilled jobs;
- Equal opportunities for employment should be created to ensure that the local female and youth population also have access to these opportunities;

- Individuals who have potential skills should be encouraged and given training opportunities to develop their skills;
- Mechanisms should be developed for individuals to create job opportunities to exploit the project benefits during and after its construction; and
- Employment of project labour and payment should be complying with the country labour legislation.

8.1.5 Benefits for Local Economy

The employment opportunity, income from shops, house rental, increases demand for food, beverage, etc are the areas of income during project construction period. Furthermore, local contractor will also be used for some construction works which is considered positive impact for the local economy.

The likely impact on rural economy due to increased economic activities during construction phase is considered positive impacts for the area. As the result of increased trade and business, significant amount of cash will be channelled into local economy. This short term economic boom will contribute to improve the living conditions of the people in the project area.

Moreover, establishing railway transport network will encourage producing diversified market oriented surplus for marketing. This will in turn contribute not only to boost intra-regional and inter-regional trade but also contribute for poverty reduction and sustainable local economy development.

Enhancement Measures

The following enhancement has been proposed:

- promote the railway transport facilities to the local people to be the service users; and
- Create suitable conditions to the local investors to be engaged in agriculture, agro-industry, fishery, ecotourism development, and in other developmental activities through the provision of credit and associated supports.

8.1.6 Benefits for National Economy

It is the fact that establishing railway transport system in selected corridors; and railway lines will certainly create better access and connectivity in the country. The proposed railway will connect regions to regions and gives access to the neighbouring countries and alternate ports so that there will be strong socio-cultural and economic relationships among them. This will contribute to the economic development of the country. It will also create access to local and foreign markets and in turn it will encourage development as the railway transport is low cost, safe and speeder.

Moreover, since the project influence regions are widely known by its tourist attractions due to its natural endowments, historical and cultural heritages, the introduction of railway transport in such areas would contribute for ecotourism development.

In general, the benefits for national economy due to the proposed railway project will include:

- Improved productivity;

- Immediate job creation;
- Knowledge transfer;
- Urban development along the route;
- Stimulation of economic development; and
- Positive impacts on tourism development.

Enhancement Measures

This benefit can be enhanced by adopting railway maintenance system and constructing feeder accesses roads to connect rural Kebeles with the proposed railway line. Moreover, creating favourable environment for investors in areas of such as agro-industry, ecotourism, fishery, agro-forestry and apiculture along with the provision of railway transport would be stimulant for the growth of the national economy.

8.1.7 Benefits for Public Health and Living Conditions

The proposed railway transport would reduce dependence on human portage, which benefits the female members of the communities in particular. It would also increase mobility, social communication and interaction of women both within and outside of the project influence areas. Hence, business women will be among the most beneficiaries as the railway transport is low cost, safe and speeder.

Besides, the railway transport would contribute to improve social services of the project influence areas; such as schools, health institutions, banks and agro-industry businesses.

In general, the benefits in terms of public health and living conditions would include:

- More time for family and community activities;
- Increase in leisure time;
- Improved sense of security during travel;
- Reduction of air pollution;
- Reduction of stress and road rage; and
- Reduction of accidents and fatalities.

Enhancement Measures

This benefit can be enhanced by constructing feeder roads so that the local communities of the project influence areas will have access to the railway line.

8.1.8 Facilitate Humanitarian Aid

The proposed railway transport would greatly facilitate humanitarian works during emergency cases as it enables transportation of bigger quantity of goods on long or medium distances at relatively low costs and speeder than of other mode of transport.

Enhancement Measures

This benefit can be enhanced by constructing feeder roads that will connect rural villages/ kebeles to the proposed railway line.

8.1.9 Responsibility for Ecology

As many studies have identified, railway traffic is an efficient and environment-friendly transport system in many cases. Large volumes of goods can be transported on long distances quickly with a minor impact on environment. Compared with automobile or air transport, railway transport produces the lowest amount of emissions and requires much lower costs on regeneration of damaged environment. Another important of railway transport above the road transport is a lower occupation of agricultural land. Besides, noise strain produced by the railway transport on environment is lower than by the road transport.

Enhancement Measures

This benefit can be enhanced gradually when the railway transport is full-fledged, by the introduction of specific tariffs on the automobiles to cover the costs of regeneration of the damaged environment caused by the amount of emissions they produce.

8.1.10 Cultural Development

The in-migrant people for job opportunities will bring both positive and negative impacts to the local people. Some of them will have different cultural backgrounds and behaviours so hat they might not be comply with the culture of the local communities. On the other hand, the existence of social interactions between the influx of people and local persons will create suitable opportunities for skill transfer and other socio-cultural developments to the local communities.

In general, the proposed railway transport will promote cohesion and interaction among community members of the project influence regions. Besides, the flow of tourists will be increased due to the railway transport and this will induce growth in ecotourism development.

Enhancement Measures

This benefit can be enhanced by creating awareness among the project workforce to respect the traditions and culture and norms of the local communities and encourage local project workers to develop their skills while they work for the project.

8.2 Negative Impacts

8.2.1 Adverse Impacts on Environment

The project construction activities involve site clearance, excavation, paving and grading activities, all of which can cause vegetation removal and soil disturbance. These activities can contribute to the damages and degradation of the natural resource base of the area; soil and water resources.

Besides, impacts due to the rail line project is also expected to be caused by the environmental phenomenon such as flooding in the plain lands following river banks (like Borkena River); land slide/land slip risks at steep slopes and at rugged topographic landform sites.

However, no significant disturbance to flora and fauna resources is expected as the major rail line route traverses intensively cultivated and settled areas. It is at some locations that patches of plantation tree forests exist; like plantation eucalyptus forest at the project origin, and acacia

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woodlands that encounter at intervals. The major potential adverse impacts of the project are discussed as here under.

The adverse impacts of the project will be experienced most at sites and locations described under section three and four of this report; on environmental resources within the railway route ROW and at material production sites. These resources include bio-physical environment and socio-economic environments as well. Some of these are:

- The vegetation covered areas within ROW, especially plantation forests at both origin of the railway project, around Kemisse town and patches of forests at religious sites like churches and cemeteries falling in ROW width. Patches of clustered fruit and plantation trees at homesteads and other dispersed tree hedges;
- Land prone for slide and soil erosion at steep mountainous areas;
- The land and vegetation resources at material production sites;
- The water resources at the river crossings and along the railway route, at downstream sides of material production sites and the adjacent lands;
- Farmlands and grazing grounds along the carriage way, detour roads and access roads to material sites; and
- Settlement sites like in towns and villages traversed by the rail line.

8.2.1.1 Impact on Land Resource and Soils

The construction work involves site clearance, excavation, paving and grading activities, all of which involve disturbance of the land surface, loss of productive soil and loss of vegetation cover along the rail line route corridor, at quarry and borrow pit development sites, along detours, and along access roads to material production and camp sites.

The land area to be occupied by the proposed rail way width would be permanently removed from the stock of land that can be used for agriculture and animal husbandry. The removal of such productive land from the local economy can reduce the potential socio- economic benefits expected. However, the land size is not that significant as compared to the available land areas in the districts of project implementation.

The area of land which would be temporarily occupied for material production (such as quarry and borrow material), and detour road is also substantial.

Road side ditches constructed to divert surface drainages to adjacent lands are major contributors to soil erosion. Erosion effects can be enhanced especially at steep slopes due to cuts in soil, embankment construction, borrows pits and quarries, excavation of foundations for bridges and culverts, and due to loosely compacted surfaces etc.

The topography of the land in the project areas is rugged, and major parts of the land is bare and exposed to direct actions of erosive factors like rainfall and winds.

Erosion effects are already observed at steep slopes and downside of the existing track roads due to discharges from culverts and drainage ditches. This impact is expected to be aggravated with the railway construction and improvement in runoff collection/runoff concentration along the rail line sides. Unless proper protection and mitigation measures are incorporated in the design and construction of the drainage discharges, the impact can be significant.

The steep sloped mountain sides have been severely damaged by runoff removing the top soil. At most locations, rock material including big boulders are being removed from the hills and mountains and deposited at down side water courses or plain grounds.

The excavation, paving and grading of such surfaces accelerates the erosion effects, and exacerbates land degradation problems in the project areas. Removal of the sparse vegetation cover exposes the soil to further erosion effects. The eroded soil that is transported to the nearby water body can cause sedimentation and change in the ecosystem, and on the quality of the water. This impact is clearly observable already in the area like in Borkena River, Dirma and Passo Mille Rivers that are traversed and others in the locality. In those rivers and streams, deposits of silt and boulders have built up in the river beds, and forced meandering water flows by affecting the river banks.

Excess excavated material from the road cutting operation, side tipping of spoils down the slopes can kill the under lying vegetation and add to erosion and slope instability problems.
Soil contamination and soil quality deterioration can result from spills and leakage of fuel and lubricants used, and also from mismanagement of used and waste oils around camps and garage sites. During the service period of the road, soil contamination in the corridors can arise from traffic operation and from transportation of hazardous products. This effect would be significant at river crossings and at the seasonal marshland sites of the flood plain.

Measures to Minimize Loss of Land Resources and Erosion Effects

The land acquisition and occupation both for the rail line and for ancillary activities like material site development, access and detour road construction, locating garges and explosives stores etc. should be in accordance with the requirements of Proclamation No.456/2005 taking into account restrictions given thereof.

Proper mitigation measures should be implemented to minimize the adverse impacts on land resource and erosion effects. The following measures are proposed for inclusion both in the design and to be implemented during the construction and operation phases;

- Planning the excavation works during the dry season especially around river crossings and at road side ditches;
- Limiting the area of soil disturbance within the widths delineated for the rail line (60meters along all stretch and 110meters at railway stations), and along detour and access roads to material sites;
- Limit and clearly delineate quarry and borrow material production areas;
- Stockpile the overburden and top soil removed for later use; to rehabilitate degraded ground and/or abandoned quarry sites;
- Provide energy dissipaters at culvert and drainage outlets, to minimize adverse impacts of soil erosion;
- Location of culvert discharges should consider downside land use and properties; and should avoid settlement sites and crop fields as far as possible;
- Divert and/or extend drainage channel away from property, crop fields and settlement sites;
- Rehabilitation of excavated and paved land surface as soon as possible;

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- Removal and cart away of excess material from sensitive sites as soon as possible, and in parallel with the excavation activities. This is especially crucial while working in the flood plains and seasonally water inundated wetland area. Dispose the excess soil material at designated & approved site;
- Exercise proper work discipline and waste management practices;
- Improved technical standards of construction like; provision of appropriate drainage, slop protection measures to control sheet and rill erosion can decrease erosion effects on detour and access roads used during construction rather than causing major adverse impacts;
- Plantation of grasses at steep slope cut and high embankment fill sites; construction of retaining structures as deems necessary can assist in reducing the effects of land slide, soil erosion and gulley formation;
- Stabilizing cut slopes by grassing and seedlings plantation should be done as soon as grading is completed;
- Do not allow runoff flow on cut slopes and embankment fills; provide lined water ways / ditches as required, by avoiding scour effects;
- River bank scouring problems can be minimized by careful selection of river crossing sites and through proper engineering design; and
- Deep gulley formation along existing side ditches can be minimized by; grass cover of the ditch bottom, by grouted stone riprap (possibly stepped in case of steep longitudinal gradient) if cost is not a constraint, or dry /loose stone rip-rap to reduce the cost.

8.2.1.2 Impacts on Slope Stability and Landscape

For most of its length, the railway line follows mountain sides and at some locations there might be a need for tunnel crossings. Land slide/land slip risk is high at such sites both during construction and post construction of the rail line. This impact can have adverse consequences to both the natural as well as socio - economic environment. On the other hand, the impact on the rail line operation may also significant due to the land slide problem, by blocking the traffic flow as well due to damage to the physical infrastructure itself.

The major factors contributing to slop instability are topography, geological formations, vegetation cover, rainfall intensity and land use practices. In general, areas with weathered rocks, steep slopes and sparse vegetation cover are susceptible to slope instability. All of these factors are fulfilled for most of the lands of the railway project ROW corridor; this is true especially at mountainous and escarpments, and also at rolling terrains, which dominate the landscape of the project woredas.

Climatic factors like increase in rainfall intensity, high temperature and dryness (lower soil moisture) or excess soil moisture loosen the soil structure and increase vulnerability to land slide and land slip risks.

Some of the suspected land slide/land slip sites are among the lists indicated in the geotechnics and materials report, and should be considered as sensitive sites to be dealt with. This table lists sites of steep slopes at escarpments and mountain sides that will be traversed by the rail line project. These stretches are potential land slide risk areas and proper coping methodologies have to be adopted while project implementation.

The design will attempt to avoid and protect these sites preferably by realigning the road route, and by leaving adequate buffer zone around sensitive sites.

The excavation at some of the steep slope and in the escarpments can cause land slide and slope instability. This may cause life risks and property loss both during the construction and operation phases of the railway project. Land slide can form gulley and further aggravates the erosion effect as well.

Mitigation Measure for Slope Instability

The land slide prone sites will be avoided as far as possible by re-alignment of the route. In case avoidance is found to be difficult or impossible, only then other mitigation measures should be adopted to protect landslide/land slip effects. Slope stability protection measures should be arranged and implemented along with the excavation activities.

Slope stability should be ensured both for soil conservation objectives and also for the safety of workers and the railway user in general. Some of the specific measures to mitigate the impacts include the following:

- The engineering design will specify the slop protection measures based on the geotechnical investigation findings;
- Clause shall be included regarding restrictions posed by proclamation 456/2005 as regards to locating of material sites, camps, access road, detour roads etc on sensitive sites including land slide prone sites and steep slope areas;
- Slope instability can be minimized through special retaining structures like using gabions, dry masonry retaining structure, and other slope stabilization measures will be applied at hilly and mountainous terrains as found to be feasible;
- At sites where cuts and fills are required, slope shape and steepness are designed according to soil types; either edge rounding and terraces or compaction of soils (loose surfaces) of road shoulders to resist erosion and to enhance vegetation growth;
- Re-vegetation of the slopes, since tree roots can hold soil together. Appropriate tree species should be selected from locally available list and adopted. Planting of shallow rooted trees should be avoided, as these could add weight to the moving mass and enhance land sliding;
- Water entering the slope mass should be intercepted and drained away from the reach of slide susceptible areas. These may include paved chutes and furrow ditches which divert surface water to other locations;
- Avoid any under cuttings of the slopes;
- Avoid using of land slide susceptible areas for extraction of construction material.
- Construct the base of the road using porous material in order to allow water to percolate and drain; and
- Slop protection measures adopted should give preference as far as possible to bio - engineering techniques, in accordance to the specific site conditions.

8.2.1.3 Impact on Flora /Vegetation Cover and Forest Resources

The vegetation cover of the area is severely degraded by intensive crop cultivation, animal grazing and use as fire wood. Though plantation forest is seen along the route corridor, no significant natural forest is found in the area.

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Impacts on vegetation cover that may be caused for the road will be due to the widths of the railway, due to quarry and borrow pit development for material extraction, due to camp site and garage construction, and due to access to material production sites and due to detour roads. Major impacts to the vegetation cover would be caused during the construction phase of the project.

There is no major wild life habitat like parks and sanctuaries that fall in the right – of - way of the road project. However, smaller wildlife species common to the sparse vegetation covered areas are found in all of the woredas.

Proposed Mitigation Measures for the Flora and fauna Resources

- There will be no realignments, quarrying and borrowing including construction of detour and access roads to the borrow pits, material and quarry sites within the relatively dense forest or bush covers;
- Construction in dense acacia wood land areas should be done by half width at a time. While work is underway on the half width, the remaining portion can accommodate and serve as passage for vehicular and/or other transport facility. In this case, the need for detour road construction can be avoided;
- Camps and garages should not be located in the dense vegetation covered areas; the supervising consultant should be informed that no approval of such site is given to the contractor. The environmental inspector and the resident engineer have the responsibility of ensuring that these requirements are met;
- Excavated and paved grounds both for the road and at material production, camps and garage sites should be rehabilitated to the original condition as far as possible. Rehabilitation is done by backfilling, compacting and grassing or by seedling plantation;
- Trees cut / removed for the project should be replaced by planting and growing seedlings at appropriate place in the premises. At least 15 – seedlings have to be planted for every tree removed;
- Adequate monitoring mechanism should be established to supervise and control illegal deeds within forest conservation sites like; illegal logging, timber trade and charcoal making; and
- Capacity building activities and awareness creation measures have to be taken both for the construction workers as well as to the surrounding community.

8.2.1.4 Adverse Impact on Air Quality

The assessment and monitoring of air pollution level depends on the traffic volume, traffic composition, and vehicle speed and road surface conditions. Construction vehicles deployed in the area, motorized vehicles and industrial development along the rasiway alignments and especially in the town centers; can contribute to the pollution effect of the local atmosphere during the construction and operation phases of the railway project.

The major air pollution comes from dust particles during the construction phase. The dust particle of excavated soil can easily be exposed to wind action. The alignment follows unpaved new route for most of its length and no pollution impact is observed due to transport facilities; and there are no significant settlements along the alignment. Hence, dust pollution is not observable in the premises. However, with the improvement in the transport infrastructure, and

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connectivity with the major trunk roads, it is expected that both the number of vehicle and settlement density will increase substantially.

Air pollution will also be caused by particles produced from crusher plants, smoke from vehicle and machinery motor exhaust, all can contribute to the adverse impacts. The air pollution effects can have significant adverse impacts in the relatively densely populated areas of the towns like Kombolcha and smaller villages crossed by the line.

Proposed Mitigation Measures to Minimize Air Pollution Effects

The construction period air pollution impacts can be mitigated by:

- Dust suppression measures like water spraying on the paved and excavated surfaces to minimize the impact of pollution due to dust particles;
- Location of quarries and crushers should consider local wind direction to protect the workers on site, sensitive ecosystems and sites, residential areas etc. Quarries and crushers should be located away from densely populated sites, away from institutions like schools, religious and ceremonial places and market places;
- Regular maintenances of vehicles and machinery motors for better performances. Installation of dust suppression accessories to machinery exhausts and crushers;
- Trucks carrying fine material that can easily be windblown should be covered while transporting; and
- Air pollution prevention measures should be incorporated in the construction work specifications and contract agreements.

8.2.1.5 Adverse Impact on Water Resources and Wetlands

There are several rivers and streams that are crossed by the railway route and others that fall in the influence areas. Some seasonal marshlands in the flood plains of Borkena, Dirma and mille rivers are habitat and feeding grounds for variety of flora and fauna species, including livestock grazing, crop production etc. The water sources are used for all purposes including domestic water supply, animal watering and irrigation. The upkeep of the water resources is, therefore, very crucial both to the health and economic well-being of the community.

The major impacts on the water resources and seasonal marshlands of the area relate to silt deposits at the river beds, changes in local flow direction of surface runoff, reduction in the rate of ground water recharge, and consequences of water quality and riverine ecology. Damages and disruptions caused to the surrounding environment and natural resource base, and natural drainage system would contribute to the impact on the water resources. Most of the rivers and stream courses in the area are severely affected by deposits of rock and silt material transported from the bare land of the catchment. The silt build up in the river beds has caused meandering of the water flow and river bank erosion.

Currently the water from springs is clear and of lower turbidity as observed visually. These water sources are directly used for human consumption. With minor spring source development and protection measures, they can be considered as safe potable water source for the local community.

Degradation of water quality can be caused by; entry of excavated soil material in to the river courses during construction activities, oil and fuel spillages from leaking machinery parts and

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upon refilling of equipment, and by wastes generated at camp sites. The pollution effect and sedimentation in river beds by soil deposit can hinder the growth and population of animal and plant life in the water bodies.

It is, therefore, essential to maintain the water quality at its current situation as far as possible. Any debris, excavated soil material and wastes generated from the project activities can adversely affect those sources, if not properly managed.

The seasonal wetland and marshlands of concern are all located at the riverbanks, mainly Borken River and Dirma River flood plains and other stream banks, crossed by the rail line. These flood plains are seasonally water inundated and are habitat for multitudes of aquatic life.

The railway embankment does interfere with the smooth water flow during inundation and can disrupt the habitat connectivity, though it is seasonal. On the other hand, the flooding and water inundation in the plains can adversely affect the embankments and railway line infrastructure in general. Hence, proper mitigation measures should be considered to allow smooth water flow in both directions. This can be done by providing adequate number and adequately sized culverts as determined by the hydrological/hydraulic analyses in the catchment.

The other issue is the disposal or stockpiling of spoil soils in the flood plain and marshlands. Such places like Borkena flood plains are sensitive to the impacts. The spoil deposits can damage the underlying flora and fauna resources and hamper their growth if left for long on the site. Moreover, it disfigures the landscape or will be gradually washed out and taken to the river beds.

Proposed Mitigation Measures to further minimize impacts on water resources and marshland areas include:

- Provision of adequate flow dispersal structures following the natural flow regime of the runoff water. This can reduce flow concentration to specific direction that can result in flooding effects and soil erosion, helps uniform recharge of water sources (both ground and surface sources) and wetland/marshland areas;
- Silt transport to the water bodies will be reduced by programming the construction during dry seasons, and also by soil erosion protection measures;
- Avoid stockpiling spoils at river banks, in flood plains, at banks of streams and groundwater sources and wetland sites;
- Cart away spoils soils immediately and regularly while working in the premises of wetland sites and at river crossings;
- The water quality deterioration caused by pollution from oil products and chemicals can be minimized by timely maintenance of leaking machinery parts, good housekeeping practices in garages, campsites and other operation sites. These facilities should be located at a properly selected site and away from water sources;
- Waste management and provision of waste handling facilities at garages, camp sites and at working places should be ensured by the contractor and the supervising inspector. Liquid and solid waste collection and storage facilities like pit latrines, cesspools and solid waste land fill sites should be located away from water sources and marshland areas;
- Avoid washing and refueling of vehicles and machineries at river crossings;

- Avoid entry of excavated surplus material in to the water body and wetland/marshland areas;
- Check dams, diversion structures at major discharge points of the runoff water may reduce direct entry of silt and pollutants to the water bodies; and
- Stone rip raps or lined ditches might be required at the discharge side of culverts to minimize soil erosion and gulley formation.

8.2.2 Socio-Economic and Cultural

Most of the potentially adverse impacts of the project are expected to occur during the construction phase of the project. Construction would involve activities that may affect the socio-cultural and economic conditions at the construction sites and may also directly or indirectly affect the surrounding areas.

The socio- cultural impacts are associated with the proposed project incorporated changes such as safety aspects and living conditions. The expected changes that can occur in relation to social health, safety aspects and living conditions during and after the construction period could be as a result of the presence of job opportunities and the influx of construction workers and job seekers to the project site.

Homes, a variety of workplaces, schools and other establishments/structures located very close to the railway corridor are particularly vulnerable to adverse impacts associated with the project construction and operation works.

The potential adverse impacts of the project and their associated mitigation measures are discussed below in detail.

The construction and operation of the proposed railway line could lead to a change in the number and composition of the population within the affected local areas. This could in turn lead to economic, land use and socio-cultural impacts.

8.2.2.1 Integration With Local Community

Construction workers tend to ignore their cultural or societal rules that guide their behaviour once they are away from their respective homes. They also tend to engage in negative behaviour such as risky sexual and other destructive behaviours.

This may lead to infections such as HIV/AIDS which these migrant labourers are likely to take back home to their partners or wives.

Mitigation associated with integration with local community

The following mitigations have been proposed:

- Launch aggressive culturally appropriate STDs and HIV/AIDS awareness campaigns;
- Distribute condoms by placing them at centrally located points;
- Control access to the construction site to prevent sex workers; and

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- Employ local women to decrease their financial vulnerability.

8.2.2.2 Influx of Construction Workers and Influx of Job Seekers

Influx of construction workers and job seekers are anticipated to cause demographic change (number and composition of the local community), and impact on economy, health, safety and social well-being.

If construction workers are from different cultural backgrounds than locals, conflicts can be expected where cultural backgrounds are not respected. This may lead to the local community developing negative attitude towards construction workers, with the possible resultant negative impact on social being.

On the other hand, if the community is accepting new people, the presence of construction workers could lead to a temporary boost in the local economy if construction workers utilize local services.

However, if available local service will not be sufficient for both locals and construction members, this could create other social problems. Besides, it is not expected that all job seekers would be employed in the project; hence, some job seekers will mostly reside in the vicinity of the camp for a few days in the hope of securing jobs on site. Among these job seekers who will not offered any employment some may look for materials that they can steal in order to sell. This may lead to increase theft acts in the project area.

Mitigation Measures

The following mitigations are proposed:

- Raise awareness amongst construction workers about local traditions and practices;
- Inform local business people about the expected influx of construction workers so that they could plan for extra demand.
- Ensure that employment procedures/ policy is communicated to local stakeholders, especially Woreda and Kebele Administrations;
- Have clear rules and regulations for access to the construction site to control loitering;
- Consult with local police services to establish standard operating procedures for the control and removal of loiterers at the construction site; and
- Construction workers must be provided with identification cards.

8.2.2.3 Social Pathologies Arising From Population Influx

It is possible that conflict might arise between the newcomers and local residents. One possible reason for such conflict would be the perception among locals that the outsiders are taking up jobs that could have been given to unemployed members of the local community. As a result, an influx of unemployed job seekers could add to the potential for conflict of interest.

An influx of construction workers and job seekers might also be accompanied by an increase in crime due to the fact that they will tend to ignore their cultural or societal rules that guide their behaviour once they are away from their respective homes. These people will tend to engage

in negative behaviour such as risky sexual and other destructive behaviours such as alcoholism, drug abuse, prostitution and the spread of sexually transmitted diseases and HIV/AIDS. Among the influx of job seekers some who do not get job opportunity will become loiters and consequently they will engage in criminal activities during and after the completion of the project.

Moreover, the construction of railway line will attract to undertake squatter business along the railway line which gradually becomes unplanned villages. These may cause changes in land acquisition, market prices, population growth and high demands for economic, infrastructures and other social service. In such circumstances, unemployment problems and various crimes would be induced in the area.

Mitigation Measures

- Construction workers should be given awareness or orientations on sensitive issues such as the need to respect the culture of local people, work discipline, etc.,
- Recruit work force from the local community as much as possible;
- Giving equal or more chance for women to be employed;
- Take care when selecting campsites in such a way that it should not invite close interaction with local community; and
- Local officials should control the project induce and unplanned growth of small squatters or villages all along the railway line.

8.2.3 Severance Problem

Severance refers to the extent to which the proposal or related activities (during construction or operation) has the potential to physically divide a community. That is, this impact focuses on identifying those project elements which could reduce the level of integration within a community based largely on the physical nature of the infrastructure.

Social interaction among communities would be reduced during the construction phase as a result of the scale of works and site disturbances. The level of physical severance would be increased in some localities and this could cause barriers between communities living on either side of the railway route.

Mitigation Measures

Prior to commencement of any construction works, Contractor should prepare and submit traffic management plan and get approval from Consultant Engineer and concerned bodies. This is to mean that the proposals for temporarily closing or diverting any public right of way has to be reported to the Consultant Engineer and relevant local authority offices to undertake arrangements to ensure that there is no significant interference with the traffic and street (footpaths) those will serve the public.

8.2.4 Alterations and Closures of Footpaths and Cattle Crossings

Construction of the proposed railway will result in some temporary and some permanent alterations and closure of routes for pedestrians and walkers, horse riders, camel and cattle.

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The alterations and closures of these paths would in turn result in destruction of interactions among the local people since they share same grazing and public services.

Mitigation Measures

The Contractor should take every possible precaution to prevent his operations from damaging the roads and footpaths in the vicinity of his work sites. Contractor has to carry out all such maintenance works which are necessary to maintain the roads and footpaths in the vicinity of the works in a serviceable condition to the approved standards of the local authority. Besides, the project design should include underpasses or overoasses at specified areas to serve the local community permanently and these should be constructed in accordance with the design manual for thereof.

8.2.5 Gender Impacts

The construction of the raril line has both negative and positive impacts on women. In terms of positive impacts, the construction of the railway project will encourage the local women to engage in business activities and produce market oriented products for marketing since the modes of this transport is low cost, safe and speeder. However, it will negatively affect local women by exposing them to STDs including HIV/AIDS pandemic. The large number of workforce coming to the railway project site would be exposed to or transmit the disease.

Besides, if the workers of the project are indisciplined, problems such women and child abuse; besides, illegal pregnancy and unwanted child births will take place.

Due to the prevalence of gender-biased culture in the project influence areas, the participation of women in the project, as compared to males, will be minimal. There is a traditional belief that men are physically fit, strong and have enough experience in construction works. Therefore, males would be favoured than of females during employment by the project. If female gets by chance job opportunity she may not get equal benefit/payment as of the male worker for the same job.

Mitigation Measures

The inclusion of HIV/AIDS and STDs prevention and control program as one of the project component and close follow up its performance will mitigate the occurrence of possible communicable diseases among peoples. In connection with this, local NGOs, Woreda Administrations and Health Departments of the project influence Woredas will have significant contributions. These organizations will give awareness to the local people and project workforce to abstain from any undesirable contacts and to be aware about the mode of transmissions of HIV/AIDS. Besides, it will be very important to pay close attentions to schools particularly to female students to be adequately oriented about the issues.

8.2.6 Impacts on Vulnerable Groups

The survey identified some vulnerable groups, which are defined as old aged and female household heads. These vulnerable social groups would suffer more for they are unable to revitalize themselves in the absence of special government support.

Mitigation Measures

- Throughout the implementation process of the railway project, these vulnerable groups should be given special attentions and support. They may need more assistance while they move to the new locations and build their residential houses.
- Provision of support to project vulnerable groups such as to get access to credit & saving and other benefits would enable them to be better; and
- Propovision of advice to PAPs in general and particularly for vulnerable groups is paramount to use the compensation payment to replace the loss and as a source for income-generating scheme.

8.2.7 Occupational Safety and Health Problems

Worker health and safety is an important responsibility of construction contractor. The contractor has to ensure that hard hats, dust respirators, goggles, and other safety equipment and clothes are worn, and all workers are given pertinent safety instructions accordingly. Moreover, the contractor has to provide clinic, firstaid assistance and ambulance for emergencies and for other health problems.

The following are the possible anticipated safety problems of the project that would require paying close attentions.

8.2.7.1 Overhead Line Electrification

The new railway line will be electrified having high volts with overhead line equipment. Although this will be a safely used standard electrification system, any contact with overhead lines and electrification equipment at this voltage is almost certain to be fatal.

Therefore, appropraite precautions should be taken by Contractors and by all concerned bodies before and after the installation of the system.

Mitigation Measures

- Ensuring that there is adequate physical protection to members of the public to prevent inadvertent contact with electrification equipment;
- Provision of awareness to the communities about the possible hazards associated with overhead line electrification for the railway line. The awareness creation should involve schools, youth groups, local communities and those with properties in close proximity to the railway and should be done at an appropriate time (i.e. before and immediately following the commencement of operations); and
- Adverse impacts of overhead electrification should also be featured in the project newsletter and other newsletter for awareness creation.

8.2.7.2 Route Crime

Some route crimes will take place on the operational railway which will result in fatalities. Such route crimes will be: people putting obstructions in front of trains, and trespassing and vandalising the railway infrastructure.

Mitigation Measures

- Route crime risks will be controlled through the provision of adequate fencing in compliance with network rail standard in potential route crime hotspots; and
- Provision of an effective program of community route crime education and liaison prior to trains running on the new line in the identified potential route crime hotspots.

8.2.7.3 Use of Explosives

The use of explosives would cause accidents on human, animals and properties if they are not managed and used properly.

Mitigation Measures

- Store any explosives and chemicals in safe places;
- Prohibit use of explosives except in exceptional circumstances;
- Prior approval should be obtained from the Project Manager and the Local Authority to use explosive;
- Local residents shall be given notice of the use of explosives ahead of time; and
- The relevant Local Authority shall be given at least 14 days notice of the use of explosives with an explanation of why the use of explosives is required.

8.2.7.4 Traffic Safety and Control

During the construction period, there will be equipment and machinery movements that could increase the risk of accidents to the local communities (particularly children) and their cattle, especially when they are crossing the road.

Mitigation Measures

- During construction, the behaviour of site traffic should be controlled and properly managed by the contractor's site office in order to minimise the risks;
- Contractors should provide, erect and maintain such traffic signs, road markings, lamps, barriers and traffic control signals and such other measures like awareness creation about traffic safety before drivers start their jobs as may be necessitated by the construction of the railway works;
- Contractors should not commence any work that affects public roads until all traffic safety measures necessitated by the work are fully operational; and
- All traffic signals including temporary signals used at project works should be approved before they can legally be installed for public use. Portable traffic signals should be also complying with the current requirements of the traffic signs regulations, which lay down the size, colour and type of prescribed traffic signals.

8.2.7.5 Spread of Sexually Transmitted Diseases

The influx of construction workers and job seekers would be the causes for spread of sexually transmitted diseases in the project influence areas. These migrant labourers are likely to

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spread sexually transmitted diseases and HIV/AIDS to the local people or take back home to their partners or wives.

The impacts could be permanent duration due to the nature of HIV/AIDS and other STDs that are incurable. The spatial scale is local but infected persons from the community as well as construction team who are mobile could infect more people in other areas of the country. This will contribute for a reduction in human resources of the country as a result of death from HIV/ AIDS related illnesses. The expansion of this disease could not lead only to reduce the life expectancy but also it will increase in health care expenditure and health care cost.

According to the report on progress towards implementation of the UN Declaration of Commitment on HIV/AIDS March 2010, with an estimated 1.1 million people living with HIV, Ethiopia has one of the largest populations of HIV infected people in the world. However, HIV prevalence among the adult population is lower than many sub-Saharan African countries. Adult HIV prevalence in 2009 is currently estimated to be between 1.4% and 2.8%.

In all regions of the country, availability of voluntary counselling and testing and antiretroviral therapy is gradually increasing. However, effort needs to be put into strengthening the capacity of the health sector to deliver other HIV-related services. Effort also needs to be invested in building the capacity of other sectors in order to mainstream AIDS into their core activities. Special emphasis is required on strengthening the capacity of civil society.

It is understood that people most likely to be exposed to HIV include sex workers, road construction workers, personnel in uniformed services, farmers, migrant workers and long-distance transportation workers. In the general population, significant HIV transmission is observed in young people aged 15-24 years; girls are especially likely to be exposed to HIV, due to harmful traditional practices, early marriage (often cross-generational and often ending in divorce), female genital mutilation, abduction and violence. The underlying factors contributing to the spread of HIV are poverty, a high rate of unemployment, widespread sex work, gender disparity, rural to urban migration, and harmful traditional practices.

The possible mitigation measures would include:

- Provide health education mainly focusing on the HIV transmission and prevention;
- Provision of clinical and counselling services for the project workers and community members in the project influence area.
- Provide free counselling and distribute condoms & leaflets to workforce and vulnerable group of nearby communities; and
- Avoid discrimination in work places due to HIV/AIDS and provide counselling service.

As a means to combat HIV/AIDS at the proposed railway construction project areas, ERC has to promot awareness creation programs and follow up its implementations. The project contractor has to enter into contractual agreement to strictly implement the plan for awareness campaign and prevention of sexual transmited diseases such as HIV/AIDS and STDs.

The Table below presents an action plan to prevent the expansion of HIV/AIDS at the proposed railway construction work place and communities situated along the project area.

Table 8- 1: Plan for Awareness Campaign and Prevention of HIV/AIDS

Proj. Stage	Location	Action Theme	Action Components	Implementation Responsibility	Overseeing Responsibility	Source of Funding
Project Implementation	Construction Camp	Awareness Campaign	Signing/ hoardings	NGO/ Experienced sub consultant	health office in collaboration with ERA	HIV/AIDS Budget
	Project Work Sites	Prevention	Condom Dispensing	"	Woreda health office	HIV/AIDS Budget
		Awareness Campaign, Prevention	Signing/ hoardings	"	Woreda health office in collaboration with ERA	HIV/AIDS Budget
			Advertisements			
			Referral services			
			Social marketing of condoms			
	Immediate surroundings of the Project locations	Awareness Campaign, Prevention	Signing/hoardings	"	"	HIV/AIDS Budget

8.2.7.6 Malaria Problem

As the socio-economic survey of this project has identified malaria is one of the prevalent diseases of major project influence areas. Its impact would be more severe in the lowland sections of the areas where the proposed railway line passes through.

Mitigation Measures

- Do not induce malaria out break by creating temporary & permanent water holding areas which favour mosquito breeding;
- Use chemically treated mosquito nets in times of malaria out break and provide a clinic or medical facilities at the construction camps; and
- Restore borrow pits and quarry areas to minimize breeding sites for mosquito.

8.2.7.7 Dust Pollution

The construction of railway line will cause some dust and fumes from moving aggregate, soil and other granular materials. It will be hard to avoid such dust nuisance particularly during dry weather. The occurrence of nuisance is mostly likely at properties within about 100 metres of the railway construction. The nuisance will take place in other far areas during winddy days following its direction.

Mitigation Measures

Contractors will be required to take all reasonably practicable measures to avoid nuisance from dust or fumes or any other air borne pollutants. Some measures will include:

- Using effective water sprays when all raw materials that could cause a dust nuisance are being delivered or handled;
- Not burning debris or other materials on site;
- Imposing a maximum 10mph vehicle speed limit on sites, and confining haulage and delivery vehicles to designated roads within the site;

- Ensuring vehicles that carry spoil and other dust-generating materials are adequately covered;
- Enclosing construction compounds with solid hoardings that are a minimum of two metres high;
- Ensuring that enough dust-suppression equipment, including water bowsers with spray bars, is always available;
- The hard surface of heavily-used areas will be kept clean by brushing and water spraying regularly; and
- Consideration of the use of an approved mechanical road sweeper to clean work sites and any mud or debris deposited by site vehicles on roads or footpaths in the vicinity of each work site during working hours.

8.2.7.8 Air Pollution

Air pollution would bring health and social problems for the local people reside along or close to the project construction. The Project Contractor should take particular precautions to prevent the occurrence of smoke emissions or fumes from site plant or stored fuel oils. Plant for the project construction s hould be well maintained and measures should be taken to ensure that the project machinery is not left running for long periods when not directly in use. The Project Contractor has to carry out the project works with prior attention given to the legislation and guidance stated for precautions to prevent the occurrence of air pollution.

Mitigation Measures

Some proposed mitigation measures are listed below.

- Application of good practices in construction activities and restriction of traffic speeds will minimise the dust production and its adverse effects;
- Vehicles and machinery must be kept in good condition to prevent excessive smoke from exhausts;
- Reduce dust by watering the access road surface that travels through settlement areas at least three times a day;
- Locate construction plants such as stone crushing plants away from the settlement areas;
- Prevent the generation of air pollutants during the construction period by watering during crushing and screening of aggregates;
- Avoid burning of materials such as tiers, plastic, rubber products or other materials that creates heavy smock or nuisance odour, and
- Avoiding disposing of any volatile chemicals to the air.

8.2.7.9 Noise and Vibration Impact

Noise represents the general effect of irregular and chaotic sounds. It is traumatizing for the hearing organ and that may affect the quality of life by its unpleasant and disturbing character. Noise can be manifested in three levels depending on emissions intensity; psychological disturbances (perturbations, displeasure), functional disturbances (sleep disorders, loss of work

productivity, speech interference) or physiological disturbances (health issues such as fatigue, and hearing damage). Connecting with this issue, noise and vibration associated with trains would be the major irritants.

Long term exposure to noise levels above 75dB seriously hampers hearing and affects human physical and psychological wellbeing. Transport noise emanating from the movement of transport vehicles and the operations of rail-yards will affect human health, through an increase in the risk of cardiovascular diseases. Increasing noise levels will have a negative impact on the urban environment reflected in falling land values and loss of productive land uses.

Regarding with the proposed project, during construction, the most noticeable sources of noise would be from machinery in the repair shops; blasting in tunnels and quarries; or from heavy earthmoving equipment. During the operating phase, passing trains, as well as the operation of equipment in each station, shop, and marshalling yard, will also generate noise.

Mitigation Measures

The impact of construction noise and vibration on the local communities and wildlife will be minimized and, reasonably practicable and acceptable to the local community by the arrangements to be done through project design, construction planning, best practicable means; setting noise and vibration limits; and noise and vibration monitoring.

Some mitigation measures are discussed below.

- Following standard procedures, contractors should have to undertake consultation with local officials to schedule operating hours of equipment and to locate machinery away from sensitive areas; local environmental protection bureaus should be notified about construction activity 15 days in advance. Contractors should be encouraged to use new and well-maintained equipment and to mandate that workers use ear protection in areas having high levels of noise;
- Appropriate worker protection should be provided. Potentially affected residents should be informed of the construction schedule, and blasting operations should be restricted in accordance with existing standards for noise and vibration.
- Construction works producing nuisance noise should be minimised or rescheduled so as not to occur at night or on locally recognised holidays or religious days;
- All machinery and plant should conform to the applicable noise standards, and plant must be provided with effective noise mufflers;
- Construction workers should adhere to health and safety standards pertaining to noise, such as wearing ear protection when operating plant or heavy machinery; and
- Avoid noisy works after regular working hours at or near the residential areas.

8.2.7.10 Disposal of Waste and Other Contaminated Materials

The construction process will generate sizeable quantities of wastes from the works and construction camps which will cause health problems to the people living nearby if it is not managed properly. Besides, it will bring the residential surrundings to be dirt and pungent.

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Mitigation Measures

The Project Contractor should take appropriate measures to properly manage wastes and other contaminated materials.

8.2.7.11 Impacts Related to Establishment of Construction Camps

The establishment of construction camps usually causes some negative impacts on the local communities located nearby. It is usually accompanied with some social and health problems that are primarily associated with the incoming population, including the railway construction crew.

As a large proportion of the labour force might be employed from outside, the potential problems will include spreading of communicable diseases, deterioration of environmental sanitation, and escalation of the pressure on natural resources, water supply and public health services.

The following adverse impacts are expected to take place:

- Loss of land (farmland or natural forest etc) for the construction of project camps;
- Transmission of diseases, particularly HIV/AIDS and STDs; and
- Overloading on the existing facilities (health care, potable water supply, garbage disposal facilities).

Mitigation Measures

- Negative social impacts due to campsites can be avoided or minimised by careful selecting campsites. They should not be located at or nearby vulnerable sites such as settlements, prime agricultural lands, religious sites, etc.
- All waste that will be produced from campsites must be treated in a proper way and controlled by the construction supervisor. Dispose all the wastes from the campsites properly in designated and authorized places and garbage disposal facilities should be provided by the contractor and the camp should remain clean all the times.
- Maintain trees in the camp to provide shed and to increase aesthetic value;
- Housing at the camps should be of sufficient quality to prevent disease-causing vectors, and adequate in number to prevent overcrowding. Furthermore, the campsites must have proper management and discipline; and
- The camps should be dismantled and the areas rehabilitated as per the surrounding nature once construction is completed.

8.2.8 Impacts of Quarry Sites, Borrow Areas and Detour Roads

Unless they are properly rehabilitated they would cause problems like breeding sites for mosquito, un-aesthetic view, accidents for animals and children (particularly quaries and borrow areas), loss of productive land etc. Therefore, they should be rehabilitated after the completion of the project construction.

Mitigation Measures

- Select quarry and borrow sites far from settlement areas and get approval from Engineer and local authorities before exploiting;
- Do not locate quarry and borrow sites in a dense forest areas;
- Rehabilitate all quarries and borrow sites and access roads after use, and
- Maintain detour roads within the ROW as much as possible.

8.2.9 Archaeology and Cultural Heritage

All possible appropriate measures should be taken to protect religious, cultural and historical resources from damages due to the construction of railway line, railway stations and other project works.

Therefore, the following mitigation measures are proposed.

Mitigation Measures

- Provide brief training for equipment operators and construction personnel on discovery of artefacts and the need to report any discoveries to the relevant authority;
- Design the proposed railway to avoid impacts on burial places and sacred places;
- If in case archeologically important phenomenon appear during road construction, suspend the work and report to the nearby authority or tourism bureau; and
- Whenever there is an indication of archaeological or historical events arrange for inspection by experts.

8.2.10 Inventory of Losses and Mitigation Measures

8.2.10.1 Buildings and Other Properties

The Socio-Economic Impact Assessment of the project has been carried out along the whole stretch of the proposed rail line. The following sections illustrate the identified project affected properties and PAPs to understand the type of intervention measures required to enhance the living condition of PAPs.

8.2.10.2 Residential Houses

According to the losses of inventory survey as illustrated in Table 8-2, the affected residential houses are about 21179.18 m^2. Consequently, the project affected families (households) and project affected persons (PAPs) would be 412 and 2225, respectively.

Table 8- 2: Project Affected Residential Houses

Woreda	Location	Household Heads			Project Affected Persons			Total Affected (M2)			Magnitude of Impact
		M	F	T	M	F	T	Grass	CIS	Total	
Kemissie/ Dawa Chafa	Kebele 11, Kebele 12	77	24	101	227	240	467	1129.56	1327.22	2456.78	Fully
Dessie Zuria	Kebele 09	3	1	4	18	27	45	78	180	258	Fully

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Woreda	Location	Household Heads			Project Affected Persons			Total Affected (M2)			Magnitude of Impact
		M	F	T	M	F	T	Grass	CIS	Total	
Kombolcha	Kebele 10	13	3	16	54	58	112	86	1170	1289	
	Kebele 04	26	8	34	69	66	135	6	2277	2319	
	Kebele 09	22	1	23	65	58	123	302	1147	1496	
	Kebele 07	36	5	41	156	129	285	267	2145	2412	
Sub Total	-	97	17	114	344	311	655	661	6739	7525	
Warababu	Kebele 02	24	9	33	88	77	165	336.63	1489.77	1826.4	Fully
Tehuledere / Hayk	Kebele 07/02	6	3	9	26	22	48	12	518	534	
	Kebele 018	21	1	22	66	56	122	130	1269	1399	
	Kebele 010	55	5	60	191	209	400	27	3228	3255	
	Kebele 012	24	4	28	68	79	147	376	1107	1483	
	Kebele 013	20	6	26	57	66	123	929.6	780.5	1710.1	
	Kebele 05	10	0	10	28	29	57	0	409.94	409.94	
	Kebele 016	5	0	5	15	11	26	250	72	322	
Sub Total	-	141	19	160	451	472	923	1724.6	7384.4	9113	Fully
Total Woreda		**342**	**70**	**412**	**1128**	**1127**	**2255**	**3929.79**	**17120.39**	**21179.18**	

Source: Inventory of Losses, 2011

The identification of loss of residential houses by construction type is very helpful to consider their replacement costs and to compensate project affected persons.

Photo 8 - 2: Types of project affected residential houses

8.2.10.3 Commercial Houses

The affected commercial houses identified during project property inventory would be 1127m^2. The project affected families (households) and project affected persons (PAPs) as the result of this would be 14 and 169, respectively.

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Table 8- 3: Project Affected Public and Private Commercial Houses

Woreda	Location	Household Heads			PAPs			Total Affected (M^2)			Magnitude of Impact
		M	F	Total	M	F	Total	Grass	CIS	Total	
Kemissie											
Private	K.12	2	0	2			84	0	84	84	Fully
Tehuledere											
Private	K.018	1	0	1	4	1	5	12	0	12	Fully
Private	K. 010	8	0	8	29	31	60	0	382	382	Fully
Private	K. 013	1	0	1	3	3	6	0	45	45	Fully
Private	K. 05	2	0	2	6	8	14		388	388	Fully
Public	K. 10								216	216	Fully
	Total	**14**	**0**	**14**	**42**	**43**	**169**	**12**	**1115**	**1127**	

Source: Inventory of Losses, 2011

8.2.10.4 Institutions

Inventory of losses has identified there would be some affected buildings of institutions.

Table 8- 4: Project Affected Institutions

Woreda	Location	Institutions	CIS houses (in m^2)	Magnitude of Impact
Kemissie	Kebele 11	Public Mosque	25	partial
	Kebele 13	Government School	777	partial
Dawa Chafa	Kebele 12	Government School	751	partial
Tehuledere	Kebele 010	Public Toilet	12	Fully
		Kebele Office	43	partial
		Police Office	50	partial
		Farmar School	84	partial
	Kebele 07/02	School	125	partial
Total			**1867**	

Source: Inventory of Losses, 2011

8.2.10.5 Boundary Fences

An inventory of project affected boundary fences has been taken during the course of the field study. The affects boundary fences situated within the proposed ROW is about 1,028 metres by 2 metres height (2,056m^2) as illustrated in the Table 8-6 shown below.

Table 8- 5: Affected Fences (mt)

Woreda/Kebele/ Town	Chainage	Wood	Stone and wood	Barbed wire	Kulkual	Magnitude of Impact
Kemissie, K. 04, Kachur School	0+338-0+513	-	-	120	-	Fully
Kemissie, K. 04, Kachur, Tobe named	0+513-0+525	58	-	-	-	Fully

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Woreda/Kebele/ Town	Chainage	Wood	Stone and wood	Barbed wire	Kulkual	Magnitude of Impact
Kemissie, Kebele 04, Tuche						
Ahimed Tadesse	11+440 - 11+460	50	-	-	-	Fully
Public	11+500-11+510	200	-	-	-	Fully
Bedriya Endris	11+500-11+510	200	-	-	-	Fully
Mohammed Adem	11+580-11+600	-	200	-	-	Fully
Dawa Chafa, Kebele 011, Tuche						
Ahimed Endris	13+030-13+050	20	-	-	-	Fully
Hussien Seid	13+030-13+050	27	-	-	-	Fully
Ahimed Fekie	13+030-13+110	90	-	-	-	Fully
Hussien Yimam Yusuf	18+340-18+357	-	-	-	17	Fully
Zehara Siraj Hasene	18+357-18+379	-	-	-	22	Fully
Omer Yassin	18+390	-	-	-	24	Fully
Total (length in metre)	-	**645**	**200**	**120**	**63**	**1,028**
Total (area in m^2)	-	**1,284**	**400**	**240**	**126**	**2,056**

Source: Inventory of Losses, 2011

8.2.10.6 Other Structures

According to the project inventory survey, some project structures were identified to be affected by the project construction.

Table 8- 6: Project Affected Structures

No.	Woreda, Kebele, Village	Owner Name	Structure Type	Quantity		Magnitude of Impact
				Unit	Size	
1	Kemissie Town	ELPA	Electric pole	N	1	Fully
2	Kemissie, Kebele 04, Tuche	Mohammed Siraj Ali	Water container house	M^2	18	Fully
3	Kemissie, Kebele 011, Amrach	Public	water pipe and public tap	mt	30	Fully
4	Kemissie, Kebele 011, Amrach	Bulo Adem Hussien	Water well	N	1	Fully
5	Kemissie, Kebele 04, Tuche	Ahmed Ebrahim	Water container house	M^2	20	Fully
6	Kemissie, Kebele 04, Tuche	Belay Muze Keskis	Water container house	M^2	20	Fully
7	Dawa Chafe, Kebele 09, Teref	Dawid Mohammed Yesuf	Earth canal	mt	240	Fully
8	Dawa Chafe, Kebele 09, Teref	Abera Hussien	Earth canal	mt	240	Fully

No.	Woreda, Kebele, Village	Owner Name	Structure Type	Quantity		Magnitude of Impact
				Unit	Size	
9	Dawa Chafe, Kebele 09, Teref	Public	Earth canal	mt	140	Fully
10	Dawa Chafe, Kebele 09, Teref	public	Earth canal	mt	20	Fully
11	Dawa Chafe, Kebele 09, Teref	public	Earth canal	mt	38	Fully
12	Dawa Chafe, Kebele 09, Teref	public	Earth canal	mt	139	Fully
13	Dawa Chafe, Kebele 012, Suftela	Government	Water pipe	mt	31	Fully
14	Dawa Chafe, Kebele 012, Suftela	Public	Graveyard	N	1	Fully
15	Dawa Chafe, Kebele 012, Suftela	Government	Water pipe	mt	31	Fully
16	Werebabu, kebele 02	Public	Grave yard	N	2	Partial
17	Tehuledere Kebele 012	Public	Grave yard	N	1	Partial
18	Tehuledre Kebele 013	Public	Grave yard	N	1	Partial
19	Tehuledere Kebele 015	Public	Grave yard	N	1	Partial
20	Tehuledere Kebele 018	Public	Grave yard	N	2	Partial
21	DessieZuria, Kebele 9	Public	Grave yard	N	1	Partial
22	Wererebabu, Kebele 02	private	Water container house	N	11	Fully
23	Wererebabu, Kebele 01	private	Water container house	N	1	Fully
24	Tehuledere, Kebele 018	private	Water container house	N	1	Fully
25	Tehuledere, Kebele 012	private	Water container house	N	1	Fully
26	Tehuledere, Kebele 016	private	Water container house	N	1	Fully

Source: Inventory of Losses, 2011

8.2.10.7 Cropland, Grazing and Irrigation

The project affected farmland is estimated to be 396.8 ha. The total project affected households would be 2130 and the PAPs are about 11238.The major part the affected cropland is rain fed.

Table 8- 7: Project Affected Cropland /Grazing (in m^2)

Woreda	Households			PAPS			Affected Cropland			Total
	Male	Female	Total	Male	Female	Total	rain fed	Irrigation	Grazing	
Kemissie										
Kebele 04	21	13	34	101	102	203	46379	0	21994	68373
kebele 011	14	0	14	35	49	84	25500	0	4500	30000
Sub Total	**35**	**13**	48	**136**	**151**	**287**	**71879**	**0**	**26494**	**98373**
Dawa Chafa										
Kebele 06	78	9	87	280	305	585	309141	29280	0	338421
Kebele 09	20	2		55	77	132	132345	1680	0	134025

Woreda	Households			PAPS			Affected Cropland			Total
	Male	Female	Total	Male	Female	Total	rain fed	Irrigation	Grazing	
Kebele 019	21	1	22	75	83	158	76720	0	0	76720
Kebele 011	22	5	27	71	87	158	46527	0	0	46527
Kebele 012	91	14	105	309	332	641	551213	23150	0	574363
Sub Total	**232**	**31**	**241**	**790**	**884**	**1674**	**1115946**	**54110**	**0**	**1170056**
Kalu										
Kebele 034	41	2	43	108	129	237	114175	6675	0	120850
Kebele 032	18	1	19	54	42	96	62600	0	0	62600
Kebele 033	98	20	118	260	300	560	322000	0	0	322000
Sub Total	**157**	**23**	**180**	**422**	**471**	**893**	**498775**	**6675**	**0**	**505450**
Dessie Zuria										
Kebele 09	112	14	126	308	343	651	225190	7160	74800	307150
Sub Total	**112**	**14**	**126**	**308**	**343**	**651**	**225190**	**7160**	**74800**	**307150**
Kombolcha										
Kebele 07	17	2	19	55	59	114	27650	0	0	27650
Kebele 02	18	1	19	62	58		47150	12250		
Kebele 07/02	13	4	17	19	24	43	28250	0	0	28250
Kebele 09/07	20	4	24	76	44	119	79050	0	0	79050
Kebele 11	18	2	20	31	34	65	34120	0	0	34120
Kebele 10	51	10	61	174	192	366	166550	0	0	166550
Sub Total	**137**	**23**	**160**	**417**	**411**	**707**	**382770**	**12250**	**0**	**335620**
Worababu										
Kebele 01	84	12	96	218	259	477	51352	180	16792	68324
Kebele 02	109	27	136	352	350	702	152297	40424	0	192721
Sub Total	**193**	**39**	**232**	**570**	**609**	**1179**	**203649**	**40604**	**16792**	**261045**
Tehuledere										
Kebele 03	31	2	33	87	102	189	7651	10685	0	18336
Kebele 018	69	11	80	278	279	557	81679	20865	0	102544
Kebele 011	237	39	276	675	709	1384	59690	41491	26241	127422
Kebele 010	23	13	36	108	134	242	3893	21949.2	0	25842.2
Kebele 012	190	41	231	543	598	1141	143837	65702	0	209539
Kebele 02	137	17	154	335	471	806	130867	98850	1680	231397
Kebele 013	123	31	154	292	345	637	256547	45598	5800	307945
Kebele 016	26	2	28	77	90	167	59224	0	0	59224
Kebele 015	11	3	14	28	32	60	3096	8544	45968	57608
Kebele 05	96	41	137	325	339	664	77452	14850	58048	150350
Sub Total	**943**	**200**	**1143**	**2748**	**3099**	**5847**	**823936**	**328534.2**	**137737**	**1290207**
Total	**1809**	**343**	**2,130**	**5,391**	**5,968**	**11,238**	**3,322,145**	**449,333.2**	**255,823**	**3,967,901**

Source: Inventory of Losses, 2011

8.2.10.8 Trees, Fruit and Cash Crops

Inventory of trees, fruit trees and cash crop trees found on the ROW of the proposed project was carried out during the course of the field study. Consequently, the total project affected families (households) are 310 and PAPs are 1748. Of the households 260 are male-headed and 50 are female-headed. Besides, 863 PAPs are males and 885 are females. Total loss of trees, fruits and cash crops in the project affected Woredas is presented below.

Table 8- 8: Project Affected Trees within the ROW of the Project Length

No.	Size	Big	Medium	Small	Seedlings	Total	Magnitude of Impact
1	Agam	250	250	0	0	500	Fully
2	Alge	28	118	0	0	146	Fully
3	Arorisa	0	0	2	0	2	Fully
4	Awstrallya	19	15	4	0	38	Fully
5	Beharzaf	74244	122803	179536	57495	434078	Fully
6	Bisana	515	256	2235	0	3006	Fully
7	Dedeho	282	0	250	0	532	Fully
8	Gegetu	250	0	0	0	250	Fully
9	Diredawa	0	18	0	0	18	Fully
10	Farkane	0	1	0	0	1	Fully
11	Flower Tree	5	0	0	0	5	Fully
12	Girar	11503	19779	1981	1070	34333	Fully
13	Gravalia	2120	3853	1729	827	8529	Fully
14	Jakaranda	9	0	35	0	44	Fully
15	Kawete	5	0	0	0	5	Fully
16	Koshim	0	0	43	0	43	Fully
17	Qulqual	101	50	30	0	181	Fully
18	Kitkita	0	20	0	0	20	Fully
19	Kovime	0	1	0	0	1	Fully
20	Kundoberbere	70	25	27	0	122	Fully
21	Kurkura	57	40	41	5	143	Fully
22	Ledo	0	0	1	0	1	Fully
23	Lanquata	1	0	0	0	1	Fully
24	Lusania	24	44	10	0	78	Fully
25	Marvila	15	0	0	0	15	Fully
26	Meleho	3	1	0	0	4	Fully
27	Rusia	3	0	0	0	3	Fully
28	Salgena	20	0	0	0	20	Fully
29	Sekerbemank	0	6	0	0	6	Fully
30	Saspania	530	1216	104	0	1850	Fully
31	Selewa	4	2	0	0	6	Fully
32	Shewshewa	126	4	0	0	130	Fully

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No.	Size	Big	Medium	Small	Seedlings	Total	Magnitude of Impact
33	Shibah	0	1	0	0	1	Fully
34	Shiferaw	17	1	0	0	18	Fully
35	Shola	11	5	0	0	16	Fully
36	Sukay	0	10	0	0	10	Fully
37	Takima	214	431	10	0	655	Fully
38	Tid	1207	291	75	29	1602	Fully
39	Wanza	1638	372	157	24	2191	Fully
40	Welga	8	0	0	0	8	Fully
41	Weyiba	1	0	0	0	1	Fully
42	Weyira	3342	1065	862	10	5279	Fully
43	Zenbaba	0	4	2	0	6	Fully
44	Zigba	10	18	300	0	328	Fully
	Total	**116,632**	**170,700**	**217,434**	**59,460**	**564,226**	

Source: Inventory of Losses, 2011

The summary of project affected trees, fruits and cash crops is shown below.

Table 8- 9: Project Affected Trees, Fruits and Cash Crops

No	Fruits	Big	Medium	Small	Seedling	Total	Magnitude of Impact
1	Abukacdo	54	31	21	6	112	Fully
2	Ananas	9	8	2	0	19	Fully
3	Aplle	5	4	309	60	378	Fully
4	Birtukan	771	353	128	27	1279	Fully
5	Chat	196805	48479	28126	5432	278842	Partial
6	Coffee	7334	2024	321	416	10095	Partial
7	Gesho	449	231	0	0	680	Fully
8	Kashmir	0	1	0	0	1	Fully
9	Komtate	1	2	0	0	3	Fully
10	Lemon	49	20	18	0	87	Fully
11	Mango	304	178	77	11	570	Fully
12	Menderin	6	0	0	0	6	Fully
13	Muz	3115	594	492	38	4239	Fully
14	Papaya	173	47	20	0	240	Fully
15	Shenkora	309935	5233	13398	0	328566	Partial
16	Tringo	27	10	0	0	37	Fully
17	Zeyitun	415	299	67	1003	1784	Fully
18	Woyin	25	0	0	0	25	Fully
	Total	**519,477**	**57,514**	**42,979**	**6993**	**626,963**	

Source: Inventory of Losses, 2011

Photo 8 - 3: Affected dense eucalyptus trees at the start of the project

8.2.10.9 Crossing Footpaths

Demolitions of footpaths which will connect villages to villages; villages to nearby towns; communities to social services (such as school, health post and market) are other identified impacts due to the project railroad line construction. About 12 different footpaths will be affected by the railroad line starting from km 0+00 to km 18+70. The number of crossings to be affected by the project railway line will increase. The degree of importance of these affected footpaths is very great since they will serve both human and cattle. These crossing foot paths would be many, crossing foot paths within the first 18 km of the road are shown in this report to indicate that adiquate considerations should be taken during design and construction stage.

Table 8- 10: Affected Footpaths by the Proposed Railroad Line up to Km 18+700

No	Location	Nature of Impact
1	At Km 0+500	Big footpath and needs attention
2	At Km 1+400	Big footpath and needs attention
3	At Km 1+900	Small footpath
4	At Km 2+300	Small footpath
5	At Km 4+000	Small footpath
6	At Km 5+000	Small footpath
7	At Km 6+000	Big crossing footpath
8	At Km 8+100	Mekoy crossing road
9	At Km 12+100	Small footpath
10	At Km 12+700	Small footpath
11	At Km 15+300	Small footpath
12	At Km 18+700	Small footpath

Source: Socio-Economic Survey, 2011

8.2.10.10 Proposed Railway Station at Kombolcha Town

The area of Kombolcha Old Airport has been chosen to be the Railway Station. In spite of the fact that it has sufficient open area, number of residential houses would be affected as the railway line crosses the area.

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Photo 8 - 4: Railway Station Site at Kombolcha

Photo 8 - 5: Types of affected house due to the selected railway station site, Kombolcha

The proposed railway station at the Kombolcha Air Port will affect some lands allocated for some local and foreign investors.

Photo 8 - 6: Affected land allocated for an Indian Investor

8.2.11 Mitigation Measures for Affected Properties

The existing buildings, structures and other properties within the ROW of the railway line should be identified and take appropriate measures before the commencement of project construction. In line with this the Consultant carried out census and losses of inventory on the affected plots of land, structures and other properties that would be affected by the railway line ROW.

Besides, the Contractors is expected to take all necessary measures required for the protection of all existing buildings, structures or erections and other properties from damage during construction.

Before commencing on any construction works, the Consultant Engineer of the Project will prepare a schedule to clear obstructions such as buildings and other structures assessed found within the zone of influence of the engineering work. The schedule will identify those

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properties which may be at risk from ground movement (settlement or heave), problems arising from blocked drainage or vibration arising from the construction or operation of the railway, based upon the final design and method of construction for the railway works.

The proposed possible mitigation measures for loss of buildings, structures and other properties due to the railway construction are described in Table 8-12 below.

Table 8- 11: Anticipated Impacts on Properties and Mitigation Measures

Anticipated Impacts	Mitigation Measures
Loss of structures	▪ Pay appropriate compensation before the start of the construction works; ▪ Shift the rail centreline to either right or left side if possible to minimize the impact; and ▪ Give special attention for the vulnerable households during resettlement and rehabilitation processes.
Loss of fences	▪ Pay appropriate compensation before the start of the construction works; ▪ Shift the railway centreline to either right or left side if possible to minimize the impact; and ▪ Give special attentions for the vulnerable households during resettlement and rehabilitation processes.
Loss of trees	▪ Pay appropriate compensation before the start of the construction works; ▪ Shift the railway centreline to either right or left side if possible to minimize the impact; and ▪ Give special attention for the vulnerable households during resettlement and rehabilitation processes.
Loss of crop land plots	▪ Pay compensation either in form of land or money for the lost of land and production; ▪ Minimize land areas required for each component during the road construction; ▪ Stockpile top soils from borrow areas, quarry sites, access roads to use during rehabilitation work; and ▪ Rehabilitate all the land after the completion of road construction in such a way that it continues giving the interrupted services by refilling stockpile, loosening the compacted soils, levelling and removing foreign materials, etc.
Acquisition of land for construction compounds, explosives storage, access road, etc,	▪ Pay compensation either in form of land or money for the lost of land and production; ▪ Minimize land areas required for each component during the railway construction; ▪ Stockpile top soils from borrow areas, quarry sites, access roads to use during rehabilitation work; and ▪ Rehabilitate all the land after the completion of railway line construction in such a way that it continues giving the interrupted services by refilling stockpile, loosening the compacted soils, levelling and removing foreign materials, etc,

8.2.11.1 Replacement/Compensation Cost for Affected Properties

8.2.11.1.1 Replacement Cost for Project Affected Residential Houses

The Consultants of this study has collected current construction costs of properties from Woreda Administration Offices to estimate the replacement costs of project affected properties. The following Table 8-13 shows the current market price of houses of various types per meter m^2.

Table 8- 12: Replacement Cost for Affected Structures/ Houses

No.	Type of Infrastructure/House	Estimate Cost in Birr/M^2			
		Dawa Chafa	Were- babo	Kalu	Average
1	Mud and wood Gojo house	216.19	200	500	305.40
2	Mud and wood houses but have grass roof	459.58	250	650	453.19
3	Mud and wood houses but have ceiling	648.58	1000	1860	1169.53
4	Mud and wood houses but have cemented screened floor finished	1354.41	1200	2010	1521.47
5	Mud and wood houses and cement plastered and painted wall, having ceiling	1464.41	1300	2300	1688.14
6	Mud and wood houses but have masonry foundation, cement plastered and painted wall, have ceiling	1524.41	1500	2800	1941.47
7	Mud and wood houses but have masonry foundation, cement plastered and painted wall, have ceiling and cemented floor finish	1604.41	1750	3050	2134.80
8	Mud and wood toilet	342	250	1120	570.67
9	Mud and wood toilet with cemented screened floor finished	491.33	1200	1250	980.44
10	10% HCB and RC and 90% mud and wood have masonry foundation, cement plastered and painted wall, have ceiling and cemented screened floor	1694	2200	3350	2414.67
11	HC and column and beams and have masonry foundation , cement plastered and painted wall, have ceiling and cemented screened floor finished	3128.43	2600	3950	3226.14

Source: Socio-Economic Survey, 2011

For the purpose of computation of costs to replace the affected residential houses, the consultant uses the average cost of the collected current market prices of houses from the Woreda Administrations. To this effect, the estimated replacement cost of the affected residential houses is estimated to be Birr 21,793,977.

Table 8- 13: Replacement Cost of Loss of Residential Houses (In Birr)

Woreda	Location	Grass Roofed Houses			CIS Roofed Houses			Tota Area m^2	Total Replacement Cost
		Area m^2	Cost per m^2	Total	Area m^2	Cost per m^2	Total		
Kemissie/ Dawa Chafa	K. 11, K. 12	1129.56	453	511690.68	1327.22	1169	1551520.18	2456.78	2063210.86
Dessie Zuria	K. 09	78	453	35334	180	1169	210420	258	245754
Kombolcha	K. 10	86	453	38956	1170	1169	1367730	1289	1406688
	K. 04	6	453	2718	2277	1169	2661813	2319	2664531
	K. 09	302	453	136806	1147	1169	1340843	1496	1477649

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Woreda	Location	Grass Roofed Houses			CIS Roofed Houses			Tota Area m²	Total Replacement Cost
		Area m²	Cost per m²	Total	Area m²	Cost per m²	Total		
	K. 07	267	453	120951	2145	1169	2507505	2412	2628456
Warababu	K. 02	336.63	453	152493.39	1489.77	1169	1741541.13	1826.4	1894034.52
Tehuledere/ Hayk	K. 07/02	12	453	5436	518	1169	605542	534	610978
	K. 016	130	453	58890	1269	1169	1483461	1399	1542351
	K. 010	27	453	12231	3228	1169	3773532	3255	3785763
	K. 012	376	453	170328	1107	1169	1294083	1483	1464411
	K. 013	929.6	453	421108.8	780.5	1169	912404.5	1710.1	1333513.3
	K. 05	0	453	0	409.94	1169	479219.86	409.94	479219.86
	K. 016	250	453	113250	72	1169	84168	322	197418
Total	-	**3,929.79**	**453.00**	**1,780,194.87**	**17,120.39**		**20,013,735.91**	**21,179.18**	**21,793,977.54**

Source: Inventory of Losses, 2011

8.2.11.1.2 Project Affected Commercial Houses

Having considered the average of estimate costs that will able to construct better houses, the estimated replacement cost of the affected commercial buildings is estimated to be Birr 1,308,871.

Table 8- 14: Replacement Cost of Loss of Commercial Houses (In Birr)

Woreda	Location	Grass Roofed			CIS Roofed			Total area (m²)	Total Replacement Cost
		Area m²	Cost per m²	Total	Area m²	Cost per m²	Total		
Kemissie									
Private	K. 12	0	453	0	84	1169	98196	84	98196
Tehuledere							0		0
Private	K. 018	12	453	5436	-	-	-	12	5436
Private	K.010	-	-	-	382	1169	446558	382	446558
Private	K. 013	-	-	-	45	1169	52605	45	52605
Private	K. 05	-	-	-	388	1169	453572	388	453572
Public	K. 010	-	-	-	216	1169	252504	216	252504
Total		12	453	5,436	1115	1169	1,303,435	1127	1,308,871

Source: Inventory of Losses, 2011

8.2.11.1.3 Replacement/Compensation Cost for Buildings/Houses of Institutions

Having considered the average of estimate costs that will replace the affected institution buildings; the estimated replacement cost is estimated to be Birr 6,022,942.

Table 8- 15: Replacement Cost of Loss of Institution Houses (In Birr)

Woreda	Location	CIS roofed houses		Replacement Cost
		Area (in m2)	Cost per m²	
Kemissie	Kebele 11	25	3226	80650

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	Kebele 13	777	3226	2506602
Dawa Chafa	Kebele 12	751	3226	2422726
Tehuledere	Kebele 010	12	3226	38712
		43	3226	138718
		50	3226	161300
		84	3226	270984
	Kebele 07/02	125	3226	403250
Total		1867	-	6,022,942

Source: Inventory of Losses, 2011

8.2.11.1.4 Replacement/Compensation Cost for Other Structures

Different structures within the railway ROW will be demolished during the project construction. The estimated replacement cost for these affected structures would be about Birr 302,100.

Table 8- 16: Replacement Cost of Other Structures (In Birr)

Woreda	Structure Type	Size and Unit	Number/ Quantity	Per unit Cost in Birr	Toal Cost
Kemissie	Electric pole	Number	1	200	200
Kemissie	water container house	Number	3	10000	30,000
Werebabu	water container house	Number	2	10000	20,000
Tehuledere	water container house	Number	3	10000	30,000
Kemissie	Hand pump	Number	1	20000	20,000
Kemissie	water pipe	metere	30	lump sum	3,000
Dawa Chafa	water pipe	metere	62	lump sum	6,200
Kemissie	water well	Number	1	lump sum	1,000
Dawa Chafa	Earth canal	metere	817	100	81,700
Dawa Chafa	Grave yard	Number	1	lump sum	20,000
Werebabu	Grave yard	Number	2	lump sum	40,000
Tehuledere	Grave yard	Number	5	lump sum	50,000
Total					302,100

Source: Inventory of Losses, 2011

8.2.11.1.5 Loss of Boundary Fences and Replacement Cost

Cost estimate of types of fences has been collected from the project affected Woredas shown below in Table 8-18.

Table 8- 17: Replacement Cost of Other Structures (In Birr)

No.	Type of Infrastructure/House	Estimate Cost in Birr/M^2		
		Dawa Chafa	Werebabo	Average
1	Chiraro fence	88.2	100	94.1
2	Wood fence	176	150	163.0
3	Barbed wire with wood pole stand	NA	200	200.0
4	Wire fence	602.4	1000	801.2

Source: Socio-Economic Survey, 2011

An inventory of project affected fences has been taken during the course of the field study. The affected fences situated within the proposed railway ROW is about 1,050 metres by 2 metres height as illustrated in the Table 8-19 shown below.

Based on the current construction cost obtained from Woreda Administration Offices, the estimated replacement cost of the affected fences is estimated to be Birr 223,322.

Table 8- 18: Replacement Cost for Affected Fences

No	Fence Type	Cost Birr/ Meter	Kemissie Woreda		Dawa Chafa		Total Cost Estimate
			Meter	Cost Estimate	Meter	Cost Estimate	
1	Wood fence	163	508	82,804	137	69,596	152,400
2	Stone and wood	175	200	35,000	-		35,000
3	Barbed wire	200	150	30,000	-		30,000
4	Kulkual	94	-		63	5,922	5,922
	Total	**632**	**850**	**147,804**	**200**	**75,518**	**223,322**

Source: Inventory of Losses, 2011

8.2.11.1.6 Impact on Farmland and Replacement Cost

According to the socioeconomic survey of this project, the average landholding size of household in the project affected Woredas ranges from 0.4 to 0.85 ha of land. As the Table 8-22 shown below a household would lose up to 0.28ha or 2859 m^2 of landholding size due to the proposed railway ROW. This is a great impact so that it needs to give more attentions during the determination of compensation for the replacement value.

Table 8- 19: Identified Affected Farmland and PAPs within the Project ROW Length

No.	Woredas	Afected Cropland (m^2)			Total	Households	PAPs
		Rain fed	Irrigation	Grazing			
1	Kemissie	71879	0	26494	98373	48	287
2	Dawa Chafa	1115946	54110	0	1170056	241	1674
3	Kalu	498775	6675	0	505450	180	893
4	Dessie Zuria	225190	7160	74800	307150	126	651
5	Kombolcha	382770	12250	0	335620	160	707
6	Worababu	203649	40604	16792	261045	232	1179
7	Tehuledere	823936	328534.2	137737	1290207	1143	5847
Total	M^2	3322145	449333.2	255823	3967901	2130	11238
	Ha.	332.2	44.9	25.6	396.8	-	-

Source: Inventory of Losses, 2011

According to the inventory of losses, the affected land would be about 396.8 ha of which 332.2 ha is rain fed and 44.9 ha is irrigation. The Project affected families (households) and project affected persons (PAPs) would be 2130 and 11238, respectively. In computing cost estimation for project affected farmlands, the following elements have been taken in to considerations.

- Major crops grown in the project area;
- Current market price of the major crops per quintal and their aggregate average price per quintal;

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- Frequency of production the farmland could provide - rain fed farm once per year while irrigable plot twice or more annually;
- Average five consecutive years production of major crops; and
- Ten years compensation factor (according to the Proclamation on Expropriation of Landholdings for Public Purposes and Payment of Compensation (Proclamation no. 455/2005) for permanent impact.

For the purpose of land loss compensation grazing land has been considered as rain fed cropland; and the estimated loss of cropland would reach 357.8 ha.

The major crops grown in the project area, productivity and their current market price per quintal[6] has been collected from project affected Woredas and described in the Table 8-21 below.

Table 8- 20: Major Crops, Productivity/Yield and Current Price per Quintal

No.	Major Crops	Yields per hectare				Average market Price per Qtl in Birr
		Kalu	Kombolcha	Tehuledre	Werebabu	
1	Sorghum	34	17	18	12	550
2	Teff	16	12	15	8	880
3	Maize	50	20	23	18	450
4	Barley	34	17	18	12	475
5	Wheat	22	21	20	-	600

Source: Socio-Economic Survey, 2011

The cost estimate of the rain fed cropland has been computed based on the current market price of five commonly grown crops and multiplied by the compensation factor, which is derived from Proclamation on Expropriation of Landholdings for Public Purposes and Payment of Compensation (Proclamation no. 455/2005). The average crop production yields per ha is assumed to be 24.4 quintal and the current market price per quintal in Birr will be 590. Accordingly the estimated compensation cost for the affected cropland (357.8 ha) is about Birr 51,508,427 (see Table 8-22 for the detail).

Table 8- 21: Compensation Cost for Affected Rain Fed farmland

No.	Woredas	Cropland (ha)	Crop production per year (qt/ha)	Total production (qt)	Av. current market price per qt. (Birr)	Total Market price (Birr)	Comp. Factor	Estimated Comp. cost (Birr)
1	Kemissie	9.8	24.4	240.0	590	141,617.8	10	1,416,177.71
2	Dawa Chafa	111.6	24.4	2722.9	590	1,606,515.9	10	16,065,158.62
3	Kalu	49.9	24.4	1217.0	590	718,036.5	10	7,180,364.90
4	Dessie Zuria	30.0	24.4	732.0	590	431,865.6	10	4,318,656.04
5	Kombolcha	38.3	24.4	934.0	590	551,035.7	10	5,510,356.92
6	Worababu	22.0	24.4	537.9	590	317,346.9	10	3,173,468.64
7	Tehuledere	96.2	24.4	2346.5	590	1,384,424.5	10	13,844,244.51

[6] See Annex 8 for the detail information.

No.	Woredas	Cropland (ha)	Crop production per year (qt/ha)	Total production (qt)	Av. current market price per qt. (Birr)	Total Market price (Birr)	Comp. Factor	Estimated Comp. cost (Birr)
	Ha.	357.8		8,730.24				51,508,427.33

Source: Socio-Economic Survey, 2011

8.2.11.1.7 Affected Irrigation Land and Compensation Payment

Some farmlands in the project affected area are suitable for irrigation farms and the local people could collect cash crops at most three times a year. The irrigable farmland that would be affected by the projection would be 44.9 ha. The types of vegetables grown on these farmlands are many of which are potato, carrot and onion.

Table 8- 22: Major Crops, Productivity/Yield and Current Price per Quintal

No.	Major Vegetables	One Term Yield per hectare in quintal	Yield per hectare per year (3 terms)	Current price per quintal in Birr	Current price per quintal in Birr/year	Average price per quintal per year in Birr
1	Potato	225	675	500	337,500	252,500
2	Carrot	200	600	300	180,000	
3	Onion	80	240	1000	240,000	

Source: Socio-economic survey, 2011

Commonly known types of vegetables are considered to estimate the compensation payment. The average crop production yield per ha per year in three yield term is assumed to be 505 quintal and the average current market price for the year per quintal in Birr will be 252,500. Having taken all valid assumptions in the computing of cost estimation, the estimated compensation cost for affected irrigation land is about Birr 113,456,633 (see Table 8- 24 for the detail).

Table 8- 23: Compensation Cost for Affected Irrigation Farmland

No.	Woreda	Cropland (ha)	Total market price for the production per ha in Birr	Total Market price per year (Birr)	Comp. factor	Estimated compensation cost (Birr)
1	Kemissie					
2	Dawa Chafa	5.4	252,500	1,366,278	10	13,662,775
3	Kalu	0.7	252,500	168,544	10	1,685,438
4	Dessie Zuria	0.7	252,500	180,790	10	1,807,900
5	Kombolcha	1.2	252,500	309,313	10	3,093,125
6	Worababu	4.1	252,500	1,025,251	10	10,252,510
7	Tehuledere	32.9	252,500	8,295,489	10	82,954,886
Total	Ha.	44.9				113,456,633

Source: Socio-economic survey, 2011

8.2.11.1.8 Summary of Compensation Cost for Affected Land

The total compensation cost for project affected land is estimated to be Birr 164,965,060. As Table 8-25 below illustrates the most affected areas are Dawa Chafa and Tehuledere, respectively.

Table 8- 24: Compensation Cost for Affected Farmland (Rain Fed + Irrigable Farmland)

No.	Woredas	Rain fed Cropland (ha)	Irrigation land (ha)	Total Farmland (ha)	Comp. for Rain fed Cropland (Birr)	Comp. for Irrigation Land (Birr)	Total comp. Cost for Farmland (Birr)
1	Kemissie	9.8		9.8	1,416,178		1,416,178
2	Dawa Chafa	111.6	5.411	117.0	16,065,159	13,662,775	29,727,934
3	Kalu	49.9	0.6675	50.5	7,180,365	1,685,438	8,865,802
4	Dessie Zuria	30.0	0.716	30.7	4,318,656	1,807,900	6,126,556
5	Kombolcha	38.3	1.225	39.5	5,510,357	3,093,125	8,603,482
6	Worababu	22.0	4.0604	26.1	3,173,469	10,252,510	13,425,979
7	Tehuledere	96.2	32.85342	129.0	13,844,245	82,954,886	96,799,130
	Total	**357.8**	**44.9**	**402.7**	**51,508,427**	**113,456,633**	**164,965,060**

Source: Socio-economic survey, 2011

8.2.11.1.9 Impact on Trees, Fruits and Cash Crops and Compensation Cost

The project affected Woreda Administration Offices have been requested to give information about the current market price of trees, fruits and cash crops in their areas so as to use for valuation of losses. Of the project affected Woredas, only Werebabo and Dawa Chafa Woreda Administrations made response. The rate of cost for project affected trees, fruits and cash crops as reported by these Woredas is presented in the Table 8-26 below. Accordingly the valuation of trees, fruits and cash crops that would be affected due to the railway ROW has been carried out using the given cost rate to estimate the compensation cost.

This cost rate will be revised and accordingly the compensation cost estimate for trees, fruits and cash crops will be also revised with taking into consideration the current market cost rates for the same types of properties that would be provided by other project affected Woredas.

Table 8- 25: Unit Price Rate for Compensation of Affected Trees, Fruits and Cash Crops

No.	Descriptions	Unit Price Per Tree In Birr			
		Seedlings Size	Small Size	Medium Size	Big Size
	Types of Trees				
1	Eucalyptus	5	200	300	400
2	Wanza	5	200	300	400
3	Bisana	20	150	200	250
4	Aroresa	20	250	300	450
5	Tsid	15	250	350	500
6	Fala	5	75	100	150
7	Kurkura	10	150	200	300
8	Shewshewa	5	100	150	200

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No.	Descriptions	Unit Price Per Tree In Birr			
		Seedlings Size	Small Size	Medium Size	Big Size
9	Kundoberebere	25	250	275	350
10	Gravaliya	15	200	250	300
11	Aulaga	10	125	175	250
12	Woyiba	25	300	450	500
13	Jatrofa	25	250	300	400
14	Sasbanya	10	150	220	300
15	Woyira	20	250	300	450
16	Shembeko	3	15	20	30
17	Shiferaw	5	75	120	150
18	Fortukoma	3	180	250	300
	Types of Fruits and Cash Crops				
1	Abukado	50	420	637	850
2	Papaya	40	90	118	288
3	Mango	30	519	773	938
4	Brtukan	40	578	806	1058
5	Banana / Muz	30	212	275	345
6	Zeyitun	20	318	473	580
7	Timgo	20	183	234	385
8	Lemon	15	150	181	254
9	Coffee	20	70	90	120
10	Chat	30	60	78	90

Source: Socio-economic survey, 2011

The total compensation cost for the loss of trees, fruits and cash crops will be Birr 380,616,850. The detail is presented below in Table 8-27 and Table 8-28. Compensation factor does not considered for the compensation of project affected trees, while for fruit and cash crpos the compensation factor is considered to be 10 years.

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Table 8- 26: Estimate Compensation of Affected Trees

Size	Big	unit cost	Total	Medium	unit cost	Total	Small	unit cost	Total	Seedlings	unit cost	Total	Total Trees	Total Cost
Otage	28	300	8400	118	200	23600	0	150	0	0	10	0	146	32000
Arorisa	0	40	0	0	300	0	2	250	500	0	20	0	2	500
Awstraliya	19	300	5700	15	200	3000	4	150	600	0	20	0	38	9300
Beharzaf	74244	400	29697600	122803	300	36840900	179536	30	5386080	57495	10	574950	252038	72499530
Bisana	515	250	128750	256	200	51200	2235	150	335250	0	20	0	3008	515200
Dedeho	282	300	84600	0	200	0	250	150	37500	0	10	0	532	122100
Diredawa	0	300	0	18	200	3600	0	150	0	0	10	0	18	3600
Flower Tree	5	300	1500	0	200	0	0	150	0	0	10	0	5	1500
Girar	11503	300	3450900	19779	200	3955800	1981	150	297150	1070	10	10700	34333	7714550
Gravalia	2120	300	636000	3853	250	963250	1729	200	345800	827	15	12405	8529	1957455
Jakaranda	9	300	2700	0	200	0	35	50	1750	0	10	0	44	4450
Kawete	5	300	1500	0	200	0	0	50	0	0	10	0	5	1500
Koshim	0	300	0	0	200	0	43	50	2150	0	10	0	43	2150
Kundoberbere	70	350	24500	25	275	6875	27	250	6750	0	25	0	122	38125
Kurkura	57	300	17100	40	200	8000	41	150	6150	5	10	50	143	31300
Ledo	0	300	0	0	200	0	1	150	150	0	10	0	1	150
Lusania	24	300	7200	44	200	8800	10	150	1500	0	10	0	78	17500
Meleibo	3	300	900	1	200	200	0	150	0	0	10	0	4	1100
Rusia	3	200	600	0	50	0	0	30	0	0	10	0	3	600
Salgena	20	200	4000	0	50	0	0	30	0	0	10	0	20	4000
Saspania	530	200	106000	1216	50	60800	104	30	3120	0	10	0	1850	169920
Selewa	4	200	800	2	50	100	0	30	0	0	10	0	6	900
Shewshewa	126	300	37800	4	200	800	0	50	0	0	10	0	130	38600
Shibah	0	150	0	1	120	120	0	75	0	0	5	0	1	120
Shiferaw	17	150	2550	1	120	120	0	75	0	0	5	0	18	2670
Shola	11	400	4400	5	300	1500	0	200	0	0	5	0	16	5900

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Size	Big	unit cost	Total	Medium	unit cost	Total	Small	unit cost	Total	Seedlings	unit cost	Total	Total Trees	Total Cost
Sukay	0	250	0	10	175	1750	0	125	0	0	5	0	10	1750
Takima	214	200	42800	431	175	75425	10	100	1000	0	5	0	655	119225
Tid	1207	500	603500	291	350	101850	75	250	18750	29	15	435	1602	724535
Wanza	1638	400	655200	372	300	111600	157	200	31400	24	5	120	2191	798320
Welaga	8	250	2000	0	175	0	0	125	0	0	10	0	8	2000
Weyiba	1	300	300	0	200	0	0	50	0	0	10	0	1	300
Weyira	3342	450	1503900	1085	350	372750	862	250	215500	10	20	200	5279	2092350
Zigba	10	450	4500	18	350	6300	300	250	75000	0	20	0	328	85800
Total	**96,015**		**37,035,700**	**150,368**		**42,598,340**	**187,402**		**6,766,100**	**59,460**		**598,860**	**311,205**	**86,999,000**

Source: Socio-economic survey, 2011

The compensation for fruits and cash crops is estimated to be Birr 293,617,850. The detail is presented Table 8-28 below.

Table 8- 27: Unit Price for Compensation of Affected Fruits and Cash Crops

No.	Fruits	Big	Unit Cost	Total	Medium	Unit Cost	Total	Small	Unit Cost	Total	Seedling	Unit Cost	Total	Total	Total Cost	Comp. Factor	Total Compensation Cost
1	Abukadio	54	850	45900	31	637	19747	21	420	8820	6	50	300	112	74,767	10	747670
2	Ananas	9	385	3465	8	234	1872	2	183	366	0	20	0	19	5,703	10	57030
3	Aple	5	1058	5290	4	806	3224	309		0	60		0	378	8,514	10	85140
	Berebere	230	40	9200	0	30	0	0	20	0	0	10	0	230	9,200	10	92000
4	Birtukan	771	1058	815718	353	806	284518	128	578	73984	27	40	1080	1279	1,175,300	10	11753000
5	Chat	196805	90	17712450	48479	78	3781362	28126	60	1687560	5432	30	162960	278842	23,344,332	10	233,443,320
6	Coffee	7934	120	880080	2024	90	182160	321	70	22470	416	20	8320	10095	1,093,050	10	10,930,300
7	Gesho	449	35	15715	231	25	5775	0	15	0	0	5	0	680	21,490	10	214900

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No.	Fruits	Big	Unit Cost	Total	Medium	Unit Cost	Total	Small	Unit Cost	Total	Seedling	Unit Cost	Total	Total	Total Cost	Comp. Factor	Total Compensation Cost
8	Kashmir	0	385	0	1	234	234	0	183	0	0		0	1	234	10	2340
9	Komtate	1	385	385	2	234	468	0	183	0	0		0	3	853	10	8530
10	Lemon	49	254	12446	20	183	3620	18	150	2700	0	15	0	87	18,766	10	187660
11	Mango	304	938	285152	178	773	137594	77	519	39963	11	30	330	570	463,039	10	4630390
12	Mandarin	6	385	2310	0	234	0	0	183	0	0	20	0	6	2,310	10	23100
13	Mut	3115	345	1074675	594	275	163350	492	212	104304	38	20	760	4239	1,343,089	10	13430890
14	Papaya	173	288	49824	47	118	5546	20	90	1800	0	40	0	240	57,170	10	571700
15	Shenkora	309935	4	1239740	5233	3	15699	13398	2	26796	0	1	0	328566	1,282,235	10	12,822,350
16	Tiqil Gomen	120	20	2400	900	15	13500	0	10	0	0	5	0	1020	15,900	10	159000
17	Tringo	27	385	10395	10	234	2340	0	183	0	0	20	0	37	12,735	10	127350
18	Zeyitun	415	580	240700	299	473	141427	67	318	21306	1003	20	20060	1784	423,493	10	4234930
19	Woyin	25	385	9625	0	234	0	0	188	0	0	20	0	25	9,625	10	96250
	Total	519827		22415470	58414		4762436	42979		1990069	6993		193810	628213	29,361,785		293,617,850

Source: Socio-economic survey, 2011

8.2.11.1.10 Summary of Project Affected Properties and Cost of Compensation

The loss of properties within the railway ROW and the required for replacement or compensation cost is about Birr 265,710,533. The type of properties loss and their size is presented in brief in Table 8-29 below.

Table 8- 28: Affected Properties and Cost of Compensation

No.	Loss of Properties	Households	PAPs	Unit	Quantity	Replacement/ Compensation Cost
1	Residential houses	412	2255	M^2	21,179.20	21,793,977
2	Commercial houses	14	169	M^2	1,127	1,308,871
3	Institution houses	-	-	M^2	1,867	6,022,942
4	Other Structure	Community		Various Types		302,100
5	Fences	12	-	Meter	1050	223,322
6	Cropland	2130	11,238	ha	332.2	
				Qtl	8,730	51,508,427
7	Irrigation land			ha	44.9	
				Qtl	2,070	113,456,633
8	Trees	352	2150	No.	564,226	86,999,000
9	Fruits and Cash Crops			No.	626,963	293,617,850
	Total	-	-	-	-	**575,233,122**

Source: Socio-economic survey, 2011

8.3 Land Requirement for the Project Construction

Right of way width for the project railway route, detours or access roads for the project construction within the project area would result in loss of grazing land, crop land and bush land of the communities. Moreover, land acquisition for camp site, crasher plant, quarry sites and borrow areas would cause same problems.

The estimated land requirement for the right of way of the project will be about 528.5 ha considering the ROW width is 50 meter. The project land acquisition will be addressed in detail in the Project Land Acquisition Report separately in detail.

8.4 The Need for Resettlement Action Plan Preparation

According to ERA Resettlement / Rehabilitation Policy Frame Work (Feb. 2002) when the SIA findings reveal that more than 200 persons will be affected by the proposed railway project construction, a detailed resettlement action plan (RAP) will be prepared after appraisal and after detailed design of the railway project.

The proposed railway section line passes through 8 Woredas; Kemissie and Dawa Chefa of Oromia Zone; and Kalu, Kombolcha, Dessie Zuria, Hayk, Tehuledere and Werebabu of South Wollo Zone. It is identified that more than 2373 households would be affected by the project construction. Therefore, the possible dislocated persons as the result of this project construction will require undertaking Resettlement Action Plan (RAP).

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9. SOCIO-ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM

9.1 Socio-Environmental Management Plan

9.1.1 General

Socio-Environmental Management Plan (SEMP) is concerned with implementation of the measures necessary to minimize or offset adverse social and economic impacts and to enhance the beneficial impacts. Unless the mitigation and benefit enhancement measures identified in the SEIA are fully implemented, the prime function of SEIA, which is the safeguarding of the overall socio-environment and economic conditions of the project influence area, would not be achieved.

The objective of this SEMP is, therefore, to provide agreed precautionary measures for the Construction Contractor and Operational Manager to undertake the site works. The implementation of the SEMP provides assurance to the community and regulatory authorities, including the project influenced Woreda administrations and town municipalities that the works will be undertaken in a suitable condition manner.

Hence, in order to maintain the social and environmental situations effectively and efficiently, socio-environmental management must be fully integrated with the overall project management effort at all levels, which itself should be aimed at providing a high level of quality control, leading to a project which is properly designed, constructed and functions efficiently throughout its life.

Both the project management and socio-environmental management responsibilities are normally shared among several government and non-government organisations, each with specific executive responsibilities for particular aspects, which are exercised during the various stages of project preparation, implementation and subsequent operation and maintenance. In the following section and in Table 9 -1 the major socio-environmental management activities and responsible bodies for the execution of these activities are described.

9.1.2 Detailed Designing Phase

During the detailed design phase, the design consultant should incorporate all the recommended socio-economic and environmental mitigation and enhancement measures which are recommended by the SEIA study to be included into the design, and bidding document for the prevention of adverse socio-environmental effects.

9.1.3 Pre-Construction Phase

Prior to contractor mobilisation and the commencement of construction, the socio-environmental management should focus on:

- Ensuring that all the government requirements and procedures relating to SEIA are complied with;

- Ensuring that the tender and construction contract documents contain appropriate clauses to allow control of impacts arising from construction activities; and
- Ensuring the proper implementation of land and property acquisition procedures including the payment of compensation.

9.1.4 Construction Phase

Most of the project socio-environmental management activities will be carried out during the construction phase, since it is at this time that most impacts can be expected to occur. The construction contractor will be fully responsible for implementing all the socio-environment mitigation measures included in the SEIA report, design and technical specifications. On the other hand, construction supervisor will monitor impacts and the proper implementation of mitigation measures at the right time. The supervision team shall be fully responsible for ensuring that all the works will be carried out as per specifications that the socio-environment and cultural impacts will be taken into consideration, and that good workmanship will be followed. The team will also be empowered to deal with infringements at the time and on the spot.

In order to discharge the responsibility of overseeing the SEMP, the team of construction supervision consultant should contain sociologist and environmentalist. They will have executive responsibility for ensuring that all site socio-environmental management and monitoring aspects are dealt, promptly and properly. They will be responsible for establishing procedures and mechanisms for effective socio-environmental management and monitoring and will ensure that these are fully incorporated and integrated with the overall construction supervision and monitoring framework. This aspect will cover all 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.

The sociologist and environmentalist should also be responsible for reviewing and commenting on social and environment aspects of work plans prepared by the Construction Contractor during the mobilization period, as well as in developing site socio-environmental management procedures etc, in collaboration with the RE and other team members. They will also provide advice and assistance to the supervising Engineers and the RE, as and when required, on all aspects of social and environmental management.

The socio-economic and environment supervisors of the construction supervision consultant team should submit the socio-economic and environmental performance progress reports to the Environmental Management and Safety Branch within ERC, RE and to other relevant organizations as it deems.

Moreover, HIV/AIDS prevention, awareness creation, counselling, monitoring and evaluation activities should be subcontracted for NGOs, which were involved and experienced in such activities.

9.1.5 Commissioning Phase

During the commissioning phase, the Construction Contractor should clean up the project environment. All the salvages and waste materials from the construction process should be cleaned, demolished or dumped in appropriate and authorized places. Quarry sites, borrow areas, detour and access roads should be rehabilitated and replanted. Temporary camp

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sites should be removed and the compacted materials should be removed and reinstated so that the land continues giving services which were discontinued due to the project construction. The social and environment supervisors of the supervising consultant should follow up the proper implementation of these activities and check that the work as built meets all significant requiring conditions before the project is officially accepted. The client should hold some amount of payment tagged to clean up until the construction supervision consultant assures that the work has been done properly.

9.1.6 Post-Construction Phase

Continued enjoyment of the benefits arise from implementation of the railway project will only be achieved if effective routine and periodic maintenance of the railway line and drainage system is carried out in a timely manner. Moreover, safety measures should take place regularly as there could be a risk factor and potential source of accidents for local communities and train users for the reasons that the increased capacity and speed will generate higher passenger and freight traffic. Socio-environmental management and monitoring in this respect will be among the responsibility of the Operations Department of ERC, with implementation being carried out either by the department itself or by hired contractors. The Environmental Management and Safety Branch within ERC will take an overall advisory role during this phase.

9.1.7 Socio-Environmental Management Activities and Responsibilities

Table 9 -1 summarises the socio-environmental management measures to be taken with regard to the control of the potential impacts which might occur during the pre-construction, construction and operational phases of the railway project. It also indicates who will be responsible for taking the necessary management actions.

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Table 9- 1: Major Socio-Environmental Management Activities and Responsibilities

Project Phase	Socio-Environmental Issues	Social/Economic impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
Design Detail Phase	Inclusion of social clauses in the contract document	• If socio-environmental clauses are not being included in the contract document proper attentions would not be given for social problems.	• Ensure that detail design incorporate features to minimize adverse social and economic impacts; • Ensure that construction contract document contains appropriate clauses to allow control of socio-environmental impacts arise from the project activities.	Team leader of the final detailed design Consultant	Ethiopian Railway Corporation (ERC)	Part of the design consultancy cost
Detail Design Phase	SEIA guidelines and policies	• Considering of SEIA guidelines and relevant policies during the project detail design phase will help to minimize adverse impacts.	• Ensuring that government & funding agency requirements relating to SEIA are considered.	Team leader of the design Consultant	ERC	Part of the design consultancy cost
Detail Design Phase	Consideration of SEIA recommendation in the design	• Decreases anticipated project adverse impacts.	• Design team thoroughly understand the recommendations made in the SEIA report and incorporate necessary improvements in the final design and tender document.	Team leader of the final detailed design consultant	ERC	Part of the design consultancy cost
Detail Design Phase		• Forest & Vegetation clearance	• Defined access road is used during design and study • Limit vehicle movement only on paved access roads,	• Design consultant	ERC	Part of the design cost
Detail Design Phase		• Land acquisition & • Right -Of -Way clearance	• Include the environmental and social issues in the design and environmental clauses into the construction contract document	• Design consultant; ERC	ERC	Part of the design & RAP preparation cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estim
				Executing Body	Supervising Body	
Before Commencement	Displacement and loss of properties	• Loss of land for the project construction; • Loss of properties or assets include: residential and commercial houses; trees, fences; and other structures	• Compensation payment before the start of the construction works; • Give special attentions for the vulnerable households during resettlement and rehabilitation processes. • Minimize land take by locating camp sites, quarry areas, borrow sites, etc., in none productive areas	ERC through resettlement and compensation committees	Finance division of ERC	Compensation cost Birr 575,233,122; rehabilitation will be presented in the RAP
		• Loss of crops, trees, fruit and Loss of land due to immigrants in to the area • Disruption of other social service infrastructures	• Compensation to the affected group should be effected according to regional as well as federal rules and regulations(reference is made to conditions of proclamations No 455/2000, & 456/2000) • Resettlement of displaced people and relocation of properties and utilities should be completed well in advance of commencing the construction • Resettlement plan should be prepared in consultation and with full participation of the affected group. • Immigrants' land requirement should be administered by the local authorities	• A committee composing of • ERC ROW Agent, • Local administration • Affected group (PAPs) • Utility owners • Agriculture bureau • NGOs in the area • Community representatives	Finance division of ERC	Including in the estimated Compensation and Rehabilitation cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
Before Commencement	Public awareness	• Public doubts regarding land acquisition issue and property loss	• Informs the community about the project objectives, project related impacts and associated planned remedial measures • Compensation and resettlement programs will be arranged and settled prior to commencing construction activity	• Compensation committee composing of; • ERC, Local administration, the affected group, Community representatives and NGOs in the area	ERC; Sociologist of the supervision team	Daily allowances for compensation committee as included under RAP report.
Construction Phase	Loss of properties	• Stimulation of new construction in the ROW to obtain fraudulent compensation.	• Prohibit new and additional construction within the ROW agreed up on as of the date considered to be final (cut of date) by the registration for RAP	• Local administration	Sociologist of the supervision team	Normal administrative cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estim
				Executing Body	Supervising Body	
	Physical environment problem	• Land slide and slop instability problem may encounter at mountain sides, deep cut trenches and ditches for culverts, bridges construction and at material production sites. • Change in landscape • Degraded land & erosion hazards	• Plant trees and grass cover at graded and steep slops. • Rehabilitate excavated ground up on completion of works • Surplus excavated top soil shall be stored and used to rehabilitate degraded grounds • Provide adequate drain pipes to avoid excessive concentrated flow • Place drain outlets to avoid cascade effect. • Line runoff receiving surfaces or ditches with stone ripraps or concrete • Avoid Slide susceptible sites for use as construction material extraction area. • Re- habilitate and re- plant disfigured and excavated land for quarry and borrow pit. • The existing overburden/fill material is to be removed. • The rock face is to be benched in order to provide a key for the replacement of fill material. • A rock blanket 0.50 meters is to be placed on the natural rock (benched) to provide free draining of ground water under the road • A Geo-textile is to be placed on the rock drainage blanket and the necessary fill material and road Construction placed on top of the geo-textile.	• Construction contractor • Supervising consultant • Bureau of agriculture and rural development • Bureau of land administration and environmental protection.	Environmentali st of the supervision team	2,500,000 grassing of side slops Other slope protection measures will be estimated and included in the BOQ by the engineering design.

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
Construction Phase	Physical environment problem	• Soil contamination	• Timely cart away surplus spoil soil. • Maintain leaking equipment and vehicle parts, Avoid fuel & oil spillages while refilling, collect and properly treat used oil and • Exercise proper waste management and disposal practices at camps, garages and at work places.	• Contractor	Environmental ist of the supervision team	Part of the project construction and supervision cost :
Construction Phase	Environment al issue	• Accidental forest fire	• Accidental oil spills and refueling will be avoided as far as possible. In case it happens immediate remedial measures should be taken (clean ups of the spilled fuel will be Arrange awareness creation program for machine operators and site supervisors on work discipline to be followed while working in the densely forested and wildlife sites, so as to take care of the natural forests, not to damage or fell trees beyond what is essentially required f • The rules and regulations set for the core and buffer zones of the Awash National Park management will be strictly observed, and workers are instructed and supervised to act as per the required discipline.		Environmental ist of the supervision team	Part of the project construction and supervision cost :

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estim
				Executing Body	Supervising Body	
Construction Phase	Environmental issue	• water quality deterioration due to contaminants,	• To minimize Siltation and Sediment deposit in rivers and streams traversed by the rail line , at wetlands/marshlands along river banks and at quarry sites; • Program excavation activities at river crossing areas during dry period. • Re-vegetate erodible soil surfaces as soon as possible • Protect sensitive surfaces with mulch or fabrics, Stone ripraps, gabions etc. • Divert run off water flow through steep slope and erosion prone areas.	Contractor Respective Water bureau	Environmental ist of the supervision team	Part of the project construction and supervision cost ; and compensation cost
Construction Phase	Environmental issue	• Wetlands/marshlands degradation during works, • decrease in recharge rate, • contamination by oil and chemical products	To minimize wetland/ marshland contamination and pollution effects; • Maintenance of vehicle to minimize oil spills and prohibit open field waste disposal. • Minimize disturbance by the construction works in compliance with works contracts/ specifications • Provide adequate flow dispersal structure (culverts, etc.) to maintain the natural flow direction and to avoid flow concentration to specific locations, and maintain normal recharge of the wetland areas.	Contractor/ supervising consultant ERC	Environmental ist of the supervision team	Part of the project construction and supervision cost ; and compensation cost
	Environmental issue	Soil erosion and soil contamination	• Maintain storm drains and ditches regularly • Grass cover slops and graded grounds, and protect livestock grazing at railway shoulders and embankments	Regional rural roads authority ERC delegated offices	Environmental ist of the supervision team	Part of the project construction and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
Construction Phase		• Increase in Price of consumable items • Employment opportunity • Increase in household income	• Arrange and ensure supply of basic consumable items by encouraging entrepreneurs in the area. • Periodically avail basic items to workers at camps against payment of fair prices. • Local work force will be encouraged to benefit from the employment opportunities during construction. • Encourage workers to use locally available products to assist local economy.	• Local administration • Contractor • ERA	Sociologist ist of the supervision team	Part of the project construction and supervision cost
Construction Phase	Environmental Issue	Water sources and wetland/marshland ecosystem preservation	• Waste management practices should improve, road side littering especially in towns and villages should be regulated	Municipalities ERA	Environmental ist of the supervision team	Part of the project construction and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
Construction Phase	Environmental Issue	Flora and fauna degradation	• Prohibit illegal hunting by enforcing rules and regulations. • Prohibit and regulate illegal timber cutting and charcoal trade in the area. • Supervise closely the protection and conservation of forest areas and wild life habitats. • Minimize forest fire risks by creating awareness among the road users and the surrounding community. • Post warning signals at critical location • Prohibit illegal hunting by enforcing rules and regulations. • Prohibit and regulate illegal timber cutting and charcoal trade in the area. • Supervise closely the protection and conservation of forest areas and wild life habitats. • Minimize forest fire risks by creating awareness among the road users and the surrounding community. • Post warning signals at critical location	○ Woreda environment office ○ Local administrative organs, ○ farmers' cooperatives ○ Agricultural bureau ○ Forestry & wildlife desks ○ Woreda environment office ○ Local administrative organs, ○ farmers' cooperatives ○ Agricultural bureau ○ Forestry & wildlife desks	RE/ Environmental ist of the supervision team	Part of the project construction and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
Construction Phase		• Tree cutting, Vegetation removal, Poaching by construction workers • Accidental forest fire	• Minimize ROW width in the plantation tree covered areas and woodlands • No detour or access road will be opened in those forested areas, half width construction methods will be used in such forest areas • No material sites, camps & workshops will be located in the relatively dense vegetation covered land. • Consider possible design options to avoid and/or minimize damage to the patches of forest resources that encounter. • Limit vegetation removal to only areas required to the effective land required for project works. • Route selection for access to material sites, and detour road route should try to avoid dense vegetation covered areas • Prohibit project workers from encroachment and poaching forest and wildlife areas. • Neither fire setting, nor disposal of lit matches and/or unlit used cigarette will be done in the forests. Avoid smoking as far as possible while working in the park area. • Prohibit forest fire setting and supervise fire risks by construction crew to minimize vegetation and wildlife damage and kills. • Re-vegetation of uncovered and graded grounds, excavated and abandoned quarry sites as soon as site work ends • Planting at least 15-seedlings for every tree cut as a replacement to damaged forest resource.done	• Contractor • Supervisor consultant • ERC • Woreda Environmental Protection, land administration & use Core process.	RE/ Environmental ist of the supervision team	000,000 birr for tree planting as replacement

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estim
				Executing Body	Supervising Body	
Construction phase	Social management	The influx of construction workers and job seekers will cause adverse social impacts. The reasons are: • The incoming people will tend to ignore the local cultural or societal rules and engage in negative behaviour such as risky sexual and other destructive behaviours; • They will share local social services which is not adequate for all people; • They may lead to increase theft and other criminal acts in the area; and • They will tend to undertake squatter business which will be causes to establish unplanned settlements.	• Recruit workforce from the local community as much as possible with giving equal or more chance for women; • Inform local businesses about the possible influx of construction workers & plan for extra demands. • Ensure that employment procedures/policy is being made consulting with local stakeholders, especially Woreda & Kebele Administrations; • Have clear rules and regulations for access to the construction site that will control loitering; • Consult with local police services to establish standard operating procedures for the control and removal of loiterers at the construction site; • Construction workers should be given awareness or orientations on sensitive issues such as the need to respect local culture, work discipline, etc., and • Ensure that local officials give attentions to control unplanned growth of small squatters or settlements along the railway line section	Construction Contractor; Committee Compensation and Resettlement Committees	RE/ Sociologist of the supervision team	Part of the project construction and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
		• water source shortage, • Water supply service interruption	• The rail way project may interfere with water supply systems in urban areas like Kombolcha. In such cases, either the design has to consider avoiding the alignment or the water line has to be relocated. Arrangements have to be made for the relocation and compensation. Relocation has to be made prior to mobilizing the construction work or alternative supply line is provided until relocation is done, not to interrupt the water supply service • Competition over water use due to influx of workers in the area, and due to the construction activity should be regulated by giving priorities to the resident community; the contractor will arrange water supply point that doesn't interfere with that of the local community.	Contractor Respective Water bureau	• RE/ Sociologist of the supervision team	Part of the project construction and supervision cost; and compensation cost
Construction phase	Disruption of social relations/ mutual dealings or connections of people	Project Construction will cause: • Severance problem; and • Temporal and permanent alteration and closure of routes (foot paths/crossings)	• Make arrangements with the local authority to provide suitable temporal access to local people during project construction; and • Prepare underpasses or overpasses at specified areas to replace affected crossings	Construction Contractor	• RE/ sociologist of the road construction supervision team	Part of the project construction cost and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estim
				Executing Body	Supervising Body	
Construction phase	Project affected vulnerable groups	• Local women may expose to STDs including HIV/AIDS, illegal pregnancy and unwanted child births; • Unequal job opportunity for women; • Project affected vulnerable groups would suffer more than other affected groups.	• Aware the locals about STDs and HIV/AIDS mode of transmissions and ways to abstain from any undesirable contacts; • Provide special attentions and support to project affected vulnerable groups such as old aged persons, female household heads, and other disabled persons; • Provide equal or more job opportunities for women; and • Ensure that the performance of the designed special government support (like provision of access to credit and saving to the project vulnerable groups) is at the right track.	Construction Contractor; NGO involved in HIV/AIDS prevention component; ERC	• RE/ Sociologist of the road construction supervision team	Part of the project construction cost and supervision cost
Construction phase	Spread of Sexually Transmitted Diseases	• A reduction in human resources as a result of death from HIV and AIDS related illnesses; • It will reduce life expectancy; • Increase in health care expenditures; and • Reduction of productivity.	• Launch aggressive culturally appropriate STI and HIV/AIDS awareness campaign; • Impede the flow of sex workers to the construction sites; • Avoid discrimination in work places due to HIV/AIDS and provide them counselling service; • Distribute condoms and leaflets by placing them at centrally located and visible points; • Provide free counselling to the workforce and nearby communities.	• Contractor's health expert • Woreda health centers • NGOs in the area	Sociologist of the supervision team	Birr 2,500,000 (for subcontracting the activities for the whole project duration)

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
Construction Phase	Spread of Malaria	• Malaria out break in the low land areas of the project construction sites.	• Prevent and avoid temporary & permanent water holding areas which favour mosquito breeding; • Use chemically treated mosquito nets in times of malaria out break and provide clinic or medical facilities at the construction camp; and • Restore/ reinstate borrow pits and quarry areas to minimize breeding sites for mosquito.	Construction Contractor	Sociologist and environmentalist of the road construction supervision team in collaboration with RE and local authorities	200,000 Birr for purchasing and distributing chemically coated mosquito nets for about 2000 people at a rate of 100 Birr per mosquito net
Construction phase	First Aid Service	• Health related problems to construction workers	• Make available first aid unit including adequate supply of sterilized dressing materials and appliances; • Make available suitable transport at all times to take injured or sick person(s) to the nearest hospital; • Make available equipment and trained nursing staff at construction camp.	Contractor; RE	Sociologist of Supervision Consultant and Management & Safety Branch (EMSB) of ERC	Part of the project construction cost and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estim?
				Executing Body	Supervising Body	
Construction phase	Safety	• Personal safety measures for labour; • Risk from electrical equipments; • Health related problems during construction works.	• Protective goggles and clothing to workers engaged in stone breaking activities, welding activities, and etc.; • Helmets & boots for workers working underground and in open excavation areas; • Earplugs to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation; • Adequate safety measures for workers during handling of materials at site; • Safety belts and etc.; • Prohibit not to employ any person below the age of 14 years for any work and not to employ woman on the work of painting with products containing lead in any form; • Store any explosives and chemicals in a safe place and make notification during blasting activities; • Minimize dust emission by watering the road during construction; • Put visible and appropriate warning signs on the road during road construction including speed limits; • Provide education to personnel of the contractor about safety procedures and emergency response plans associated with their tasks.	Contractor; RE	Sociologist and environmental ist of the road construction supervision team	Part of the project construction cost and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
		Workers' health problem due to communicable diseases (Water born diseases, respiratory diseases etc)	• PROVIDE WATER FOR WORKERS FROM PROTECTED SOURCES OR PUBLIC WATER SUPPLY • ENSURE SANITARY CONDITIONS, PROPER WASTE DISPOSAL AND WASTE MANAGEMENT IN CAMPS AND AT WORK PLACES. • REHABILITATE EXCAVATED GROUNDS AT QUARRY SITES AND BORROW PITS TO AVOID MOSQUITO BREEDING. • PROVIDE STANDARD CLINIC; (ADEQUATELY STAFFED WITH SKILLED PROFESSIONALS; AND EQUIPPED WITH NECESSARY MEDICINES AND INSTRUMENTS) AT MAIN CAMPS.	• Contractor • Local health institutions	Sociologist of Supervision Consultant and Management & Safety Branch (EMSB) of ERC	Part of the project construction and supervision cost
Construction phase	Construction camps	Inappropriate campsites cause adverse effects (social or economic impacts)	• Selecting campsites will take place in such a way that they will not invite close interactions with local communities; • Locate the camps in such a way to avoid sensitive areas such as dense forests and wildlife habitats, community water supply points, and etc. • Take photograph of the campsites before the construction of any structure in order to compare the level of environmental degradation before and after the establishment of the camp site and to plan rehabilitation work • The camps will be dismantled and the areas rehabilitated as per the surrounding nature once construction is completed.	Construction contractor; ERC	Sociologist and environmentalist of the road construction supervision team in collaboration with the Woreda Environmental protection, land administration and utilization unit (EPLAUU)	Part of the project construction cost and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estima
				Executing Body	Supervising Body	
Construction phase	Archaeology and Cultural Property	Loss of historical or cultural heritage (if any).	• Precaution measures shall be taken to protect moveable and immoveable cultural or historical artefact when identified during project construction; • The concerned Culture and Tourism Department will be informed to take appropriate actions; • Employees of the contractors and all project employees shall be aware that they will responsible to inform the concerned government body within 48 hours of such discovery. They will be aware that failure to report a chance find within the 48 hours of discovery, is a punishable offence under the relevant Ethiopian legislation; and similarly, (intentional) damage to a historical or cultural artefact is a punishable offence.	Construction Contractor and Supervision Consultant	Sociologist of Supervision Consultant; and Management & Safety Branch (EMSB) of ERC	Part of the project construction cost and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
		Degradation of Sacred places; religious places, monuments and burial places, Archaeological sites.	• Protect and avoid as far as possible such sites as burial places, religious establishments and cultural sites. • Preserve any archaeological findings encountered up on excavation. • Arrange orientation program and training of machine operators on work procedures, and discipline at physical and cultural heritage sites. They need also to be oriented on recognizing types and characteristic of such heritages and means to identify them while undertaking excavation operations. It is also essential that the operators trained on site management procedures to be followed, particularly if a PCR encountered is not movable • Liaison and make arrangements with the regional bureau of culture and tourism for the training and orientation of the workers and to cooperate by timely responding to reported findings. • Report to the relevant bureau up on finding of unregistered heritages as soon as possible, before making any change to its location and feature.	• Regional/zone culture and tourism bureau. • Contractor • Supervising consultant • The community • ERC	Sociologist of Supervision Consultant and Management & Safety Branch (EMSB) of ERC	Part of the project construction and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estim*
				Executing Body	Supervising Body	
Construction phase	Labour camp management	• Problems with regard to potable water, sanitation & sewerage and waste disposal facilities in the construction compounds. • Likely sanitation & health hazards & social problems on nearby local residents.	• Maintain proper management and discipline in the camps; • Provision of health care services, adequate potable water supply, garbage disposal and sanitation facilities for the camps and work places; • Provide clean, un congested and ventilated rooms for the workforce;; • Under take standard testing of water every months; and frequent water testing when there is health problem caused by drinking water; • The sewage system for the camp shall be designed, built and operated in such a way that it does not pollute the ground water or nearby surface water; • Separate toilets/bathrooms shall be arranged for men and women • Adequate water supply is to be provided in all toilets and urinals; • All toilets in workplaces are with dry-earth system (receptacles) which are to be cleaned and kept in a strict sanitary condition; • Provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner.	Project Contractor	Environmental Expert and sociologist of Supervision Consultant and EMSS	Part of the project construction cost and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
	Traffic Accident	• Risk of accidents to the local communities (particularly children) • Risk of accidents to cattle, especially when they cross the road. • Impairment of non motorized transport, like pack animals used to transport goods. • Impairment of other motorized and none motorized transport • Availability of public transport • Transport c Traffic Accidents due to existing road crossings at Beko road and Konmbolcha road crossing • Increased construction traffic (vehicle, machinery and non motorized traffic) • Interference with wild life migratory routes	• Provide alternative pedestrian routes where these are interrupted • Provide diversions with suitable and reflecting road signs; provide barricades and delineators and flagmen to guide the construction traffic. For regulation of traffic, the flagmen shall be equipped with red and green flags; • Use clear, labelled properly and meaning full traffic signs and speed limits, especially at road crossing of the people and conjunction of animals • Traffic awareness especially at schools, churches, mosques and other risky places; Provide wider road shoulders and separate lane for pedestrian and non motorized transport • Provide paved and well constructed detour road during road construction. • Maintain and apply dust suppression measures to minimize dust pollution and vehicle accidents caused due to distant visibility problem. • Encourage local mode of transport to sustain, especially for short distance transport of goods to market places and short distance service centers and inter regional, woreda and zonal connectivity to the railway line should be supported by vehicular transport and animal packs. like flour mills, by maintaining separate lane. • Transport fees should be in accordance to the improved road standards • Over pass/under pass road should be designed at road crossings, especially at Kombolcha (km 50), and fences to protect people and animal accidents.	• Design consultant • Contractor • supervision consultant, • Trafic police of the Area • District road maintenance team of ERA	RE in collaboration with each Woreda traffic police, Sociologist and Environmental ist	Part of the project construction cost and supervision cost Part of engineering cost estimate Administrative cost
Construction phase	Civil Works Consulting Engineering/ CWCE PLC		• Provide wildlife and animal crossing corridor and/or maintain existing corridor. • Road shoulders have to be kept wide enough especially in towns and villages as per the design for use by the pedestrian.			

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estim
				Executing Body	Supervising Body	
Construction phase	Quarry sites, borrow areas and detour/access roads	• May bring accidents for children and cattle • Would serve as mosquito breeding site; • Would bring un-aesthetic view; and • Cause loss of productive land, etc.	• Select quarry and borrow sites far from settlement and environmentally sensitive areas and get approval from supervising Engineer and local authorities before exploiting; • Do not locate quarry and borrow sites in a forest areas; • Preserve top soils for reuse to refill borrow sites and quarry areas; • Rehabilitate all quarries and borrow sites and access roads after the completion of the road construction works and plant appropriate tree species.	Construction Contractor	• RE/Environmentalist of the road construction supervision team	Part of the project construction cost and supervision cost
Construction phase	Aesthetic Value	• Impacts on economic, emotional, psychological, and health reaction	• Re-plant vegetation to restore the natural appearance of the affected areas where feasible; and • Re-plant the reinstated borrow sites with appropriate plant species, mainly trees and shrubs.	Construction contractor	RE/Environmentalist and Sociologist of the road construction supervision team	Part of the project construction cost and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
Construction phase	Waste disposal management	• Contamination of local environment and cause health risks • Accumulated wastes along rail corridor	• Non-recyclable materials/ wastes shall be disposed of at allowed landfill sites or according to regulations of the country. • Collect and remove all domestic wastes from work sites; • All waste chemicals and other toxic materials shall be stored and collected for safe transport to locations approved by regulatory authorities; • Managing hazardous wastes in accordance with all relevant regulatory requirements; • Any soil contamination shall be managed to prevent health risks to work personnel and the community in general.	Construction Contractor	RE/Environmentalist and Sociologist of the road construction supervision team; Woreda Environmental Protection	Part of the project construction cost and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estim
				Executing Body	Supervising Body	
Construction Phase	Dust pollution	• It would bring health and social problems.	• Using effective water sprays when all raw materials that could cause a dust nuisance are being delivered or handled; Not burning debris or other materials on site; • Installing vehicle wheel-washing equipment at all site exit points, and making arrangements for cleaning public roads as necessary; • Imposing a maximum 10mph vehicle speed limit on sites, and confining haulage and delivery vehicles to designated roads within the site; • Ensuring vehicles that carry spoil and other dust-generating materials are adequately covered; • Enclosing construction compounds with solid hoardings that are a minimum of two metres high; • Ensuring that enough dust-suppression equipment, including water bowsers with spray bars, is always available; • The hard surface of heavily-used areas will be kept clean by brushing and water spraying regularly; Control of cutting or grinding of materials on site. • Any mobile crushing plant that is used during construction will be appropriately licensed and sited so as to minimise dust annoyance to any persons who are liable to be affected by emissions; • Locate crushers away from town centres and densely populated areas.	Construction Contractor	RE/Environmentalist and sociologist of the road construction supervision team	Part of the project construction cost and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
Construction Phase	Air Pollution	• It would bring health and socio-environmental problems	• Restrict traffic speeds to minimize dust production and its adverse effects, • Vehicles and machinery must be kept in good condition to prevent excessive smoke from exhausts, • Reduce dust by watering the road surface that travels through settlement areas at least three times a day, • Locate construction plants such as stone crushing plants away from the settlement areas, • Prevent the generation of air pollutants during the construction period by watering during crushing and screening of aggregates, • Avoid burning of materials such as tiers, plastic, rubber products or other materials that creates heavy smock or nuisance odour, and • Avoiding disposing of any volatile chemicals to the air. • Consider wind direction effects while selecting sites for plant erecting.	Construction Contractor	Environmentalist /sociologist of the road construction supervision team in collaboration project Resident Engineer (RE)	Part of the project construction cost and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estim
				Executing Body	Supervising Body	
Construction Phase	Noise nuisance and vibration impact	Depending on the intensity level of emissions there would be: • Psychological disturbances (perturbations and displeasure), • Functional disturbances (sleep disorders, loss of work productivity and speech interference) or • Physiological disturbances (health issues such as fatigue, and hearing damage).	• Minimise construction works producing nuisance noise or rescheduled so as not to occur at night or on locally recognised holidays or religious days; • Keep all machinery and plant to the applicable noise standards, and equip them with effective noise mufflers; • Locate noisy plants such as rock crusher far from the settlement and noise sensitive areas; • Minimize the use of explosives and promote a system Avoid excessive noise in the premises public service institutions, religious establishments and residential areas in towns and villages traversed. • Regular maintenance of machinery and vehicle to reduce excessive gaseous Avoid operating crusher plant during rest hours and sleeping period emissions • Avoid operating crusher plant during rest hours and sleeping period • Prepare blasting schedule.	Construction Contractor	Environmental Ist /sociologist of the road construction supervision team	Part of the project construction cost and supervision cost

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Project Phase	Socio-Environmental Issues	Social/Economic Impacts (Direct/Indirect)	Management Activities/ Mitigation Measures	Responsibilities		Cost Estimate
				Executing Body	Supervising Body	
Construction and Operation Phase	Overhead Line Electrification	• Contact with overhead lines and electrification equipment will cause fatal accidents.	• Provide adequate physical protection to members of the public to prevent inadvertent contact with electrification equipment; • Provide adequate awareness to the project workers and communities about the possible hazards associated with overhead line electrification for the railway line during project construction; • Aware communities about the possible hazards associated with overhead line electrification for the railway line following commencement of operations. • Aware the public through mass media including by using project newsletter and others.	Construction Contractor; ERC; and Local Administrations	Supervision Consultant	Part of the project construction cost and supervision cost
Operation Phase	Route Crime Issues	• Fatalities such as trespass upon a live railway or acts of vandalism	• Route crime risks will be controlled through the provision of adequate fencing in compliance with Network Rail Standard in potential route crime hotspots; and • Provision of an effective program of community route crime education and control points in potential route crime hotspots.	Construction Contractor; ERC; Local Administration	Local Administration	Routine Works of Local Administrations
Sub Total Socio-Environmental Mitigation, Compensation and Management Cost[#]						581,233,122
Contingency 10%						58,123,312
Total						639,356,434

[#] It is assumed that all necessary costs for the activities indicated in the management plan will be budgeted accordingly.

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9.2 SOCIO-ENVIRONMENTAL MONITORING PLAN

Social monitoring and evaluation of the railway project is very essential part. It helps to follow up the implementation of the proposed mitigation measures and evaluate the effectiveness of the proposed mitigation measures.

There are two basic forms of social monitoring, Compliance monitoring, which checks whether the prescribed actions have been carried out, usually by means of inspection or enquiries; and effect monitoring, which records the consequences of activities on one or more social components and usually involves physical measurement of selected parameters or the execution of surveys to establish the nature and extent of induced changes. For this particular case, it is recommended to carry out compliance monitoring in order to crosscheck whether the proposed mitigation and enhancement measures are taken properly or not.

Compliance monitoring can be carried out internally by the project proponent itself or externally by other responsible organization or stakeholders other than the project proponent.

For external monitoring it is recommended to be carried out by a team comprises of experts from Amhara National Regional State Environmental Protection, Land Administration and Use Authority (EPLAUA), Woreda Administration, Woreda EPLAUU, Woreda Forestry and Woreda Health Office. The team could also include other professionals from Woreda Sectors office whenever the monitoring activities require such professionals.

The social monitoring team will report the results and recommendations to the EPLAUA of the Amhara Region, ERC and construction supervision consultants for immediate action. Such type of monitoring could also be carried out by the funding agency provided that carrying socio-environmental monitoring is part of the agencies funding policy. The detailed Social Monitoring Plan for the project monitoring (external) is given in **Table 9-2**, while the implementation of the Socio-Environmental Management Plan (SEMP) specified in **Table 9-3** will be overseen / inspected by the socio-environmental team of the supervising consultants.

EPA could also involve in complaint monitoring and auditing. Whenever complaint on socio-environmental management performance raised by any stakeholder or responsible person, Environmental Impact Assessment Section of EPA will undertake complaint monitoring and take remedial action wherever it is appropriate.

- EPLAUA of the Amhara Region will take the responsibility to organize the external monitoring team members and follow the activities of the team.
- The external monitoring team will be chaired by the representative from Woreda Administration and report to the regional EPLAUA about its performance and provide same copies of reports to the concerned bodies such as ERC, Supervision Consultants, etc.
- ERC will make arrangements before the commencement of the project so that the external monitoring team will be able to carry out the activities discussed in the External Monitoring Plan. Therefore, ERC will distribute the final project study documents for the stakeholders mainly for EPA, Regional EPLAUA, and Woreda administration. ERC will allocate the required budget for monitoring purposes.

Table 9- 2: Socio-Environmental Monitoring Plan

Phases of the Project	Socio-Environmental Issues	Indicators/Parameters to be Measured/ Monitored	Location/ Project Component	Frequency	Responsible Body	Cost Estimate
Pre-construction phase	Inclusion of social mitigation measures in the contract document	Check whether the mitigation and enhancement measures are properly included in the contract document	At ERC head office	Once during the document evaluation	ERC and EPA's representatives	Part of the routine work
Pre-construction phase	Displacement of people and loss of properties	Compliant from the affected people	In major settlement areas along the project road	Every six months	A representative from ERC and 4 members from Woreda include a social affair, 2 from environmental protection and land administration unit (EPLAUU), and a health personnel	37,000
Construction phase	Land use loss due to land requirement for road construction, access road, quarry and borrow sites and camp sites, etc.	Area of affected land use in ha	Project ROW, access roads, camp sites, and quarry sites	Every six months	Same Committee Members	Could be done without additional cost
Construction phase	Disruption of social communication due to alteration and closure of temporal and/or permanent routes	Complains from affected people due to severance, and alteration and closure of temporal and permanent routes	Project construction area	Every six months	Same Committee Members	Could be done without additional cost
Construction phase	Social management issues	Complains from local people due to conflict of interest in job opportunity and other related problems.	Project construction area	Every six months	Same Committee Members	Could be done without additional cost
Construction phase	Project affected vulenerable groups	Complains from affected vulenerable persons if no sastisfaction in compensation and rehabilitation measures	Project construction area	Once before the start of the construction work	Same Committee Members	Could be done without additional cost

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Phases of the Project	Socio-Environmental Issues	Indicators/Parameters to be Measured/ Monitored	Location/ Project Component	Frequency	Responsible Body	Cost Estimate
Construction phase	Labour camp management	Complains from project staff and workers about camp management problems.	Project camp sites	Every six months	Same Committee Members	Could be done without additional cost
Construction phase	Waste disposal management	Complains from stakeholders about waste disposal management problems.	Project construction area and project camp sites	Every six months	Same Committee Members	Could be done without additional cost
Construction phase	Safety measures	Complains from local people, project workers, and commenties and other stakeholders.	Project construction area	Every six months	Same Committee Members	Could be done without additional cost
Construction phase	Dust, air and noise pollution issues	Complains from local people, project workers, and commenties and other stakeholders	Project construction area	Every six months	Same Committee Members	Could be done without additional cost
	Landslide and slop instability, and change landscape	Complains from local people, project workers, Kebele Administration and other stakeholder	Project construction area	Every six months	Same Committee Members	Could be done without additional cost
	Degraded land and erosion	Complains from local people, project workers, Kebele Administration and other stakeholder	Project construction area	Every six months	Same Committee Members	Could be done without additional cost
	Water quality detroration; water sources and wetland ecosystem preservation	Complains from local people, project workers, Kebele Administration and other stakeholder	Project construction area	Every six months	Same Committee Members	Could be done without additional cost
	Possible advesre impacts caused by Quarry sites, Borrow areas and detour/eccess roads	Complains from local people, project workers, Kebele Administration and other stakeholder	Project construction area	Every six months	Same Committee Members	Could be done without additional cost

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Phases of the Project	Socio-Environmental Issues	Indicators/Parameters to be Measured/ Monitored	Location/ Project Component	Frequency	Responsible Body	Cost Estimate
	Flora and fauna degradation	Complains from local people, project workers, Kebele Administration and other stakeholder	Project construction area	Every six months	Same Committee Members	Could be done without additional cost
Construction & operation phase	Overhead line electrification	Complains from local people.	Project construction area	Once per year	Same Committee Members	Could be done without additional cost
Construction phase	Health conditions and status of HIV/AIDS	Overall health and sanitation situation of the project area	Campsites, working areas and near by towns	Every six months	Same Committee Members	Could be done without additional cost
Construction phase	Spread of malaria	Prevalence and trend of malaria	Campsites and working areas	Per year during the pick season	Same Committee Members	Could be done without additional cost
Project operation phase	Route crime issues	Prevalence of crimes	Throughout the project area	Every six months	ERC and Woreda Administration	Part of routine work
	Railway line maintenance	Reports from stakeholders	Throughout the project area	Every six months	ERC and Woreda Administration	Part of routine work
	Total estimated socio-environmental monitoring cost/Year					38,800[16]
	Total estimated socio-environmental monitoring cost for the Project Construction period (Project construction period assumed to be four years)					**151,200**

[16] Asumptions: period of field work 5 days; daily allowance per person Birr 300; car rent per day Birr 1500; fuel cost per day Birr 500; stationary Birr 100/person. Cost for the representative from the client will cover by the head office believing that it is part of the office routin activities.

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9.3 CAPACITY BUILDING

Capacity building is essential to properly implement the proposed socio-environmental management and monitoring plan. The Environmental protection, land administration and utilization units of each Woredas along the project railway line are the principal stakeholders for managing and implementing the environmental issues within the project area. Therefore, it is pertinent to increase the capacity of these units by providing necessary training for the staff members and by equipping the units with facilities and necessary tools. The recommended level of training in relation to the proposed railway construction is on job training. The potential participants, in addition to each Woreda EPLAU, could be representatives from the construction contractor workforce and key professionals of the construction supervising consultants.

On job training can be arranged by the construction supervision consultant in collaboration with ERC for five days before the start of actual construction work of the project and for another five days after the midway of construction work. The content of training will focus on environmental conservation and awareness creation in general and HIV/AIDS prevention in particular.

The first session of on job training could incorporate the following modules:

- An introduction to the concepts, terminology, aims and objectives of SEIA, socio-environmental management and monitoring, with specific reference to railway projects;
- HIV/AIDS pervasion and awareness creation;
- On-site review of existing socio-environmental conditions in the project area, potential impacts and mitigation and benefit enhancement measures;
- A review of approaches which have been and are being adopted towards socio-environmental management in the case of the present project, and their applicability in general to road projects, with particular reference to how uncertainties are handled; and
- A review of the role of socio-environmental monitoring as a management tool.

The second session could cover the following aspects:

- on-site comparison of impact predictions in the SEIA with what has happened in practice, with particular emphasis on analyzing the reasons for any significant differences;
- on-site review and analysis of the success or otherwise of the proposed mitigation measures, socio-environmental management and monitoring approaches, including contributions from the contractor, the site supervision team, and representatives of the local authorities and the people who live along the road; and
- Summary of lessons to be learned which could usefully be applied to similar, future projects.

A generally informal approach would be adapted to the training sessions, in order to promote interaction between trainees and trainers, and in particular to facilitate the free and open exchange and discussion of ideas.

Numbers of trainees would have to be discussed and agreed with both ERC and construction supervision consultant, but, it is suggested that the number should be limited to about 15. The cost estimated for the proposed on job training (capacity building) is listed in Table 9 - 3.

Table 9- 3: Cost Estimate for Capacity Building

No.	Items	Quantity	Unit rate	Days	Amount in Birr
1	Fee for environmental specialist and sociologist	2	2000	10	40,000
2	Vehicle hire (one Station wagon and one Minibus)	2	1500	10	30,000
3	Per diem for trainees	15	300	10	45,000
4	Course materials and others	Lump sum			15,000
	Total	-	-	-	**130,000**

Source: **Socio-economic Survey, 2011**

9.4 COMPENSATION, SOCIAL MITIGATION AND MONITORING COST ESTIMATE

The social management and monitoring cost estimated to be about 181.2 Million Birr. The cost estimates in Tables 9 - 4 below are based on the following assumptions:

- Items of an engineering nature that are in any case required under the construction contract and do not involve additional costs have been excluded from this cost estimate. Examples are drainage structures, retaining walls and lined drains that are designed to control or prevent soil erosion and slope instability.
- The costs of mitigation measures to be implemented by the Contractor during construction are considered as included in his obligations under the construction contract. This applies to such measures as good management of the construction equipment and vehicles, workforce/camp management, good construction works, provision of necessary facilities for the workforce and proper waste management or disposal, restoration of campsites; borrow pits and quarries, traffic safety, etc.
- Some of the mitigation measures to be implemented by the local government organisations are considered as part of their routine jobs. For example, law enforcement, controlling illegal establishment of settlements and exploitation of natural resources, educating people about health and traffic safety, etc.

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Table 9- 4: Compensation, Social Mitigation Management and Monitoring Cost Estimate

No.	Reference	Cost Items	Total
1	Table 9.1	Compensation cost [11]	575,233,122
2	Table 9.1	Socio-Environmental Mitigation, Management Cost	6,000,000
3	Table 9.2	Socio-Environmental Monitoring Cost	151,200
4	Table 9.3	Training Cost	130,000
Sub Total			581,514,322
10% contingency			58,151,432
Total			639,665,754

Source: Socio-economic Survey, 2011

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[11] The estimated compensation cost will be included in the Resettlement Action Plan (RAP) of the railway project. This cost is mentioned in this ESIA report simply to show the magnitude cost required to implement the proposed Socio- Economic Mitigation Measures and other project activities.

10. KEY ISSUES TO BE INCLUDED IN THE CONTRACT DOCUMENT

Concerning socio-environmental aspects of the road, the tender document for the Kemissie-Hayq Railway Section Project construction contract should include the following but not limited to:

10.1 PREPARATION OF SOCIO-ENVIRONMENTAL MANAGEMENT PLAN

The Project Contractor shall update the existing SEMP from the SEIA report or prepare a new SEMP that suits construction works for the entire project road. The SEMP shall be updated/prepared using or based on the ERA's EMSB guideline and submitted to RE/environmental supervisor and ERC / EMSB for reviewing and approval before the construction work commences.

10.2 POTENTIAL IMPACTS FROM PREPARATION AND LOCATION OF CAMPSITES

Location of campsites will have adverse effects on the environment. The following activities should be specified in the project contract document to minimize adverse impacts that could be associated with the location of camp sites:

- The Contractor Shall select location of campsites in collaboration with local authorities, RE and with EMSB of ERC, and camps shall only be established at places/locations approved by ERC's EMSB and the RE in collaboration with local Officials and community members;
- Campsites shall be located in less productive areas away from streams and rivers (at least 500 m);
- The camp sites shall not be located close to residential areas, on fertile farmlands, and forested lands;
- The RE and the contractors shall take photograph of the campsites before the construction of any structure in order to compare the level of environmental degradation before and after the establishment of the camp site and to plan rehabilitation work. Any removal activities of trees for camping shall be done in the presence of environmentalist from the supervision team and a forester from Local Forestry Department;
- Established construction campsite shall have appropriate and standard sanitation facilities including imperviously lined septic tanks to reduce possible pollution impact on ground and surface water resources;
- Dispose of all wastes from project camps shall take place properly in a designated and authorized places;
- The Contractor shall take all necessary measures and precautions to avoid any nuisance or disturbance to inhabitants arising from the execution of project works;

- If the campsites are not going to be used or going to be demolished, the contractor shall reinstate (the reinstatement activities shall include stockpiling the topsoil during camp construction, removing all concretes/slabs and all scrap metals from the workshops, loosening the compacted soils, and spreading of the top soils) to its original state; and
- The RE shall order the camp administrator for the planting of tree seedlings in the camp yard for beautification purpose.

10.3 AIR POLLUTION

The major effects on air quality during the construction period will be an increase in suspended particles from blasting, excavation, and movement of heavy machinery and other vehicles over unpaved or dusty roads. Therefore, to minimize air pollution the Contractor shall implement the following mitigation measures:

- The Contractor shall reduce dust from construction sites, access roads and detours by watering at least three times a day in sensitive areas, towns and villages;
- The Contractor shall prevent generation of air pollutants by watering during crushing and screening of aggregates;
- The Contractor shall locate construction plants such as stone crushing plants away from the settlement areas, health centres, hospitals and schools;
- The Contractor shall avoid burning of materials such as tiers, plastic, rubber products or other materials that creates heavy smoke or nuisance odour;
- The Contractor shall avoid disposing of any volatile chemicals to the air;
- Any vehicle with an open load carrying area used for transporting potentially dust producing materials should have properly fitted side and tail boards. Materials having the potential to produce dust should not be loaded to a level higher than the side and tail boards and should be covered with a clean tarpaulin in good condition;
- The contractor shall provide safety equipment such as goggle, masks and other protection measures for his work force as it needed; and
- The RE shall supervise and monitor the contractor's compliance with the above conditions.

10.4 NOISE POLLUTION

Excessive noise levels will arise during construction from operating construction equipment and vehicles, blasting, concrete batching, and aggregate production.

Noise generated from the project site can be a major annoyance to a large number of people where sensitive noise receptors which include public clinics, schools and religious place are nearby at the construction activity areas and for the people who are residing in project affected towns.

Therefore, the Contractor shall implement the following mitigation measures to minimize possible noise impacts:

- The Contractor shall not operate noisy operations like crushing plants near the noise sensitive and settlement areas, hospitals, schools, potential wildlife areas;
- Construction activities that generate disturbing noise levels are to take place during conventional working hours wherever possible;
- The Contractor shall screen equipments producing high levels of noise when working near the settlement areas, clinics and religious areas;
- The Contractor shall minimize the use of explosives and promote a systematic blasting schedule;
- The Contractor shall provide safety equipments pertaining to noise, such as ear protection wear whenever necessary for the workers; and
- The RE shall supervise and monitor the contractor's compliance of the contractors with the above conditions.

10.5 IMPACT FROM QUARRY SITES, BORROW AREAS AND ACCESS ROADS

Quarry sites, borrow areas and access roads unless properly rehabilitated would cause socio-environmental problems like loss of productive land , loss of vegetation, soil erosion, creation of mosquito breeding site, un-aesthetic view, etc.

Therefore, the contractor should implement the following mitigation measures:

- The contractor shall select quarry and borrow sites away from settlement and environmentally sensitive areas after the approval by RE, ERC (EMSB) and Local Authorities;
- The Contractor shall not select quarry and borrow sites near and at river bed;
- The Contractor shall not establish quarries and borrow pits in forest areas;
- Maintain access roads within the ROW as much as possible;
- The Contractor shall reinstate all quarries and borrow sites and access roads after the completion of the road construction works, any material sites shall not be left open unless otherwise approved by ERC (EMSB) and RE upon request from local people to have the sites open permanently.

The reinstatement works shall include the following activities:

- The Contractor shall take photographs of the proposed borrow areas, quarry sites and access roads before the commencement of the works;
- The Contractor shall take lists of all the tree species found in the proposed quarry sites, borrow areas and detour roads and the exact number of trees to be affected in the presence of Environmentalist from the Supervision Team and a Forester from the Woreda Forestry unit;
- The Contractor shall preserve top soils for later use to refill borrow sites and quarry areas and do not mix top soil with subsoil;

- Borrows and quarries shall be reinstated (which include dumping unnecessary materials and excess cuts, landscaping/levelling/shaping, spreading the topsoil uniformly over the surface, constructing spillways if in case the sites are deep enough to hold water and putting a barrier all around the sites to prevent accidents on animals and human beings) after completion of the works;
- After reinstating, plant appropriate tree species (indigenous trees) or grasses to recover the original vegetation and to improve the ecological and aesthetic value of these sites;
- Provide proper drainage to avoid storage of water in quarry and borrow sites to reduce malarial out break through reduction of mosquito breeding sites; and
- Access roads to these sites shall be reinstated to productive state. Reinstatement work shall include: preservation of the top soils and stockpiling the top soils, removing the applied selected/foreign materials, loosening the compacted soils and spreading the top soils.

10.6 TRAFFIC MANAGEMENT PLAN (TMP)

Contractor shall prepare Traffic Management Plan (TMP) that suits construction works for the entire or sections of the road project. The TMP shall be prepared using or based on the new ERA (EMSB) Road Safety Audit Manual and submit to RE and ERA's EMSB for reviewing and approval before the construction work commences

- The Contractor shall provide diversions with suitable and reflecting road signs; provide barricades and delineators and flagmen to guide the traffic. For regulation of traffic, the flagmen shall be equipped with red and green flags;
- Provide alternative pedestrian routes where these are interrupted;
- The Design Engineer shall consult the local people as to where to construct the different engineering facilities like parking bays, foot paths;
- The Contractor shall use clear, levelled properly and meaning full traffic signs and speed limits, especially at road crossing of the people and conjunction of animals;
- The Contractor shall provide traffic awareness, especially at schools, churches and other places at certain period of construction time and introduce accident prevention methods; and
- The Design Engineer shall identify all high traffic accident areas and safety measures shall be proposed at all these areas.

10.7 IMPACT ON FARMLAND

Farmland would be taken for various activities of the project construction. However, the magnitude of impact on farm land would vary depending on how the construction Contractor manages its work and working environment. Careless disposal of spoils and construction wastes on farmland and unlimited use of access roads could exacerbate adverse impacts of road construction on farm land.

Therefore, the Contractor shall implement the following measures but not limited to:

- The contractor shall abstain from locating campsites, quarries and borrow pits on fertile farmland, instead locate them in less productive areas;
- The contractor shall not establish diversion roads in productive farmland and shall limit the diversions within the Road Right of Way;
- The Contractor shall abstain from dumping any spoil from construction activities into farmland unless requested to do so by the farmers;
- The Contractor shall separate topsoil from subsoil and preserve top soils for later use; and
- The Contractor shall reinstate all the farmland temporarily taken for various activities of road construction. Reinstatement shall include stockpiling the top soils, removing any concretes or foreign materials, loosening the compacted soils, landscaping/levelling/shaping, spreading the topsoil uniformly over the surface. The level of reinstatement shall be approved by the RE and Environmental supervisor as well as it should satisfy the land holders.

10.8 HEALTH IMPACT

From the viewpoint of public health, the construction crews and the campsite areas are the main concern particularly in relation to the expansion of HIV/AIDS, STD and Malaria. To minimize these health problems the contractor or construction activities shall:

- Be aware that the road traverse through malaria endemic areas and be prepared to avoid possible health risk through environmental health and hygiene management of camp sites and availing clinic, chemically treated mosquito nets and medicines for the work force;
- The Contractor shall not induce malaria outbreak by creating temporary & permanent water holding areas which favour mosquito breeding;
- The Contractor shall restore borrow pits and quarry areas to avoid breeding sites for mosquito;
- The Contractor shall provide clinics with all necessary medications in major construction camps, and First Aid kits at all working sites;
- The Contractor shall minimize dust emission by watering the road during construction at the settlement areas at least 3 times a day (in the morning, before lunch time and before the end of working hour);
- The Contractor shall take care when selecting campsites in such a way that it should not invite close interaction with local community;
- The Contractor shall provide safe water supply & appropriate waste disposal facilities including the provision of sanitary latrines in the construction camp;
- The Contractor shall provide health education mainly focusing on the HIV/AIDS control and prevention, avoid discrimination in work places due to HIV/AIDS and provide counselling service. This activity shall be executed as a sub contract by local NGOs and relevant institution;
- The Contractor shall provide free counselling and distribute condoms & leaflets to workforce and vulnerable group of nearby communities; and

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- Due precautions shall be taken by the contractor to ensure the safety of his staff and labour in collaboration with the local health office by providing medical staff; first aid equipment and stores, sick bay and suitable ambulance service at the camps, housing, and on the site at all times throughout the period of the contract

10.9 IMPACTS RELATED TO OCCUPATIONAL SAFETY

During the road construction, there will be more occupational health problems associated with construction activities such as accidents from traffic or working machines, explosives, etc. To minimize these inconvenient working conditions and safety problems the following clauses shall be included in the contract document:

- The contractor must ensure that the potential danger to the public (including pedestrians, all road users, and adjacent building owners and occupiers) is kept to an absolute minimum. All work sites are to be clearly sign posted and fenced, and if necessary lit at night. Safe, traffic control arrangements to provide well-signed pedestrian routes to be provided to avoid construction accidents;
- During the execution of the works the contractor shall keep the site reasonably free from all unnecessary obstruction and shall store or dispose of any contractor's equipment and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required;
- Where the contractor is authorized to use explosives required for rock excavation, the explosives shall be stored, handle, and used with the utmost caution and strictly in accordance with the statutory government regulations. The contractor shall be responsible for the presentation of any unauthorized issue or improper use of any explosive and shall ensure that the handling of explosive shall be entrusted only to experienced and responsible men;
- All open excavations shall be adequately barricaded to prevent workmen or others from accidentally falling into them. Any open excavation in the road carriageway or shoulder areas shall in addition be marked at night with white painted drums (or similar) and red or amber lighted lamps, to the satisfaction of the engineer;
- Explosives and chemicals should be stored under proper security at a safe distance from the road and any inhabited premises;
- Give warning each time of his intention to blast and should station personnel on the roads and elsewhere with flags, horns and whistles and prevent persons , animals and traffic entering danger zone;
- Provide education to personnel of the contractor about safety procedures and emergency response plans associated with their task;
- The contractor shall provide accommodation and amenities as it may be necessary for all his staff and labour including all fencing, water supply (both for drinking and other purposes), electricity supply, sanitation, cookhouses, fire prevention and fire-fighting equipment, air conditioning, cookers, refrigerator, furniture, and other requirements.
- The contractor shall make any necessary arrangements for the transport, to any place as required for burial, of any of his expatriate employees or members of their families who may die in Ethiopia;

- The contractor shall arrange for the provision of a sufficient supply of suitable food at reasonable price for all his staff, labour, and subcontractors for the purposes of or in connection with the contract;
- Alcoholic liquor or drugs are strictly forbidden to use in whatever means; and
- The contractor shall pay compensation according to the laws of the country for loss or damage suffered in consequence of any accident or injury or disease resulting from his work for any workman or other person in the employment of the contractor or any subcontractor.

10.10 DISRUPTION OF CROSSINGS, AND ACCESS TO SERVICES

- The design Engineer shall not propose fill sections in towns and rural villages;
- The contractor shall provide different crossing structures or access roads to individual houses on upslope and social facilities;
- The contractor shall not use market places for permanent or temporary storage of construction materials;
- The contractor shall not block water pipes;
- The contractor shall not disrupt electric and telephone lines; and
- The contractor shall not operate noisy operations near schools and religious places.

10.11 BEFORE COMMISSIONING

The construction contractor shall clean up the project environment before officially handover the project. The social and environmental supervisors and EMSB of ERA should follow up the proper implementation of these activities and check that the work as built meets all significant environmental requirements before the project is officially accepted and should report to the concerning parties.

- All the salvages and waste materials from the construction process should be cleaned, demolished or dumped in appropriate and authorized places;
- Quarry and borrow areas should be reinstated, drained and planted trees;
- Temporary camp sites should be removed and the compacted materials should be removed and reinstated so that the land continues giving services which were discontinued due to the project; and
- The client should hold certain amount of money until the completion of the cleaning activities approved by social and environmental supervisors.

10.12 OTHERS

- The contractor should give job opportunity for the local people as much as possible, giving priority for the affected people and women;
- Take responsibility to create awareness among the work force about the protection of natural environment, maintaining of vegetation and wild life, keeping water sources clean etc. and

- Work agreed with the environmental supervisor and site engineer in implementing the socio-environmental mitigation measures specified in the SEIA report.

The construction contractor shall also present management plan for:

- Camp site construction and management;
- Water resource use plan for construction;
- Query and borrow site management and rehabilitation plan;
- Health and risk management plan including HIV alleviation program;
- Dust and pollution control and management plan;
- Blasting and crashing plant management plan; and
- Clearing up plan after the completion of the construction work.

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11. CONCLUSIONS AND RECOMMENDATIONS

The construction and operation of the Kemissie-Hayk Railroad Section Project will bring a variety of benefits at both local and national level. In particular, the impact at local level in increasing the reliability of road transport and the potential to develop the local economy through improved infrastructure and employment opportunities will be significant.

Discussions made with local authorities and community members revealed that there is huge potential for irrigation and livestock raising development along the perennial rivers of the project influence areas, but due to lack of access to local and foreign markets the development in such areas was limited. Implementing of this railroad project, therefore, would attract to bring agro-industry advancement to the project influence areas and promote economic development of the country since the railroad line will connect Ethiopia with alternate ports of neighbouring countries which would create conducive environment for import and export trade communications with such African Countries and others. Construction of the project would also promote tourism industry by providing all weather low cost, fast and safe access for the incoming tourists.

On the other hand, the construction of the proposed railway project will bring several unwelcoming impacts to the natural and social environment. However, many of these inimical impacts will be short-term and reversible, but some will be permanent impacts. The potential significant impacts will include loss of properties including houses, cropland, trees, fruits and cash crops; spreading of communicable diseases such as STDs and HIV/AIDS, and dilution of culture. However, these impacts can be reduced to acceptable levels with normal good engineering practice coupled with integrating the socio-environment, economic and cultural mitigation measures into the planning and implementation schedule of the railroad development. It can therefore be concluded that there are no severe impacts that cannot be mitigated to prevent the implementation of the proposed railway project.

To maximise the efficiency of the railway project and reduce the magnitude of the unwanted effects to acceptable levels, it is essential that the proposed mitigation measures are applied at the right time through the socio-environmental management plan, and by incorporating the relevant ones in the final engineering design for implementation. A close follow-up of the effectiveness of the implemented measures through a well-planned monitoring programme is also of critical importance. In addition, technical, operational and phasing procedures should be included in the tender documents for the contractor. Among the issues that should be given maximum attention are:

- Restricting land acquisition to what is absolutely necessary to reduce loss of farmland, grazing, trees, fruits and cash crops.
- Proper sitting of construction camps and management of workforce and restoration of these camp sites as soon as the completion of the project construction works.
- Proper management of construction machinery and control of traffic would be important to minimize possible traffic accident on livestock and people.
- The proposed railway line will connect various societies having distinct cultures and ways of living. The planning, implementation and monitoring of the anticipated socio-economic environmental impact mitigation management, therefore, requires respect and recognition of the local people and their beliefs, norms and values.

Therefore, active and whole-hearted involvement of the local community leadership and opinion-makers at all stages is of paramount importance for the project implementation.

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ANNEXURES

Annex 1: Consulted Persons and Organizations

1) Dawa Chefa Woreda Administration

1. Ato Shiferaw Mengesha, Dawa Chefa, Head of Human Resource Management;
2. Ato Masresha Teshome, Administration and Security;
3. Ato Asnake Mamo, Land Use and Administration;
4. Ato Sewnet Waqjira, Office of Education;
5. Ato Ali Endris, Office of Health;
6. Ato Aliy Mohammed, Water Supply Office;
7. W/ro Fate Endris, Women, Youths and Children Affairs Office;
8. Dr Mohammed Yesuf, Office of Agriculture;
9. Ato Shamil Ahimed, Woreda Administration;
10. Ato Abdu Seid Yimam, Farmer, Milida Koko Kebele;
11. Ato Dawid Muhe Ebre, Farmer, Milida Koko Kebele;
12. Ato Seid Yimer, Farmer, Milida Koko Kebele;
13. Mohamed Seid, Farmer, Milida Koko Kebele;

2) Kemissie Town Municipality

1. Abdurahman Ahmed,
2. Jemal;
3. Ahmed Adem,
4. Seid Mohamed,
5. Dawit Kebede,
6. Tegene Yimer,
7. Abel Fekade,
8. Omer Asehab,
9. Hassen Mohamed,
10. Tilahun,
11. M/D Hassen,

3) Kalu Woreda Administration

1. Ato Ased Mohammed; Woreda Road Office;
2. Ato Wondwossen Desalew; Woreda Land Administration;
3. Ato Lulseged Wassihun; Woreda Education office;
4. Ato mohammed Tadesse, Woreda Women, Youths, and Children Affairs;
5. Ato W/ro Ansha Seid, Woreda Excutive;
6. W/ro Ansha, Woreda Agriculture Office;
7. Ato Kasaye Liben, Woreda Administration;
8. Ato Berhe, Woreda Health Office; and
9. W/rt Kedija Zeyinu, Excutive, Harbu 01 Kebele.

4) Kombolcha Town Municipality

The participants of the meeting are 32 of which 27 are males and 5 females. The consultation meeting was chaired by the Town Municipality Head. Some of the are:

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General Manager

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1. Ato Abere Abera, Kombolcha Town Municipality Head;
2. Ato Getahun Mola, Kombolcha Town administration executive member;
3. Ato Mulugeta, Kombolcha Town administration executive member;
4. Ato Hussien Seid, Kombolcha Town administration executive member;
5. Ato Getu Mola, Kombolcha Town administration executive member;
6. Ato Fasil Eshetu, Kombolcha Town administration executive member;
7. Ato Muhamed Seid, Kombolcha Town administration executive member;
8. Ato Deneke mitku, Kombolcha Town administration executive member;
9. Abeba Nigussie, Kombolcha Town administration executive member; and
10. Ato Zerfu Fekadu, Kombolcha Project Manager, ARRDO

5) Tehuledere Woreda Administration

1. Ato Seid Eshetu, Thuledere Woreda Administration;
2. Ato Yesuf Hassan, Thuledere Woreda Administration;
3. Ato Solomon Brehanu; Thuledere Woreda Administration;
4. Ato Fettaw Ahimed, Thuledere Woreda Administration;
5. Ato Desta Girmay, Thuledere Woreda Administration; and
6. Ato Solomon Tsenfe, Thuledere Woreda Administration.

6) Hayq Town Municipality

1. Ato Getnet Yimer, Head of the Hayq Town Municipality;
2. Ato Asefa Tessemea, Women Affairs Officer;
3. Ato Wodajo Abebe, Ombudsman for the Town Municipality; and
4. Ato Akalu , From Administration Office.

7) Werebabu Woreda Administration

1. Ato Shumet Endris, Werebabu Woreda Administration;
2. Ato Semeya Ahimed, Werebabu Women Affairs;
3. Ato Seid Ahimed, Werebabu Water Supply;
4. Ato Mohammed Adem, Werebabu Health Office;
5. W/ro Lubaba Bekele;
6. Ato Fentaw Endris, Agriculture; and
7. Ato Mohammed Seid, Education.

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Annex 2: Discussion Points for Public Consultation

1. Opinions of the people about the proposed railway project;
2. Possible positive and adverse impacts that would be obtained due to the implementation of the project;
3. Possible enhancement and mitigation measures for the positive and adverse impacts of the railway project;
4. Feelings, concerns and participation of the local government authorities in the implementation of proposed project;

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Annex 3: Minutes of Meeting of the Consultation Held with Project Affected Woreda Administrations (English)

Annex 3- 1: Consultation with Dawa Chefa Woreda Administration

Place of Meeting: Dawa Chefa Administration Office
Date of the Meeting: Wednesday, 20 April 2011
Time Started: 02:00pm

Participants of the Meeting:

1. Ato Shiferaw Mengesha, Head of Human Resource Development;
2. Ato Masresha Teshome, Administration and Security;
3. Ato Asnake Mamo, Land Use and Administration;
4. Ato Sewnet Waqjira, Office of Education;
5. Ato Ali Endris, Office of Health;
6. Ato Aliy Mohammed, Water Supply Office;
7. W/ro Fate Endris, Women, Youths and Children Affairs Office;
8. Dr Mohammed Yesuf, Office of Agriculture;
9. Ato Shamil Ahimed, Woreda Administration; and
10. Ato Temesgen Yimer, from the CWCE.

Points of Discussions:

1. Opinions of the Woreda people about the proposed project;
2. Possible positive and adverse impacts due to the implementation of the project;
3. Possible enhancement measures for the project benefits and mitigation measures to alleviate the possible adverse impacts of the project; and
4. Feelings and concerns and participations of the Woreda Administration in the proposed project.

We, the above listed participants of the meeting, after we thoroughly discussed on the topic of issues indicated above, we forward our opinion on the proposed railway project as presented in the following sections.

1. The Opinions of the Woreda People about the Proposed Project:

The have got acceptance by the Woreda reda people for the reasons that the people believed that the project will create job opportunities during construction and it will also helpful during operation.

The people will require the government in future for fair compensation payment for the properties they will lose during the project construction. This issue will be raised by the people in future for the fact that the people did not obtain compensation payment on time for the loss of properties caused by electric line installations. This unwelcome experience made them to be worry about the railway project. However, they believed that the railway project has positive advantages for it will improve the social, economic, and political problems of the society.
Precautions should be taken ahead of time to protect problems that could take place by negligence. We believed that we have to give awareness to our people who will be

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affected by the project. Our people are so conscious about the project since we have been discussed about the railway project when we carried out consultation with the people on the Development and Transformation Plan of the Country.

The people felt very happy when they new that the proposed railroad line will pass through Kemissie Town.

We understood from this discussion that after the completion of the project final design, project affected properties will be inventoried, and identified, and then compensation payment for the loss properties will be prepared.

2. Possible Benefits and Adverse Impacts of the Railway Project:

1.1 Possible Benefits of the Railway Project:

- Farmers will have access to this transportation and will supply their product to market; besides, there will not be problem to distribute farming inputs on time;
- The railroad line will encourage farmers of project influence areas to produce market oriented surplus products for marketing;
- It will encourage urban settlements to take place along the railroad line;
- The project will create job opportunities for unemployed youths, besides, the local women will get advantage to earn additional income if they supply tea, food and local made beverages to the project workers during construction; and
- It will strengthen the mutual political, economic and cultural relations with neighbouring countries.

1.2 Possible Adverse Impacts of the Project:

- Loss of houses;
- Loss of croplands;
- Communicable health problems during project construction;
- Demolition of bench marks and others constructions if adequate awareness is not given to the communities ahead of time;
- People will create problems in work sites if the compensation payment is delayed or if they feel that they did not get fair compensation the properties the loss;
- Local labour workers will require the project payment higher than of the normal payment. This problem will take place when there is lack of awareness about the project. Therefore, we have to be conscious about those problems and be ready to solve these problems on the spot or ahead of time.
- Some project workers will commit corruptions by selling some project properties and consequently the activities of the project will lack quality performance.
- The Woreda Administration may not give quick response for problems, and may not follow-up to ensure that community and country advantages are well protected from misuses.

3. Possible Enhancement Measures for the Project Benefits and Mitigation Measures to Alleviate the Possible Adverse Impacts of the Project

Getachew ... General Manager

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- Provide awareness to the people to know that the project is for the country use and it is their project;
- Compensation should be prepared very carefully to make the compensation payment fair. The rate of compensation for same type of properties should not be vary;
- The rate of compensation should be based on the current market cost; using other reference to determine the rate of compensation is not fair;
- Grievance redress committees should be established and functional in all specific areas so that the project affected persons will consult them easily when they have complain;
- There should be a well established committee consists of experts for the valuation of properties and preparation of compensation cost; and the Woreda Administration should work closely with the committee to follow up their performance so that no corruption will take place;
- The properties of the project will be more protected from theft and damage if responsible guards are employed from the community members;
- Awareness should be given to the project workers hot to prevent and control sexual transmitted diseases such as HIV/AIDS; and
- The Woreda Administration Office, known community elders and the public should be informed and be aware about the schedule of project works.

4. Feelings and concerns and participations of the Woreda Administration in the proposed project

- The fact that the feeling of the Woreda Administration about the project is the same feeling as of the Woreda people. But it is much more than that.
- The Woreda Administration will take care to ensure that the project workers are secured and safe;
- The Woreda Administration will be involved in the providing of awareness creation to the local people so that the population will be cooperative;
- The Woreda Administration will support the project implementation by all possible means so that the project will be completed during the Development and Transformation Plan of Woreda Administration.

General Manager

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Annex 3- 2: Consultation with Werebabu Woreda Administration

Place of Meeting: Werebabu Administration Office
Date of the Meeting: Monday, 18 April 2011
Time Started: 04:00pm

Participants of the Meeting:

1. Ato Shumet Endris, Woreda Administration;
2. Ato Semeya Ahimed, Women Affairs;
3. Ato Seid Ahimed, Water Supply;
4. Ato Mohammed Adem, Health Office;
5. W/ro Lubaba Bekele,
6. Ato Fentaw Endris, Agriculture
7. Ato Mohammed Seid, Education;
8. Ato Temesgen Yimer, from the CWCE.

Objective of the Meeting: Discuss about the project and share people's opinions

1. Regarding to opinions of the Woreda people about the railway project:

   - They have strong interest for the proposed project for the reasons that they believe it is speedy and cheap transport and they will have access to it to supply their products to market. The Woreda is known in production of vegetables and fruits. They knew that the project is very important for the country development. The project will create job opportunities for unemployed people and besides, it will improve women's sources of income.

   - Trade is the main occupation of the Woreda. The Woreda is potential in the production of vegetables and fruits. Since the proposed railroad line passes through this area, it will enhance businesses and encourage the development of vegetable and fruit farms at large scale.

   - The threat we have about the project is that during construction, the project will cause the loss of croplands, trees, and houses which are found within the railroad line route. However, we believed that the government will give fair compensation payment for the loss properties.

   - The other problem that could be arising is if the project favours to employ labours from only one Woreda. This of course will bring unwelcome feeling to the people who are neglected. Hence, the project should give equal and fair opportunities for all project affected areas to get benefits from the project could provide.

   - During the project construction and operation, many footpaths which serve the people will be disturbed and blocked. In this manner, the normal social interactions among people will be hampered. Therefore, the project should give proper attentions and give solutions so that cattle and people and ensure that the alternative cross paths will not consume much time to get the access.

2. **With regard to possible mitigation measures related to health problems:**

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- We have to give awareness promotion to protect the expansion of communicable diseases which will come with the project construction. If this endeavours takes place, the people will able to protect themselves from health hazards.

- The Woreda Administration will give awareness for the people to support the project. The Woreda Administration believes that the railroad line will speed up the development of Woreda. This benefit will be maximized if we can work with the cooperation of the local people. As being one of the project stakeholders, the Woreda eda Administration is expected to exert great effort for the project implementation. It is believed that the participation of the local people is vital in the protection of project equipments and materials. Therefore, in this regard, we will mobilize the local people to support the project. The construction of railroad line in the country was a dream; now the dream becomes true. Henceforth, we feel very happy; and we are ready to support the project by all the possible ways.

Annex 3- 3: Consultation with HaykTown Administration

Place of Meeting: Head of Municipality Office
Date of the Meeting: Monday, 18 April 2011
Time Started: 10:00am

Participants of the Meeting:

1. Ato Getnet Yimer, Head of the Town Municipality;
2. W/ro Asefu Tessemea, Women Affairs;
3. Ato Wodajo Abebe, Ombudsman for the Town Municipality;
4. Ato Akalu , From Administration Office; and
5. Ato Temesgen Yimer, from the Consultants.

Points of Discussions:

1. Opinions of the Woreda people about the proposed project;
2. Possible positive and adverse impacts due to the implementation of the project;
3. Possible enhancement measures for the project benefits and mitigation measures to alleviate the possible adverse impacts of the project; and
4. Feelings and concerns and participations of the Woreda Administration in the proposed project.

1. The purpose of the consultation meeting with the town municipality is to discuss and identify the interest of the town municipality and obtain their opinions about the possible impacts of the project and to identify their mitigation measures.

   The construction of the railroad line is among the major targeted activities of the Five-Year Development and Transformation Plan. And the people will be very happy since the project is helpful at country level and people will benefit from the project.

   The people of Hayq have two responses; one, they believe that the construction of the railroad line is very important and they will support it. Two, the people want to

know the site of the railroad line station and the possibilities to use the station. They want the railway station to be nearby so that they will have access with no hardship. The people know that numbers of farmers will lose their croplands during construction.

2. Despite the fact that the people of Hayq are very interested about the construction of the railway project, they have demands related to the railway station. The Town Municipality will also share the demands of the people for the reasons that they have market products such as fish, vegetables and fruits. When these croplands will be affected by the project, the affected farmers will complain. Because the products that would obtained from a small size of cropland is very much. The government should give special attention during compensation payment for such type of croplands. The compensation payment for the loss property should be fair and satisfy the affected person.

3. The threats of the Town Municipality towards the Project:

   - Before the start of the project construction, all compensation payment for the loss properties should be completed;
   - The question for the railway station to be nearby should have to be treated positively;
   - There is no problem to give awareness for the local people about the project. The Town Municipality believes that it is the responsibility of all; so that from now onwards, we will undertake in full capacity to aware the people.
   - The workforce of the project will be very high during the project construction. Therefore, appropriate area for the project camp should be identified before the start of the project.
   - Proper attention should be taken to ensure that the proposed railroad line will not affect the communication of people in Kebeles and Woredas. With having this, the discussion is windup.

Annex 3- 4: Consultation with Kemissie Town Municipality

Place of Meeting: Municipality Conference Room
Date of the Meeting: Wednesday, 20 April 2011
Time Started: 08:00pm

Participants of the Meeting:

1. Executive Members of Kemissie Town Municipality ;
2. Executive Members of Kebeles of Kemissie Town Municipality; and
3. A Consultant from CWCE.

Chairperson of the Meeting: Ato Ahimed Hassen, Head of the Municipality

Points of Discussions:

1. Opinions of the Woreda people about the proposed project;

Getachew Betru (Dr.Eng.)
General Manager

Ethiopian Railways Corporation

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2. Possible positive and adverse impacts due to the implementation of the project;
3. Possible enhancement measures for the project benefits and mitigation measures to alleviate the possible adverse impacts of the project; and
4. Support of the Woreda Administration for the proposed project construction.

1. Opinions of the Woreda people about the proposed project:

- The project will enhance the development of the town since the proposed railroad line traverses the town section;
- The project started being late, it would had been started sometimes before;
- The people of Kemissie town is very willing to support the project;
- The people will benefit much from the project rail line because their economic sources depends on trade;
- The railway transportation will use as one alternative and it will be useful for it is low cost and speedy;
- However, the people requested whether the railway station is far or near to the town of Kemissie so as to use the railway;
- They are worry about the compensation payment for the loss of properties that will take place as the result of project construction.

2. Possible positive and adverse impacts of the Project:

The railway transport will have the following benefits:

- It will enhance economic development of the country;
- It helps to develop relationships in the area of business and trade;
- It will enhance the development of socio-cultural relations among peoples;
- It will help to create job opportunities to the local people;
- The adverse impact of the project will be minimal as compared to its benefits, and there will not be significant displaced persons due to the project;
- It is a low cost transport means;
- It has capacity to transport heavy goods;
- It will connect towns with towns;
- Living expense will be high due to the proposed railway project construction;
- Increase traffic accidents;
- There will not be problem in supply of goods;
- The transport is fast therefore it helps to speed up works;
- Kemissie town will have an opportunity to be a business centre;
- It will encourage to produce diversified agro-industrial products;
- Skilled youths will get opportunities for employment and to be engaged in the project construction activities.

3. Possible measures to enhance benefits:

- Develop the attitudes of the people positively to be creative to exploit the benefits to be obtained through the use of the railway transport;
- Protect infrastructures from damage during project construction;
- Provide proper attentions to protect religious institutions and cemetery not to be affected during construction;
- Develop good cooperative work environment with all stakeholders;
- Provide the maximum effort for productivity so that there will be surplus for market;
- Create suitable environment to the youths to be skilled and productive; and
- Encourage investors to involve in investment activities.

4. Possible support expected from the Town Municipality:

The Town Municipality officials are very willing to support the project in the area mentioned below.

- Provide awareness and convince the people;
- Carry out security activities to keep the project property and workers safe; and
- Mobilize the society to support the project.

Annex 3- 5: Consultation with Kalu Woreda Administration

Place of Meeting: Kalu Administration Office
Date of the Meeting: Tuesday, 19 April 2011
Time Started: 02:00pm

Participants of the Meeting:

1. Ato Ased Mohammed; Road Office;
2. Ato Wondwossen Desalew; Land Administration;
3. Ato Lulseged Wassihun; Education office;
4. Ato mohammed Tadesse, Women, Youths, and Children Affairs;
5. Ato W/ro Ansha Seid, Administration Office;
6. W/ro Ansha, Agriculture Office;
7. Ato Kasaye Liben, Administration;
8. Ato Berhe, Health Office;
9. Ato Temesgen Yimer, from the CWCE.

The purpose of this consultation is to share opinions about the proposed railroad line that will be constructed in our country and traverses through our Woreda.

The participants of this consultation which represent the Woreda Administration will responsible persons to play great role to facilitate the project construction up to its completion period.

The points of discussions are four and we give our opinions accordingly as presented below.

1. **Opinions of the Woreda people about the proposed project:**

Getachew Berru (Dr.Eng.)
General Manager

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The people of Tehuledere Woreda have good opinions about the project. The people have information about the construction of the railroad line; however, they do not know where the railroad line traverses through. On top of all, the society has positive opinions about the project. To some extent, the consultant who came from CWCE has discussed and he notified us some areas of the Woreda which will be crossed by the proposed railroad line. We understand that the majority area of Chefa will be affected by the project railroad line.

2. **Regarding the Possible positive and adverse impacts of the Project:**

The benefits of the project are many. Majority of our people are cash crop producers. Therefore, they will have good opportunity to supply for markets. Job opportunities will be created for the youths. In general, the project has social, economy and political benefits.

On the other hand, the proposed railroad line passes through irrigated croplands. Besides, many houses will be demolished since there are many people settled in the project affected area. Though the proposed railroad line will cause adverse impacts, we believe the benefit of the project has more weight than of its anticipated negative effects.

3. **Regarding possible measures to enhance the project benefits and mitigated measures to ameliorate the adverse impacts:**

   - The undertaking of the socio-environmental impact assessment could bring the possible solutions;
   - We have to able the population to participate in the project construction at higher degree;
   - The project affected persons must get fair compensation for the loss properties;
   - The affected lands during the project construction should be rehabilitated by mobilizing the community;
   - Proper attentions should be given during the preparation of compensation payment for the project affected persons;

4. **Feelings, Concerns and participations of the Woreda Administration for the project construction:**

   - The Woreda Administration has very interest for the implementation of the railway project. They will agitate and mobilize the communities of the project area to support during its construction, ; so that the project will be implemented successfully;
   - The other issue needs to mention here that the compensation has to be prepared with the consideration of current situations. Besides, there should be not delay during compensation payment;
   - We the Woreda Administration people are expected to work in the area of awareness creation and mobilization so that our people will actively support the implementation of the project.

Annex 3- 6: Consultation with Tehuledere Woreda Administration

Place of Meeting: **Tehuledere Administration Office**
Date of the Meeting: **Monday, 18 April 2011**
Time Started: **11:00am**

Getachew Betru (Dr./Eng.)
General Manager

Ethiopian Railways Corporation

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Points of Discussions are:

1. Opinions of the Woreda people about the proposed project;
2. Possible positive and adverse impacts due to the implementation of the project;
3. Possible enhancement measures for the project benefits and mitigation measures to alleviate the possible adverse impacts of the project; and
4. Support of the Woreda Administration for the proposed project construction.

Participants of the Meetings are:

1. Ato Seid Eshetu, Executive Member;
2. Ato Yesuf Hassan, Executive Member
3. Ato Solomon Brehanu; Executive Member
4. Ato Fettaw Ahimed, Executive Member
5. Ato WDesta Girmay, Executive Member
6. Ato Solomon Dinfe, Executive Member; and
7. Ato Temesgen Yimer from Consulting Engineers.

The Consultation meeting has carried out with the participants of the above listed members, and they discussed on the issues indicated above.

1. **Opinions of the Woreda reda people about the proposed project:**

The Woreda Administration has great interest about the railroad line construction. The people of the Woreda need the construction to be started as soon as possible and to be operational. They express their expectation that they would be very happy if they could have access to use the railway transportation.

2. **Possible benefits of the Project:**

- Significant numbers of unemployed people will have job opportunity;
- It will be an alternative transportation for the Woreda people including farmers;
- Framers will have opportunity to take their surplus to market in speedy manner; and
- Trade activities will be developed and consequently, people will benefit more.

3. **Possible adverse impacts of the Project:**

- Project construction may cause loss of cropland and significant farmers will be affected;
- The crossing footpaths those will take to the Lakes of Ardibbo, and Lake Hayq will be affected due to the project railroad line; and the communities of the areas will not have access to reach at the lakes and around to undertake their common farming activities. Therefore, this issue should be treated to keep the interests of the people and also to maximize the project benefits;
- Employment of labour from other areas may reduce the project job opportunity benefit of the Woreda unemployed people;

Getachew Berru (Dr.Eng)
General Manager

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- Delay in compensation payment will cause problems during project construction. This problem has been observed during the installation of telephone and electric lines by Federal Telecommunication, and Electric Light Corporations. We believe that same problem will not happen in the construction of rail way project;
- Compensation for affected irrigated croplands should be prepared by giving due attentions so that project affected farmers will get fair compensation for the loss irrigated croplands;

4. **Regarding possible measures to enhance the project benefits and mitigated measures to ameliorate the adverse impacts:**

- Payment of compensation should be completed before the start of the project construction;
- Prepare easily accessible crossing paths to replace the affected crossing footpaths and other roads by the railroad line construction so that communities continue their normal interactions among each others;
- Prepare railway station at accessible distance for the rural communities users to supply surplus products for markets;
- Aware the communities that railway transport will not exasperate living expenses;
- Undertake awareness creation activities so that the people of the project area will protect from the expansion of communicable diseases that could be take place due to project construction;
- Take prompt appropriate measures for issues that will be raised due to the implementation of the project;
- Disclose the nature and benefits of the modern railway transportation system to the public through the use of brochures, newspapers.

5. **Feelings and concerns of Woreda Administration and their participations in the project implementation:**

- Understand its benefits and ensure that the railway project will benefit the Woreda people;
- Win the trust of the people to support the project to be successful and mobilize them to be beneficiaries;
- Assist project affected farmers during compensation payment and rehabilitation;
- Assist unemployed persons to be the beneficiary of job opportunities in the project construction;
- Encourage youths to support the project and to get benefit from the project;
- Ensure that the attitudes of the people towards the project is positive; and
- Support the project to be successful by maximize the involvement of government and other organizations.

Annex 3- 7: Consultation with Kombolcha Town Administration

Place of Meeting: College of Agriculture
Date of the Meeting: Tuesday, 19 April 2011
Time Started: 07:30am

Points of Discussions are:

1. Opinions of the Woreda people about the proposed project;

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General Manager

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2. Possible positive and adverse impacts due to the implementation of the project;

3. Possible enhancement measures for the project benefits and mitigation measures to alleviate the possible adverse impacts of the project; and

4. Support of the Town Administration for the proposed project construction.

Participants of the Meetings are:

The participants of the meeting are 32 Kombolcha Town administration executive members of which 27 male and 5 females. The consultation meeting was chaired by the Town Municipality Head.

Agenda No.1, What is the opinion of the people about proposed the railroad line construction?

- We know that our people are very happy and have positive opinions for the project. They have information about the start of the project;
- Despite the fact that the proposed railroad line crosses through Tit-Meda andold Air port area and will cause loss of properties; the opinions of the people that have about the project is positive;
- The proposed railway station at Kombolcha will require abut 100ha of open land. The construction of this railway station displacement impacts since there are numbers of houses in the proposed site. Therefore, the town municipality will arrange to settle the displaced persons and to get fair compensation for the loss properties;
- In general, we understood that the town people have strong interest for the railway project and the people willingness to support the project is very high.

Agenda No.2, Regarding the benefit and adverse impacts of the project:

No.2.1, Benefits of the Project

- Since the proposed railroad line traverses the town section of Kobolcha and its main station established in the town, the town dwellers and business people will use easily the railway. Besides, it will reduce unemployment in the town since it will create job opportunities;
- It will encourage the creation of diversified income resources;
- It will improve the transport problems in the area;
- It will strengthen the town to be strong Dry Port and to provide adequate services;
- The people will benefit from this speedy transport system;
- The proposed railway transport will encourage the development of social and economic relation among business peoples;
- Kobmolcha is an industrial area and the construction of railroad line and the establishment of the rail way station in the town will cumulatively encourage to develop investments and export and import activities of the town; and
- Furthermore, it will enhance the development of mutual social, economic and political relations of Ethiopia with its neighbouring countries.

No.2.2, Adverse impacts of the Project

Getachew Betru (Dr.Eng.)
General Manager

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- The proposed rail way station at the town section of the Kombolcha will bring waste and pollution problems to the town;
- The project construction will be the causes for the loss of properties such as residential houses and displacement;
- The town population will grow as the result of the establishment of rail way station and movement of passengers in Kombolcha town;
- Some investors of the town will be affected since the proposed railroad line crosses some areas of investors; and
- Some footpaths and roads will be destroyed by the railroad line construction and this will bring problems on the continuous of social and economic interaction among peoples of communities.

Agenda No.3, Regarding the enhancement and mitigation measures for benefit and adverse impacts of the project:

Agenda No.3.1, Measures to enhance the benefits of the project

- Facilitate the possible suitable situations to maximize the project benefits and get advantages there-from; and
- Aware the people to be beneficiaries of the project since it is cheap and speedy and also it will accelerate businesses.

Agenda No.3.2, Mitigation Measures for Possible Adverse Impacts:

- Provide awareness for the people to be safe from traffic accident;
- Establish waste disposal management to protect pollution problem at and nearby railway station;
- Consult project affected investors to mitigate their problems and provide land to replace the affected land by the project construction; and
- Provide fair compensation for the loss properties; take rehabilitation measures to support affected households; and facilitate the situations to engage project affected persons in income generating activities.

Agenda No.4, Support of the Town Administration for the proposed project construction:

- The Town Municipality have strong interest for the railway project and will be happy to support the project construction by all possible ways;
- We, the town administration executive members are very eager to see the realization of the railway project.

Getachew Bezu (Dr./Eng.)
General Manager

Ethiopian Railways Corporation

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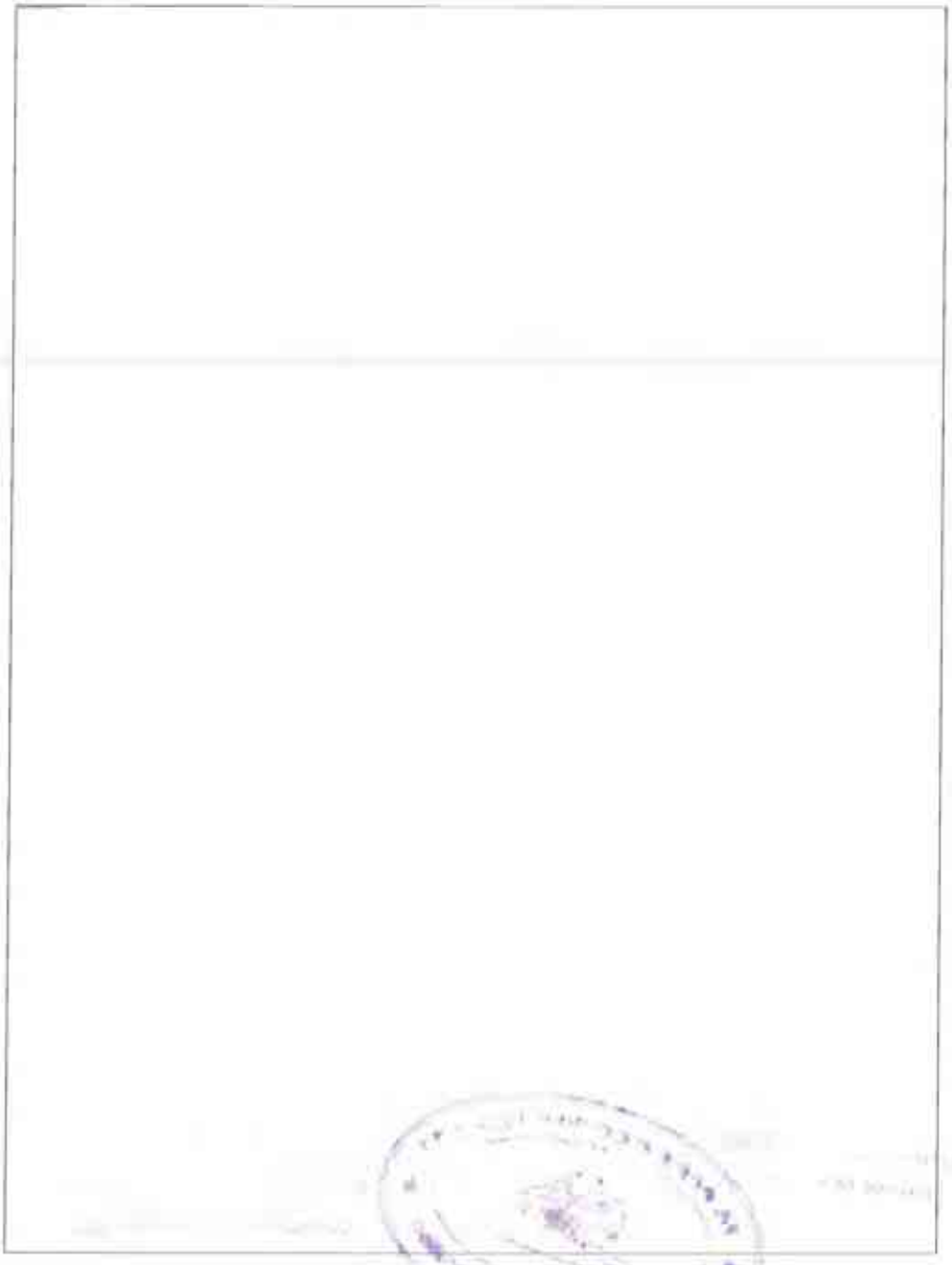
Annex 4: Minutes of Meeting of the Consultation Held with Project Affected Woreda Administrations (Amharic)



Getachew Betru (Dr./Eng.)
General Manager

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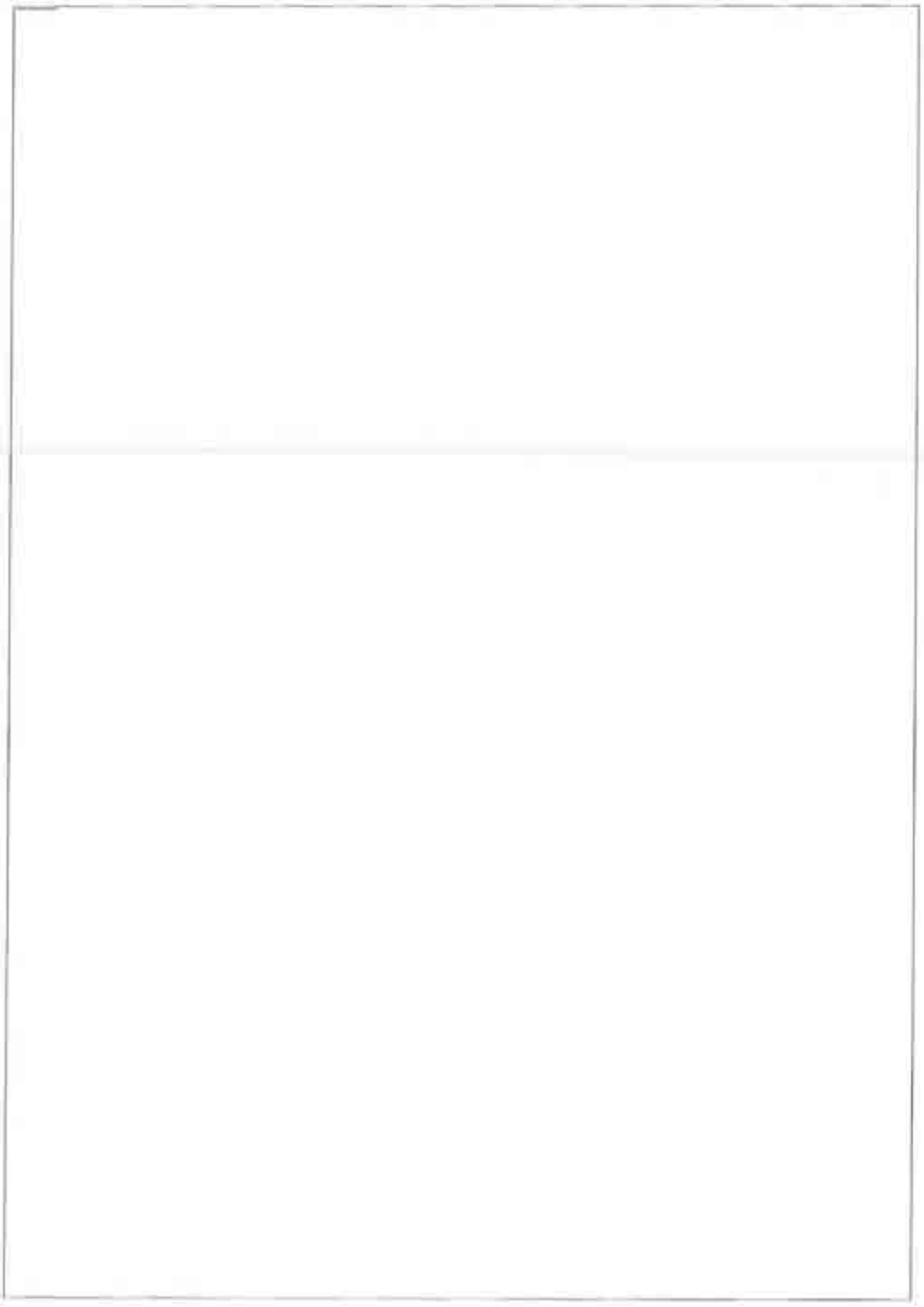

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General Manager

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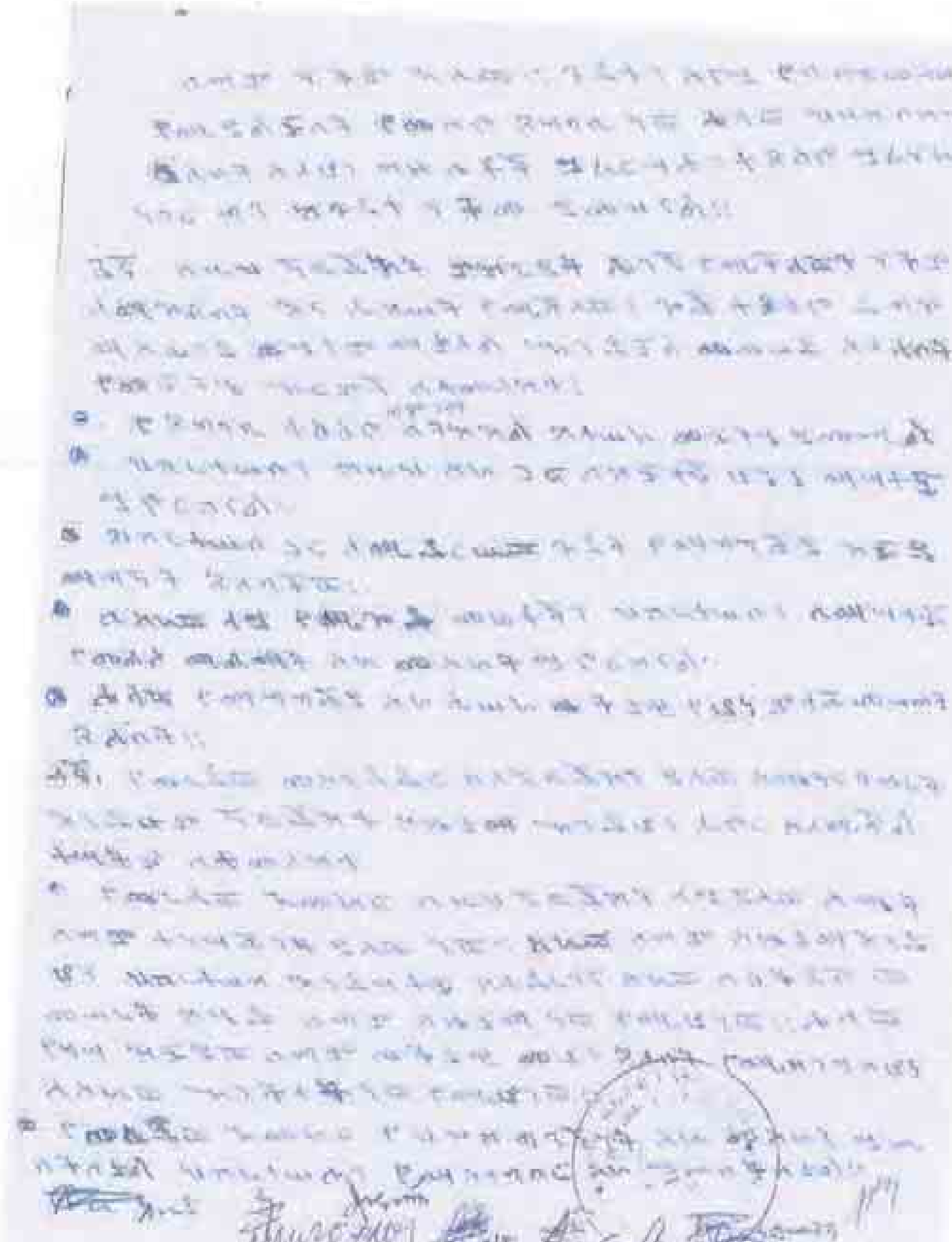

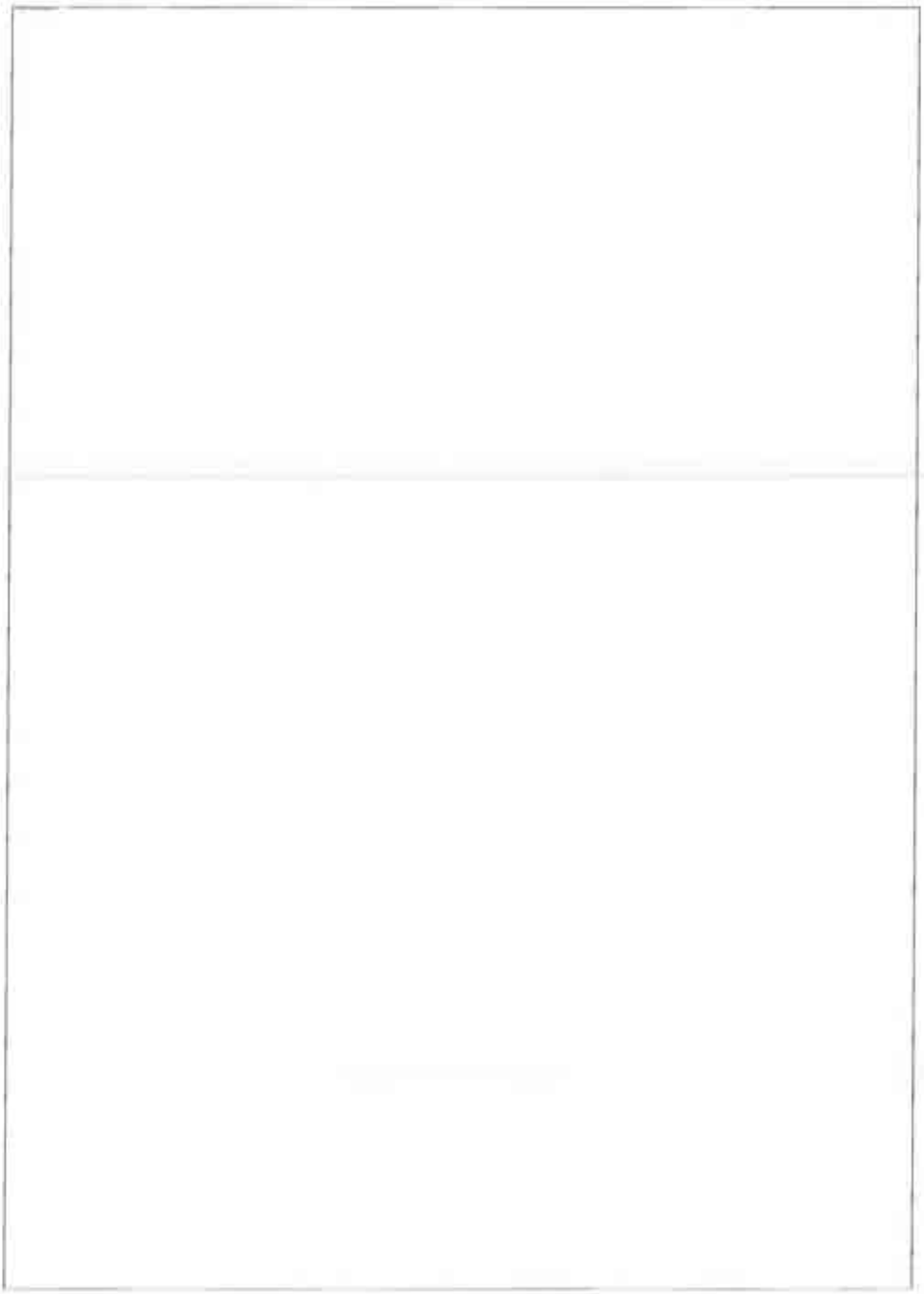

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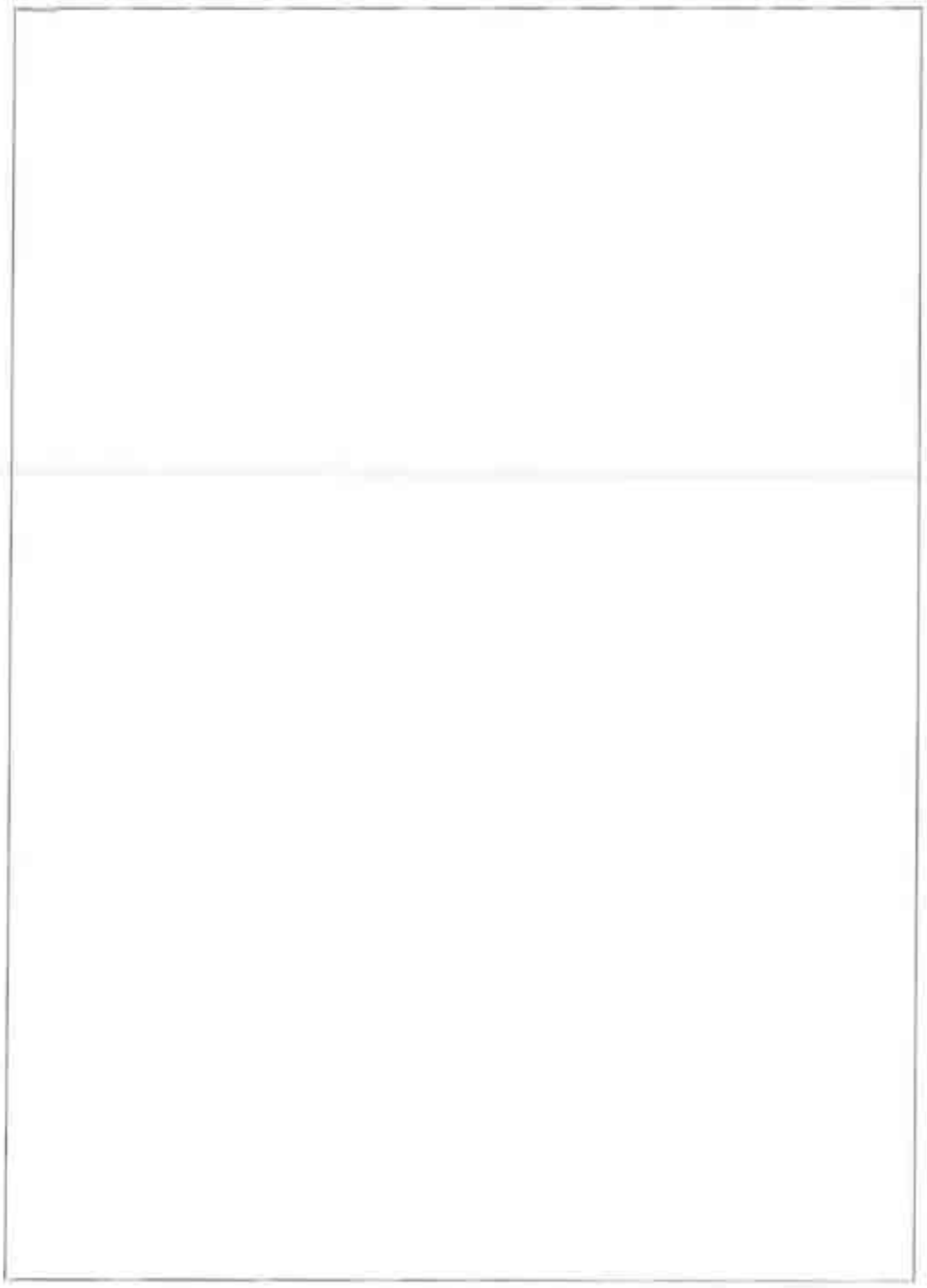

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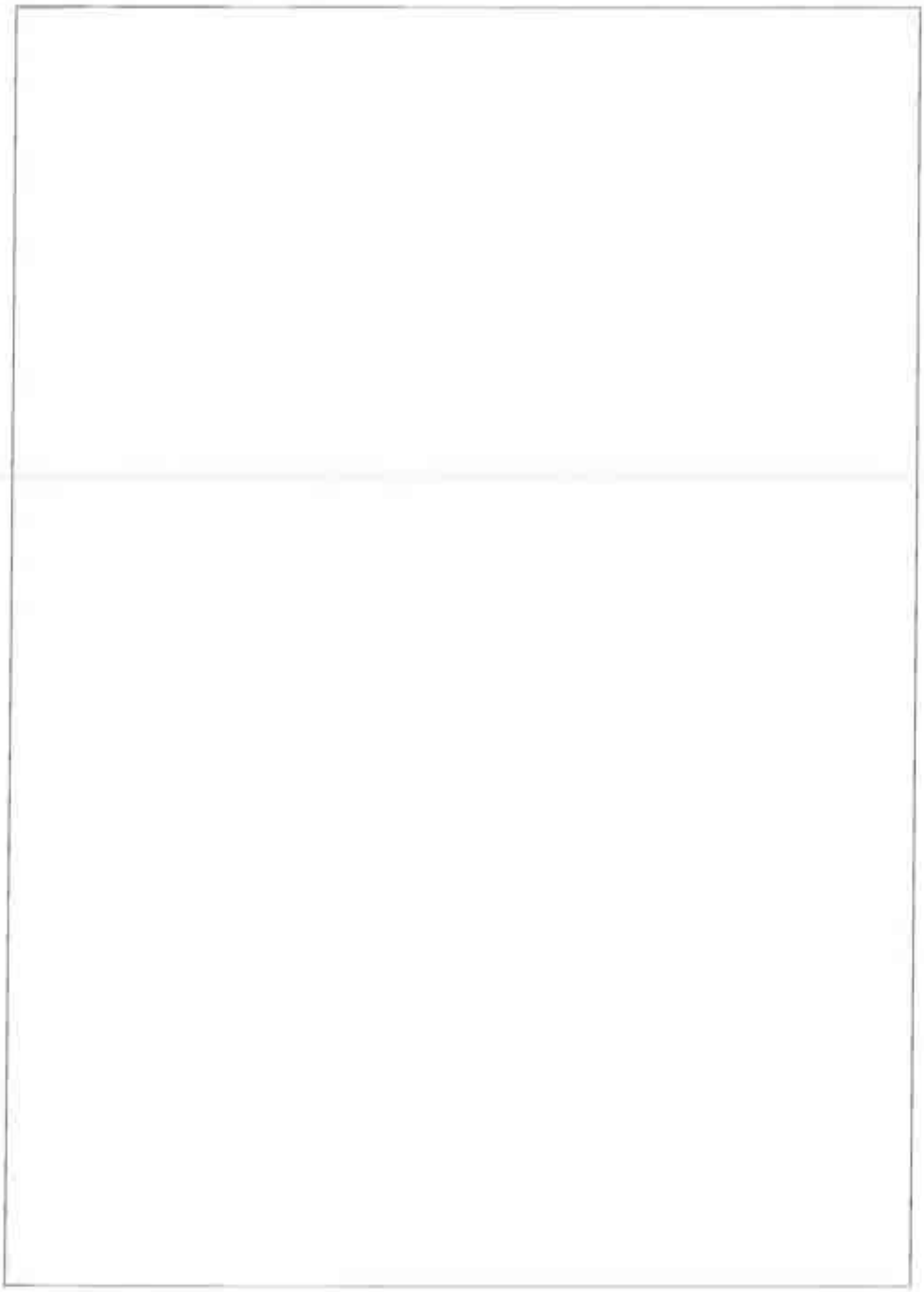

Getachew Betru (Dr./Eng.)
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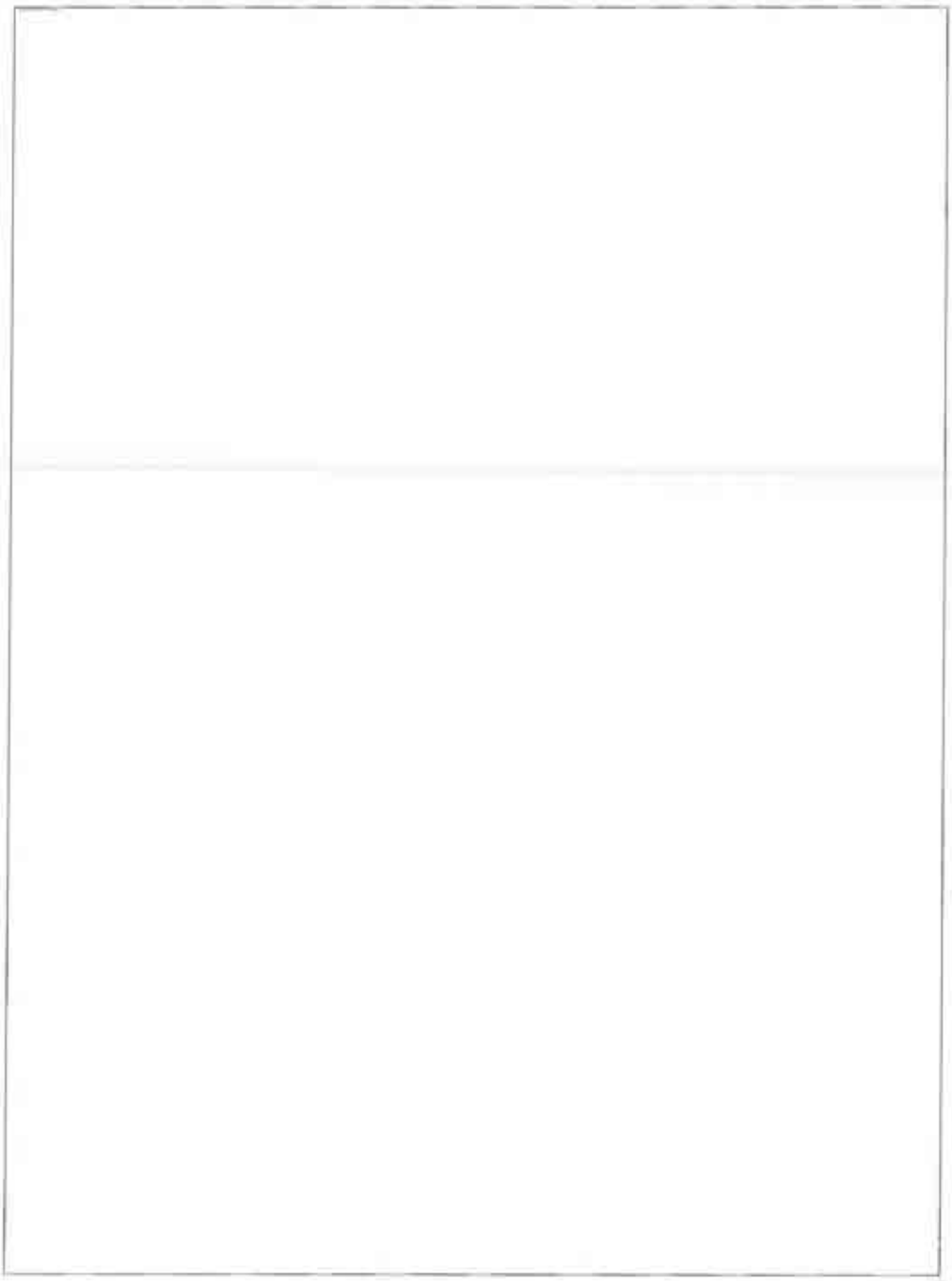

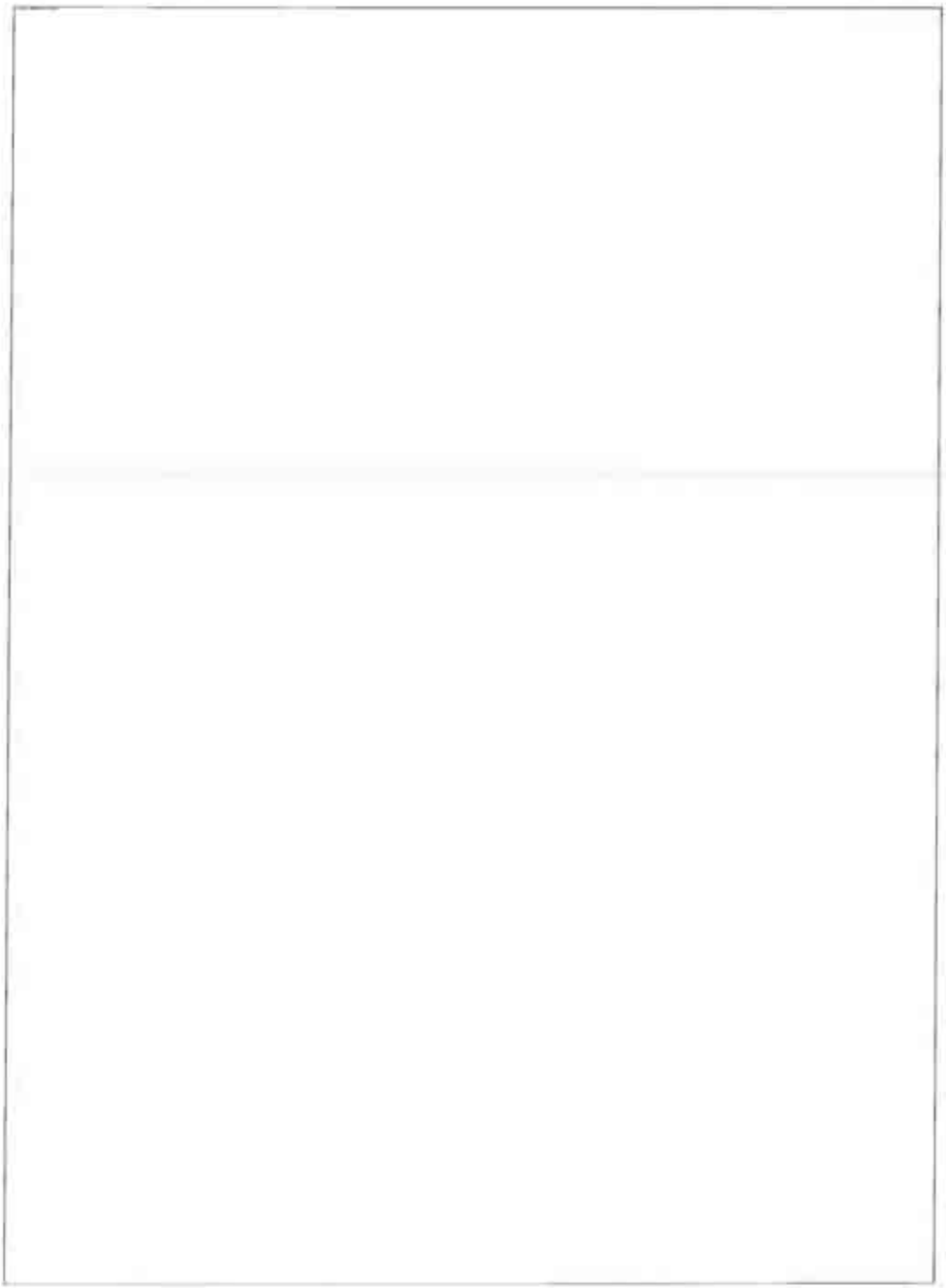

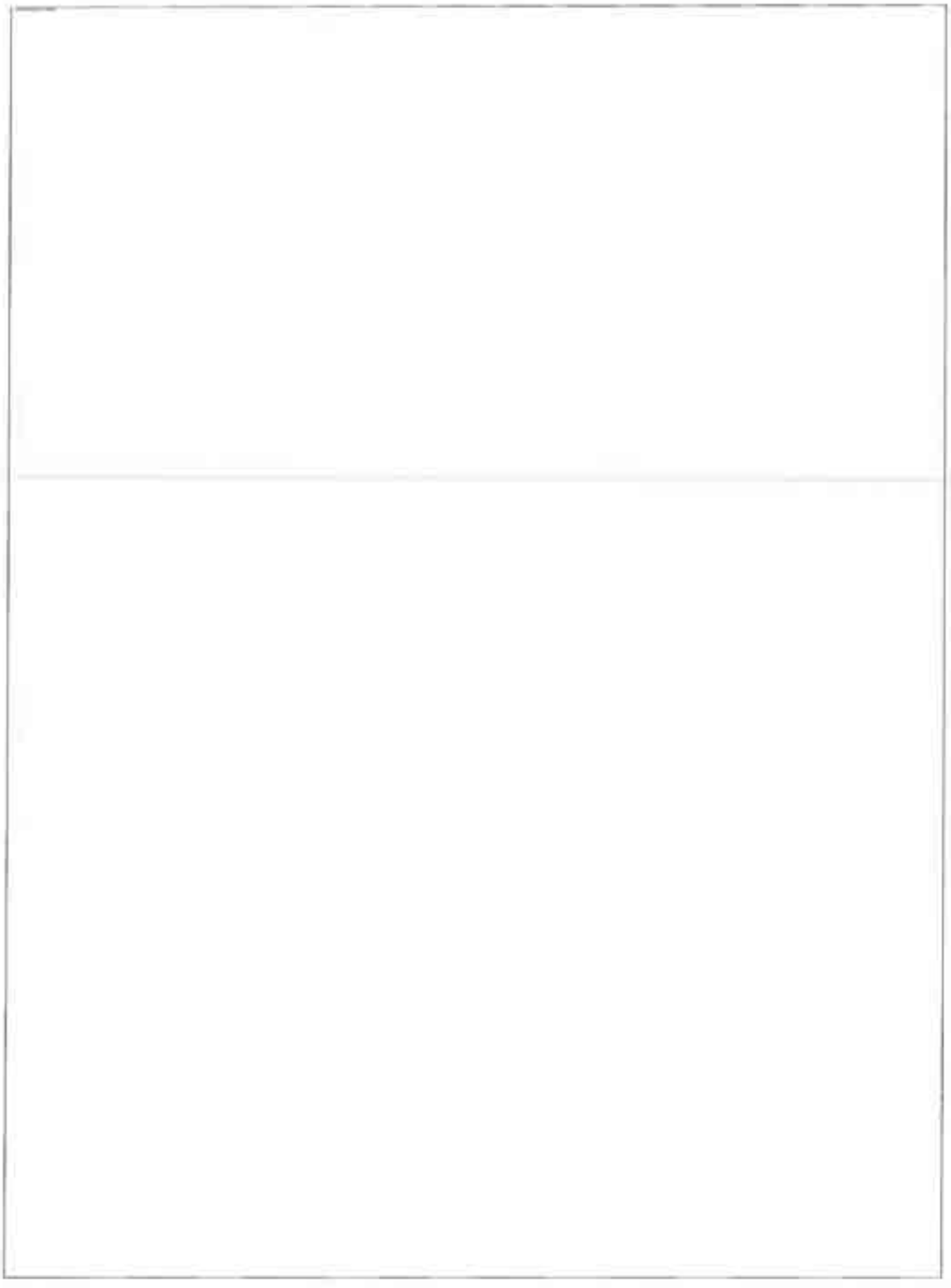

Getachew Betru (Dr./Eng.)
General Manager

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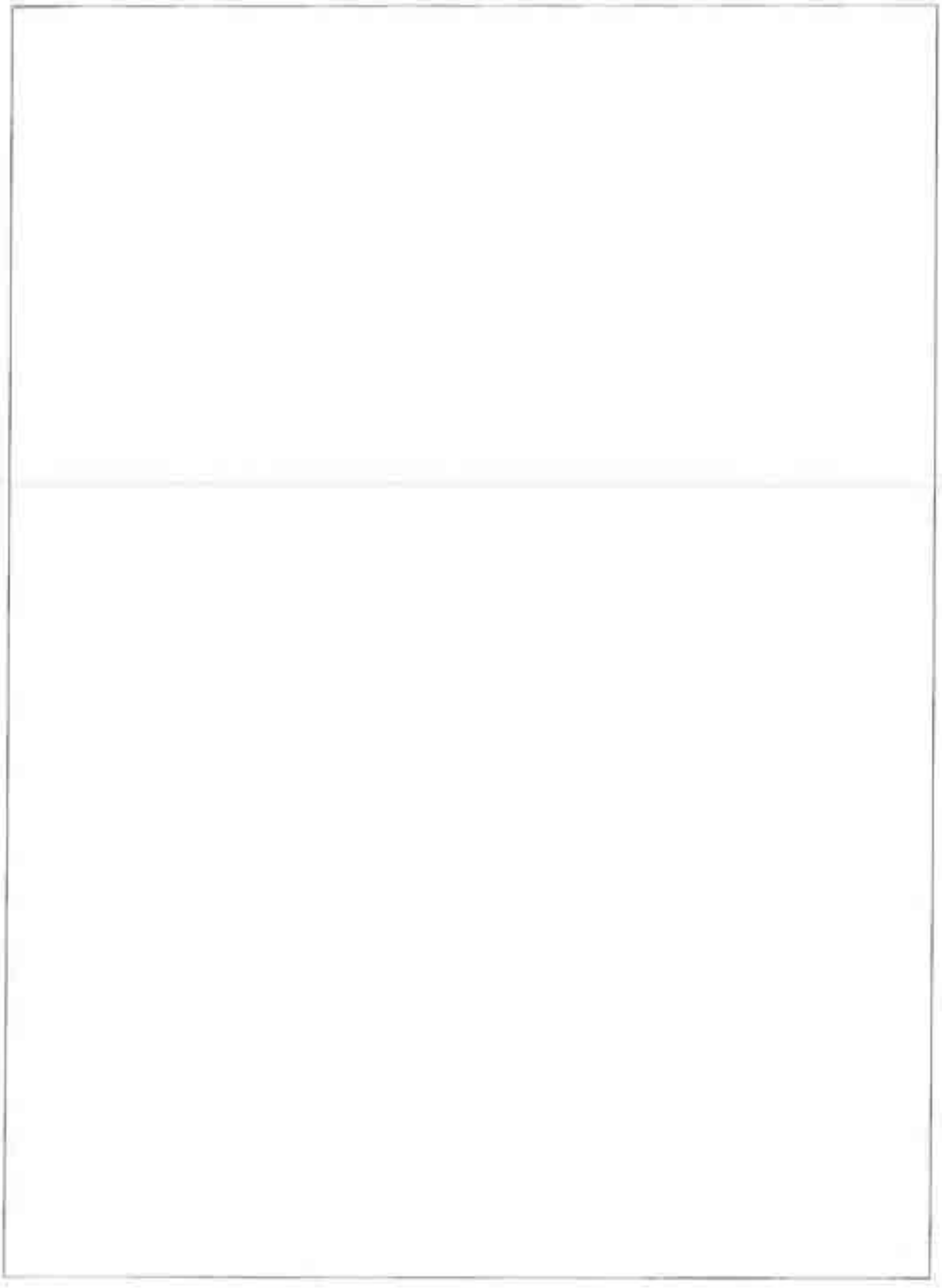

Getachew Bekru (Dr./Eng.)
General Manager

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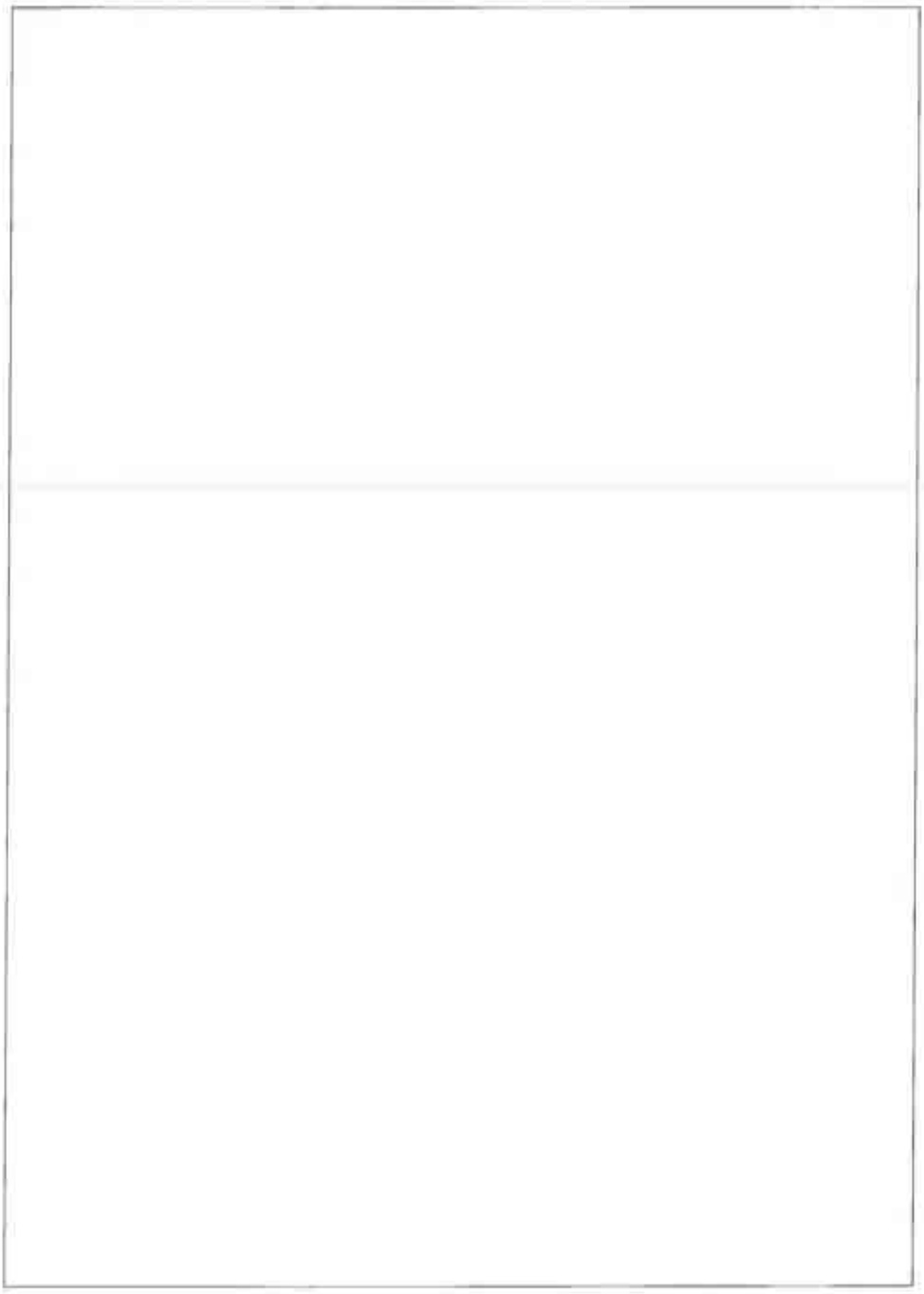

Getachew Betru (Dr.Eng.)
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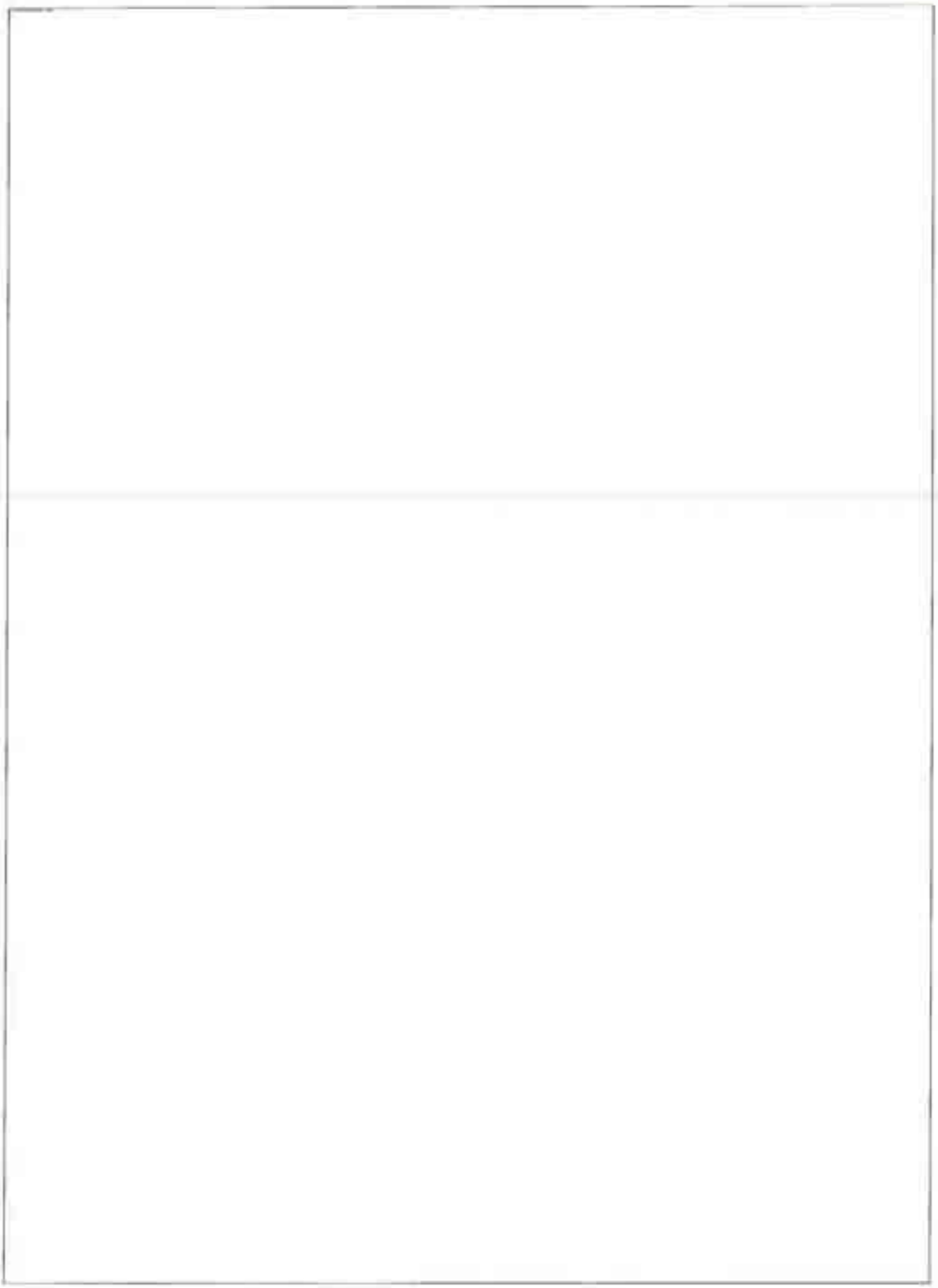

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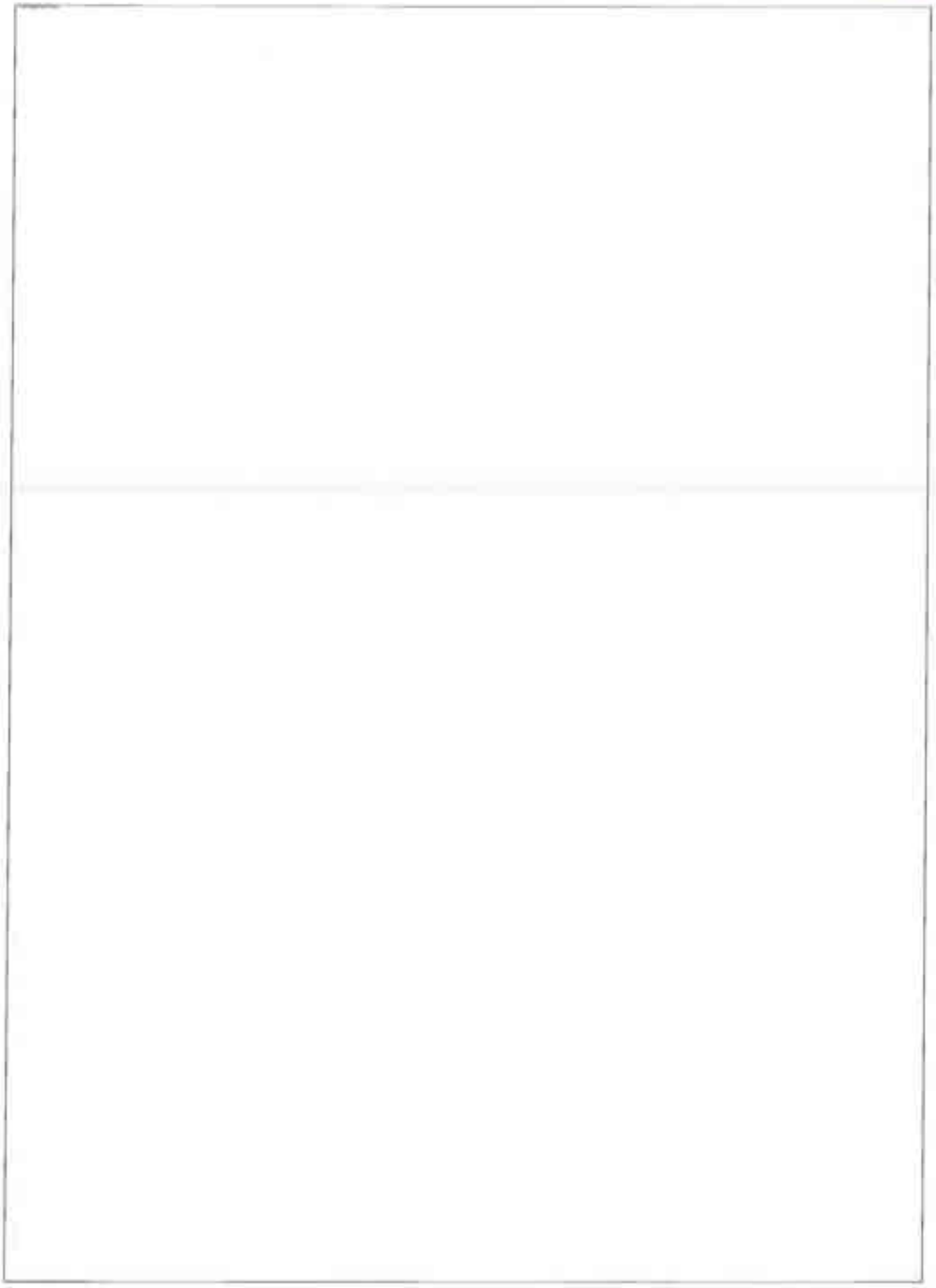

Getachew Betru (Dr./Eng.)
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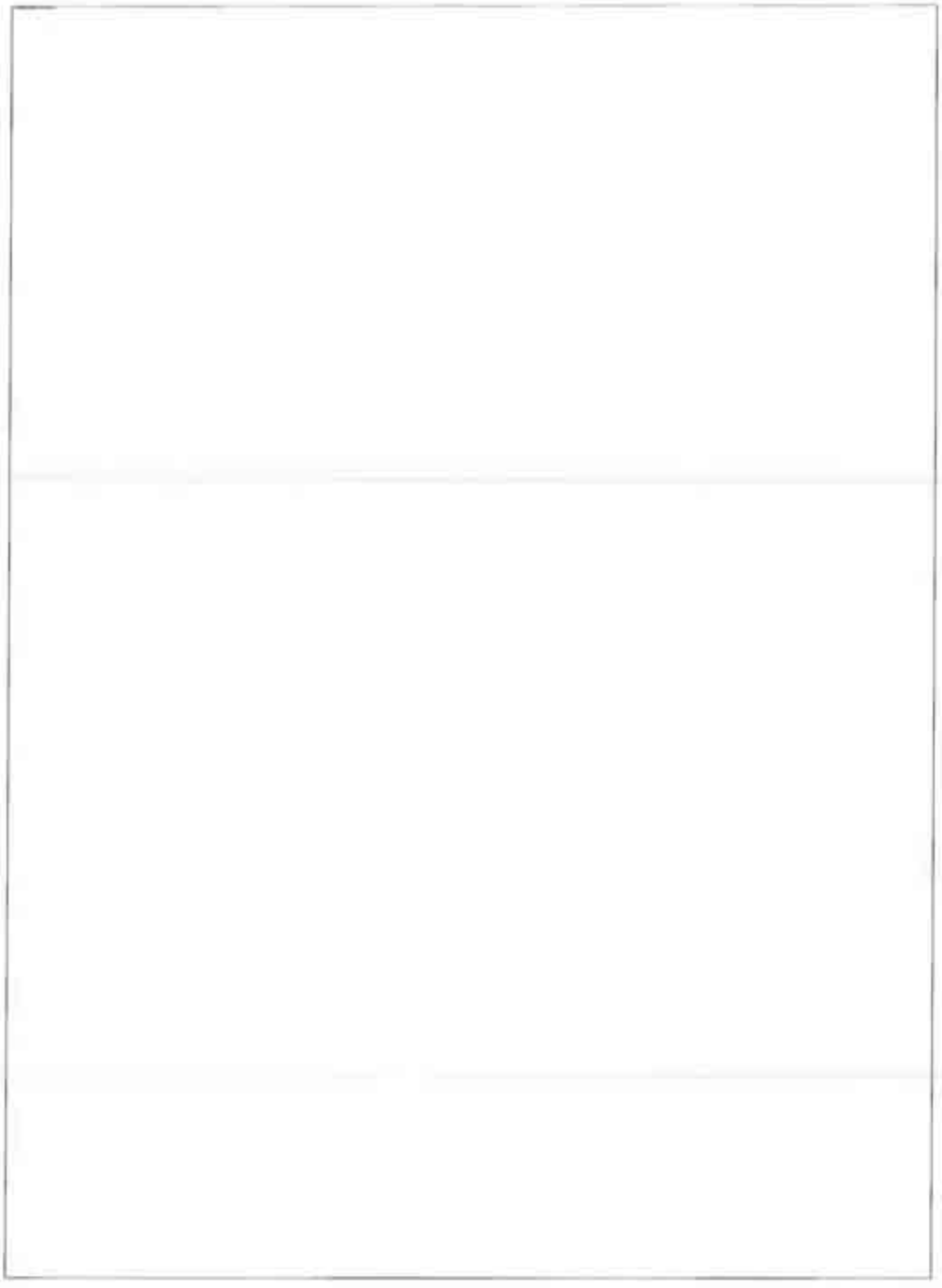

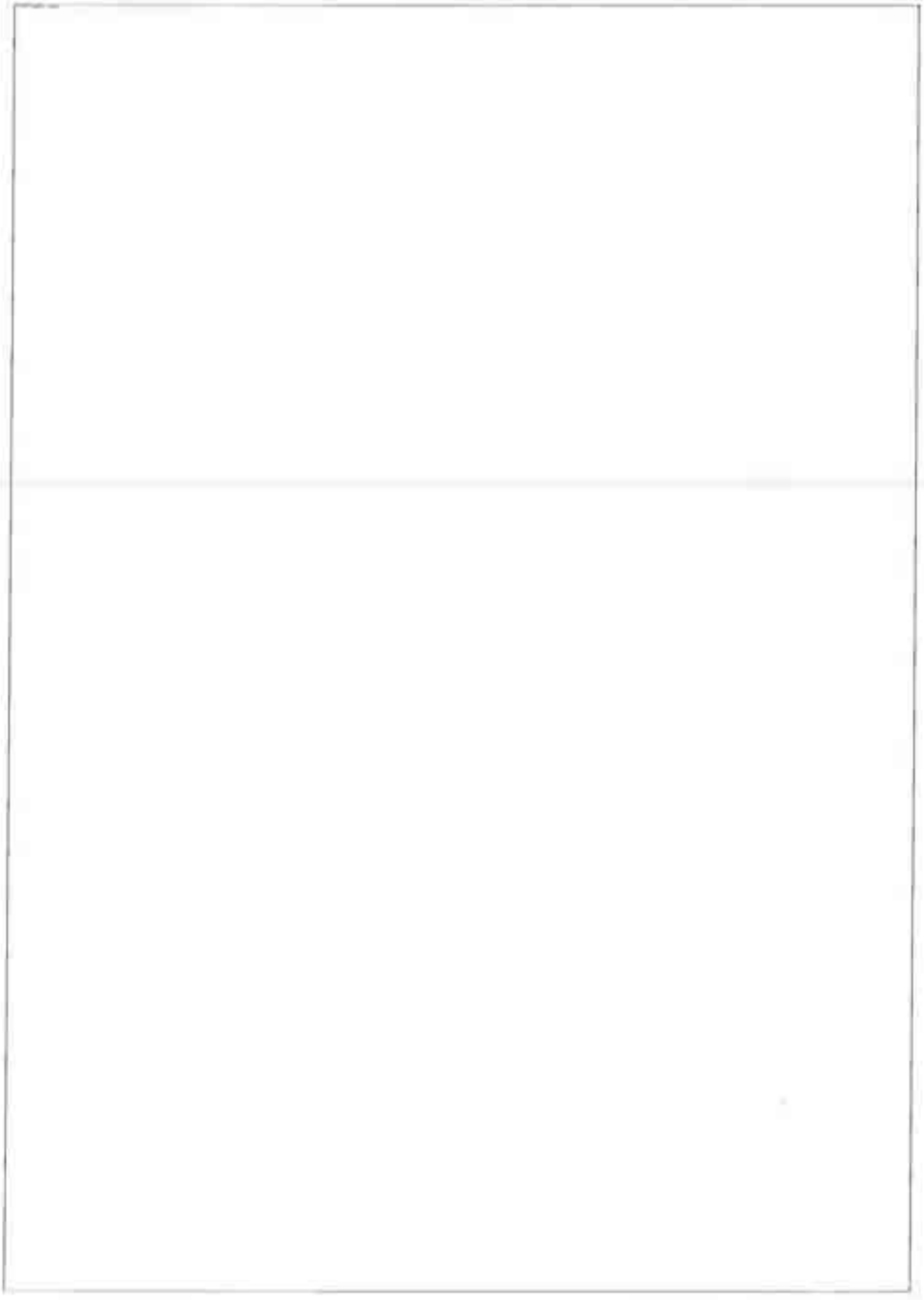

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Annex 5: Age Structure of Project Influence Woredas

Project Influence Woredas	Age Group	Urban + Rural			Urban			Rural		
		Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
Dawa Chefa	0 to 4	58480	29634	28646	892	432	460	57588	29402	28186
	15 to 64	69561	34078	35483	1804	791	1013	67757	33287	34470
	65+	5347	2834	2513	180	104	76	5167	2730	2437
	Total	133388	66746	66642	2876	1327	1549	130512	65419	65093
Kemissie	0 to 4	6324	3185	3139	6324	3185	3139	-	-	-
	15 to 64	12517	6338	6179	12517	6338	6179	-	-	-
	65+	579	259	320	579	259	320	-	-	-
	Total	19420	9782	9638	19420	9782	9638	-	-	-
Tehuledere	0 to 4	42640	21394	21246	3791	1844	1947	38849	19550	19299
	15 to 64	66968	33680	33288	10183	5241	4942	56785	28439	28346
	65+	8269	4226	4043	771	345	426	7498	3881	3617
	Total	117877	59300	58577	14745	7430	7315	103132	51870	51262
Werebabu	0 to 4	39431	19931	19500	2194	1101	1093	37237	18830	18407
	15 to 64	54753	27403	27350	4178	2016	2162	50575	25387	25188
	65+	6346	3125	3221	354	169	185	5992	2956	3036
	Total	100530	50459	50071	6726	3286	3440	93804	47173	46631
Kalu	0 to 4	76494	38752	37742	7278	3695	3583	69216	35057	34159
	15 to 64	97307	49126	48181	11599	5712	5887	85708	43414	42294
	65+	12,380	6,309	6,071	933	435	498	11,447	5,874	5,573
	Total	186181	94187	91994	19810	9842	9968	166371	84345	82026
Kombolcha	0 to 4	28159	14093	14066	18122	9023	9099	10037	5070	4967
	15 to 64	53515	26035	27480	38409	18363	20046	15106	7672	7434
	65+	3693	1840	1853	2136	1020	1116	1557	820	737
	Total	85367	41968	43399	58667	28406	30261	26700	13562	13138
All Woredas	0 to 4	251528	127189	124339	38601	19280	19321	212927	107909	105018
	15 to 64	354621	176660	177961	78690	38461	40229	275931	138199	137732
	65+	36614	18593	18021	4953	2332	2621	31661	16261	15400
	All Total	642763	322442	320321	122244	60073	62171	520519	262369	258150

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Annex 6: Dependency Ratio of Project Influence Woredas

Zone/ Woreda	Residence	Age Group Both Sex								Total Pop.	Total Dependency Ratio
		0-14			15-64		65+				
		No. of pop.	Ratio	% Share	No. of pop.	% Share	No. of pop.	Ratio	% Share		
Dawa Chefa	Urban	892	49.4	31.0	1,804	62.7	180	10.0	6.3	2,876	59.4
	Rural	57,588	85.0	44.1	67,757	51.9	5,167	7.6	4.0	130,512	92.6
	Total	58,480	84.1	43.8	69,561	52.1	5,347	7.7	4.0	133,388	91.8
Kemissie	Urban	6324	50.5	32.6	12517	64.5	579	4.6	3.0	19420	55.1
	Rural	0	0.0	0.0	0	0.0	0	0.0	0.0	0	0.0
	Total	6324	50.5	32.6	12517	64.5	579	4.6	4.0	19420	55.1
Tehuledere	Urban	3791	37.2	25.7	10183	69.1	771	7.6	5.2	14745	44.8
	Rural	38849	68.4	37.7	56785	55.1	7498	13.2	7.3	103132	81.6
	Total	42640	63.7	36.2	66968	56.8	8269	12.3	7.0	117877	76.0
Werebabu	Urban	2194	52.5	32.6	4178	62.1	354	8.5	5.3	6726	61.0
	Rural	37237	73.6	39.7	50575	53.9	5,992	11.8	6.4	93,804	85.5
	Total	39431	72.0	39.2	54753	54.5	6346	11.6	6.3	100530	83.6
Kalu	Urban	7278	62.7	36.7	11599	58.6	933	8.0	4.7	19810	70.8
	Rural	69216	80.8	41.6	85708	51.5	11447	13.4	6.9	166371	94.1
	Total	76494	78.6	41.1	97307	52.3	12380	12.7	6.6	186181	91.3
Kombolcha	Urban	18122	47.2	30.9	38409	65.5	2136	5.6	3.6	58667	52.7
	Rural	10037	66.4	37.6	15106	56.6	1557	10.3	5.8	26700	76.8
	Total	28159	52.6	33.0	53515	62.7	3693	6.9	4.3	85367	59.5
All Woreda	Urban	38,601	49.1	31.6	78,690	64.4	4,953	6.3	4.1	122,244	55.3
	Rural	212,927	77.2	40.9	275,931	53.0	31,661	11.5	6.1	520,519	88.6
	Total	251,528	70.9	39.1	354,621	55.2	36,614	10.3	5.7	642,763	81.3

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Annex 7: Ten Top Diseases of the Project Influence Woredas

Dawa Chefa Woreda	Rank in Order
Malaria	1
Pneumonia	2
Diarrhoea non bloody	3
URTI	4
Arthritis	5
Intestinal parasites	6
Sever subcutaneous infection	7
UTI	8
Diarrhoea bloody	9
Accidental injury	10

Kombolcha Woreda	Rank in Order
Gastritis	1
Pyrexia of unknown organic fever	2
Genitourinary system	3
URTI	4
Malaria	5
Diarrhoea non bloody	6
Diarrhoea bloody	7
Intestinal parasites	8
Accidental injury	9

Kalu Woreda	Rank in Order
Acute febrile illness	1
Msculo-skeletal system disease	2
Diarrhoea non bloody	3
Pneumonia	4
Malaria	5
Intestinal parasites	6
UTI	7
Rheumatoid	8
Typhoid fever	9
Helminthes	10

Tehuledere Woreda	Rank in Order
URTI	1
Acute febrile illness	2
Pneumonia	3
Malaria	4
Helminthes	5
Dyspepsia	6
Skin infection	7
Accidental injury	8
UTI	9
Intestinal parasites	10

Werebabu Woreda	Rank in Order
URTI	1
Msculo-skeletal system disease	2
Pneumonia	3
Acute febrile illness	4
Trachoma	5
Intestinal parasites	6
Eye infection	7
Diarrhoea non bloody	8
Dyspepsia	9
Other infection	10

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Annex 8: Cost Rate for Project Affected Properties

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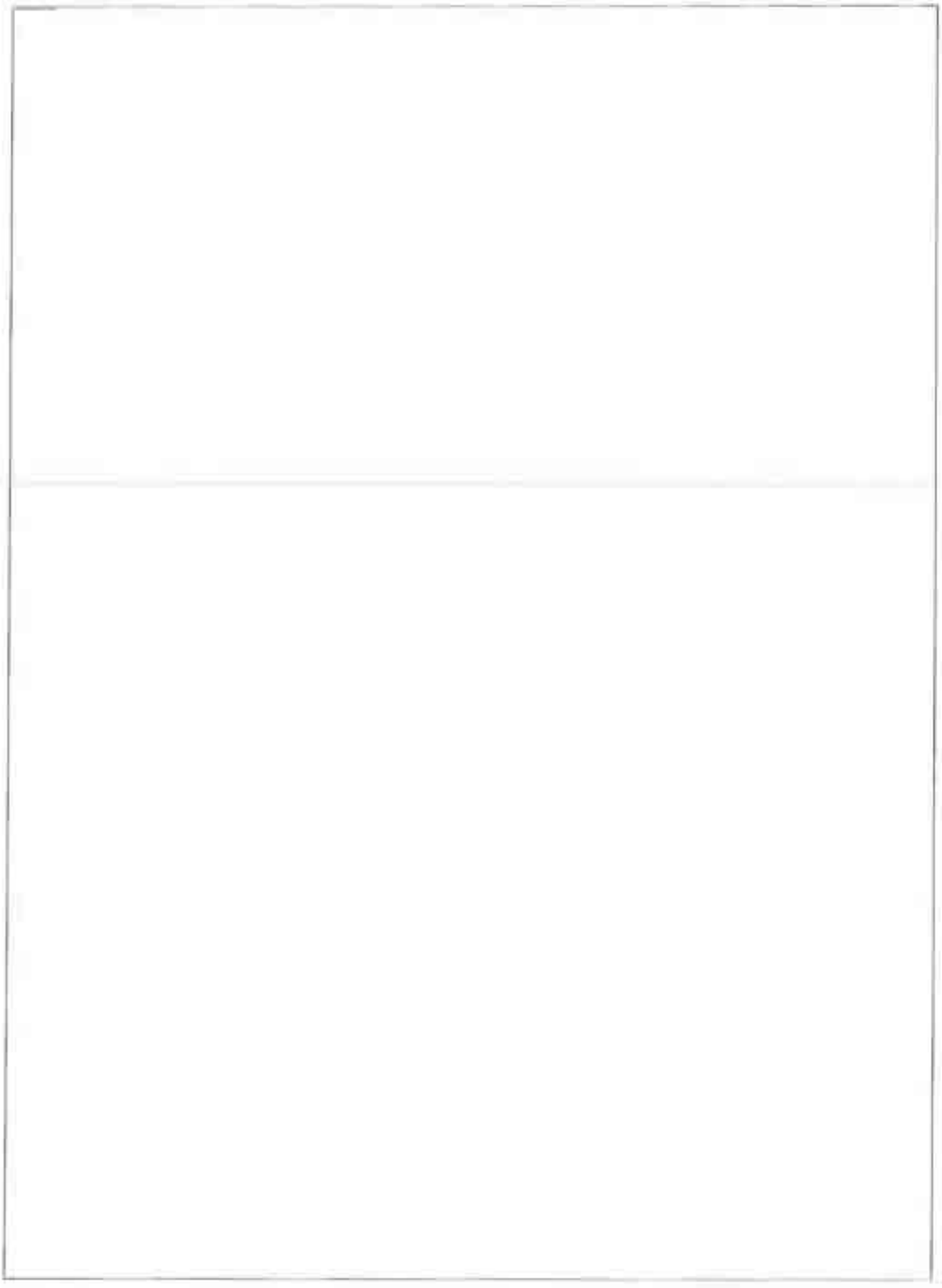

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Getachew Bezuw(Dr./Eng.)
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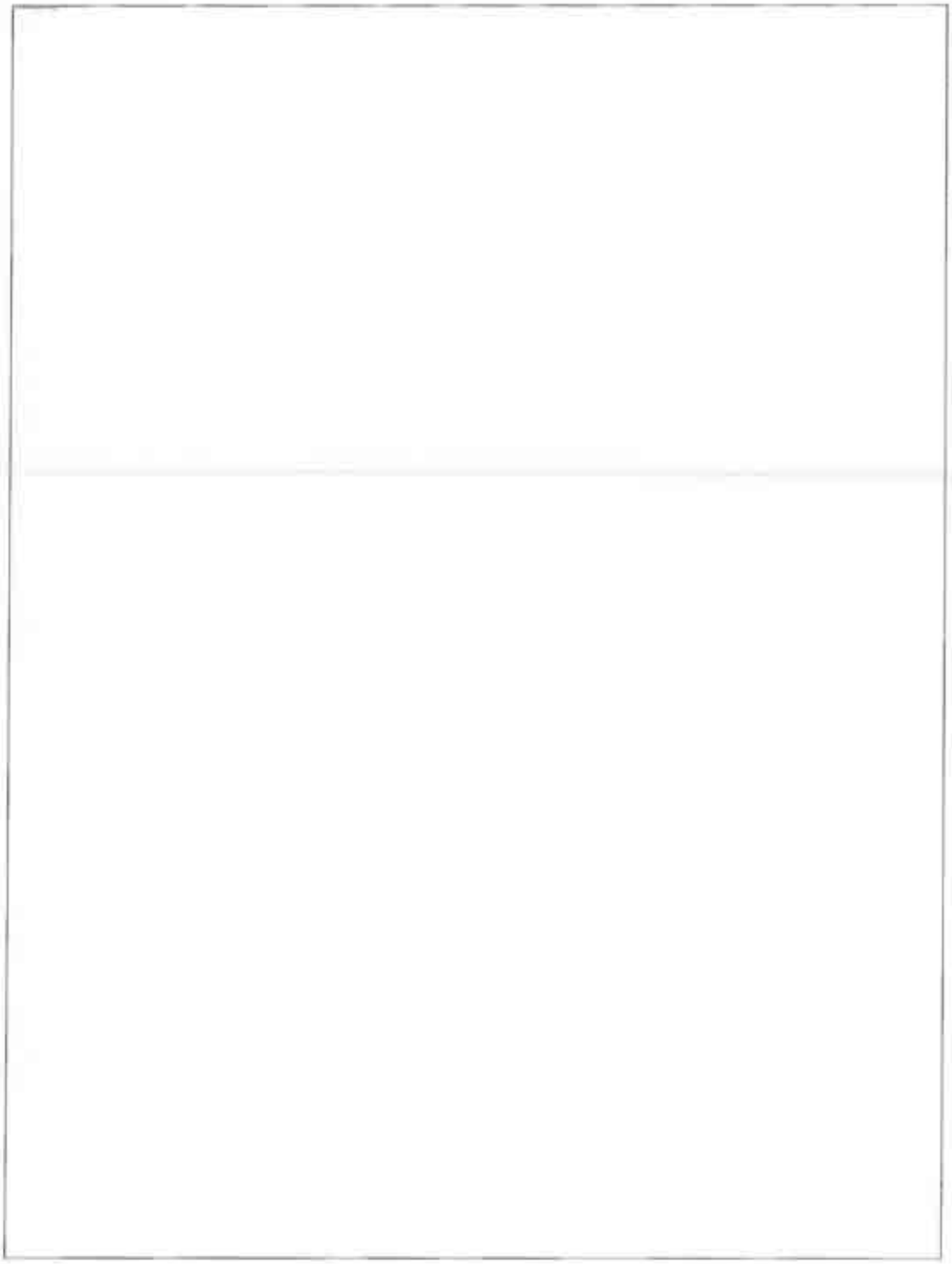
Çankaya V.D. 074 00



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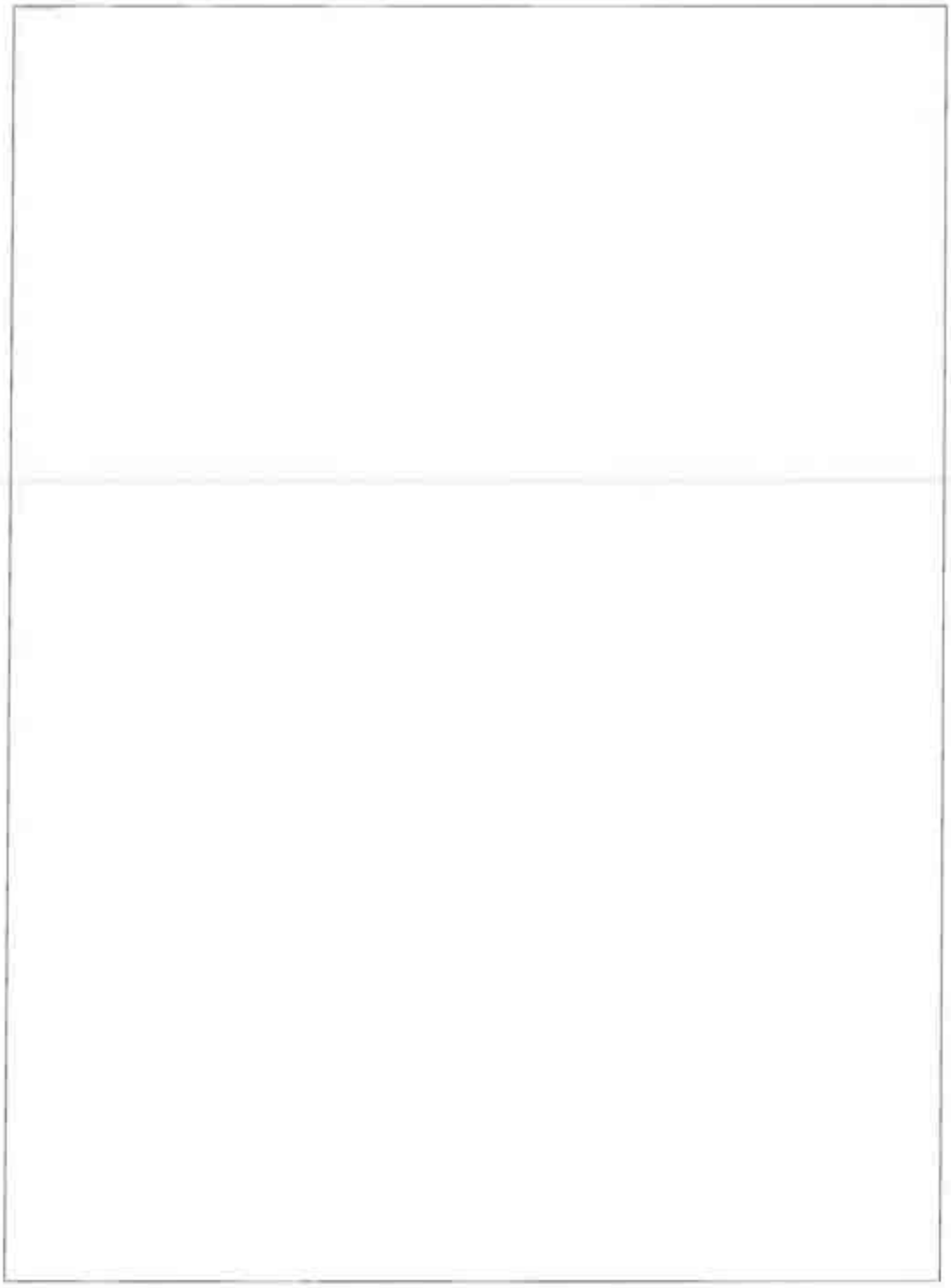
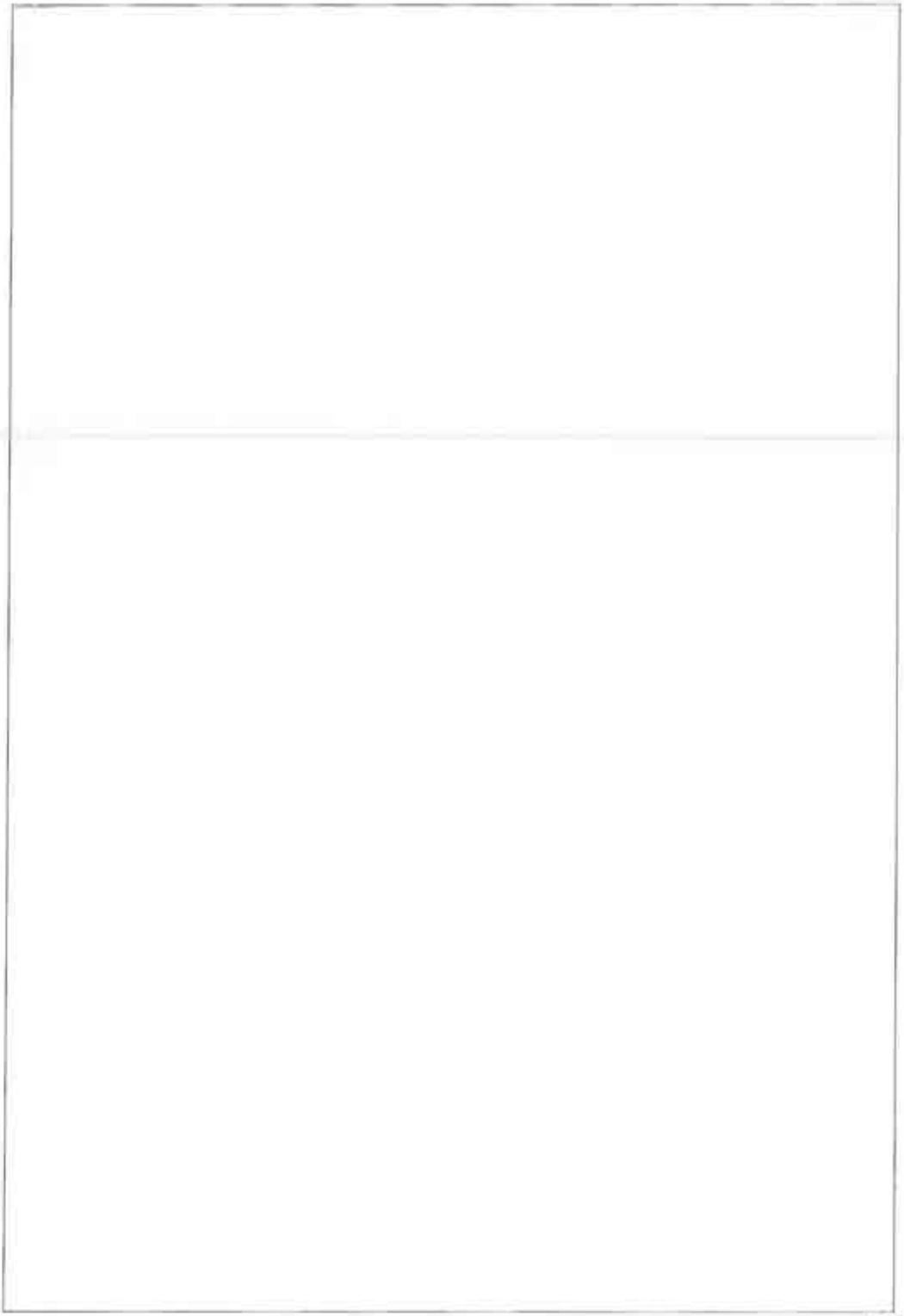




በአማራ ብሔራዊ ክልላዊ መንግስት በደቡብ ወሎ መስተዳድር ዞን የወረባቦ ወረዳ አስተዳደር

ቁጥር ወ/ወ/አ/(635)/ 2003
ቀን 4/11/2003

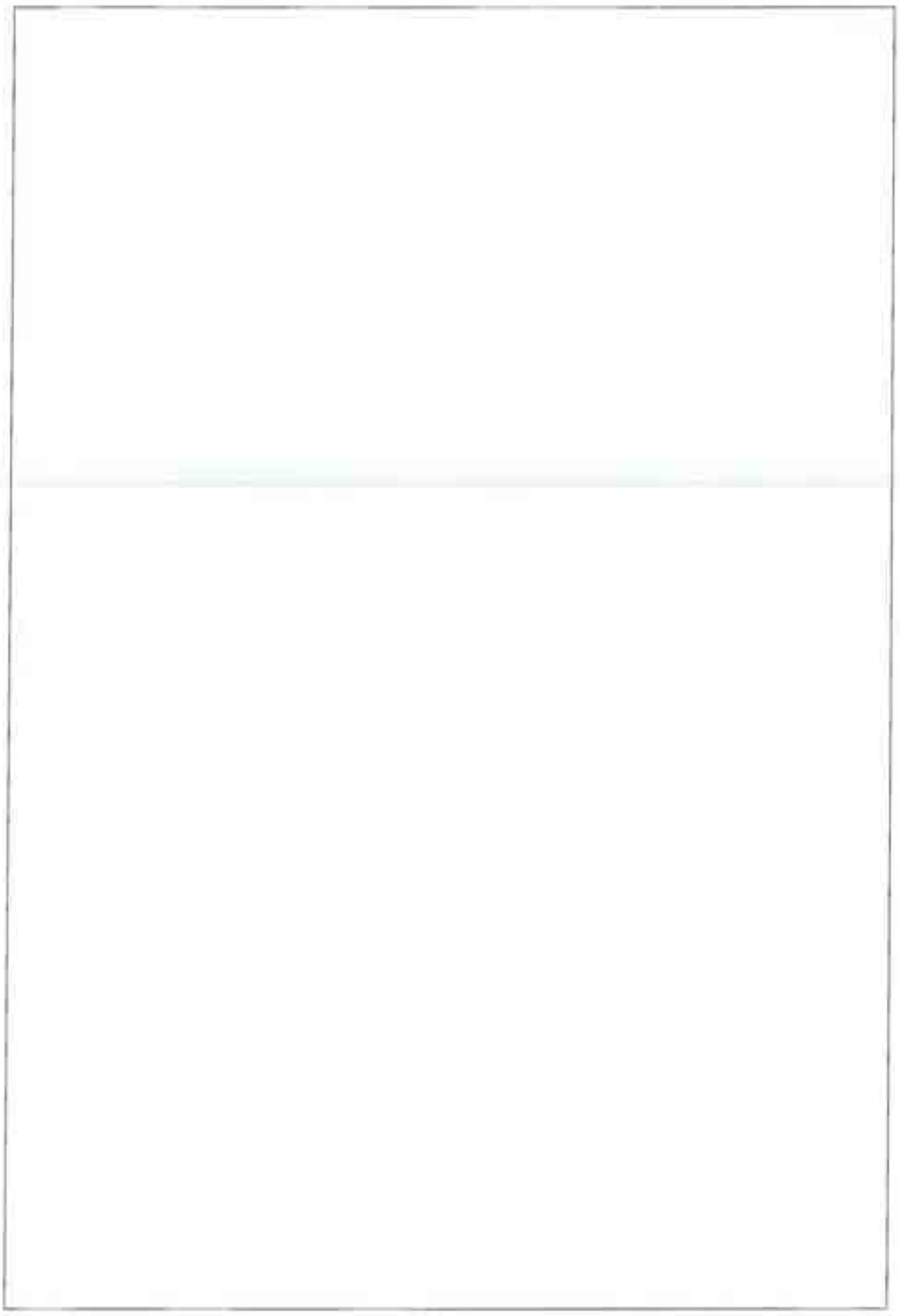
ለሲ.ቪ.ል ወርክ አማካሪ መሀንዲስ

ጉዳዩ፡-መረጃ መልቶ ስለመላክ

ከላይ በርዕሱ ለመግለጽ እንደተሞከረው የወረባቦ ወረዳ አስተዳደር የcwce በጠየቀት መጠይቅ መሰረት መረጃውን ሞልተን የላክን መሆናችንን እንገልፃለን።

ከሠላምታ ጋር

ሹመት እንድሪስ አበራ
Shumet Endries A
የወረባቦ ወረዳ አስተዳደር
ጽ/ቤት ኃላፊ



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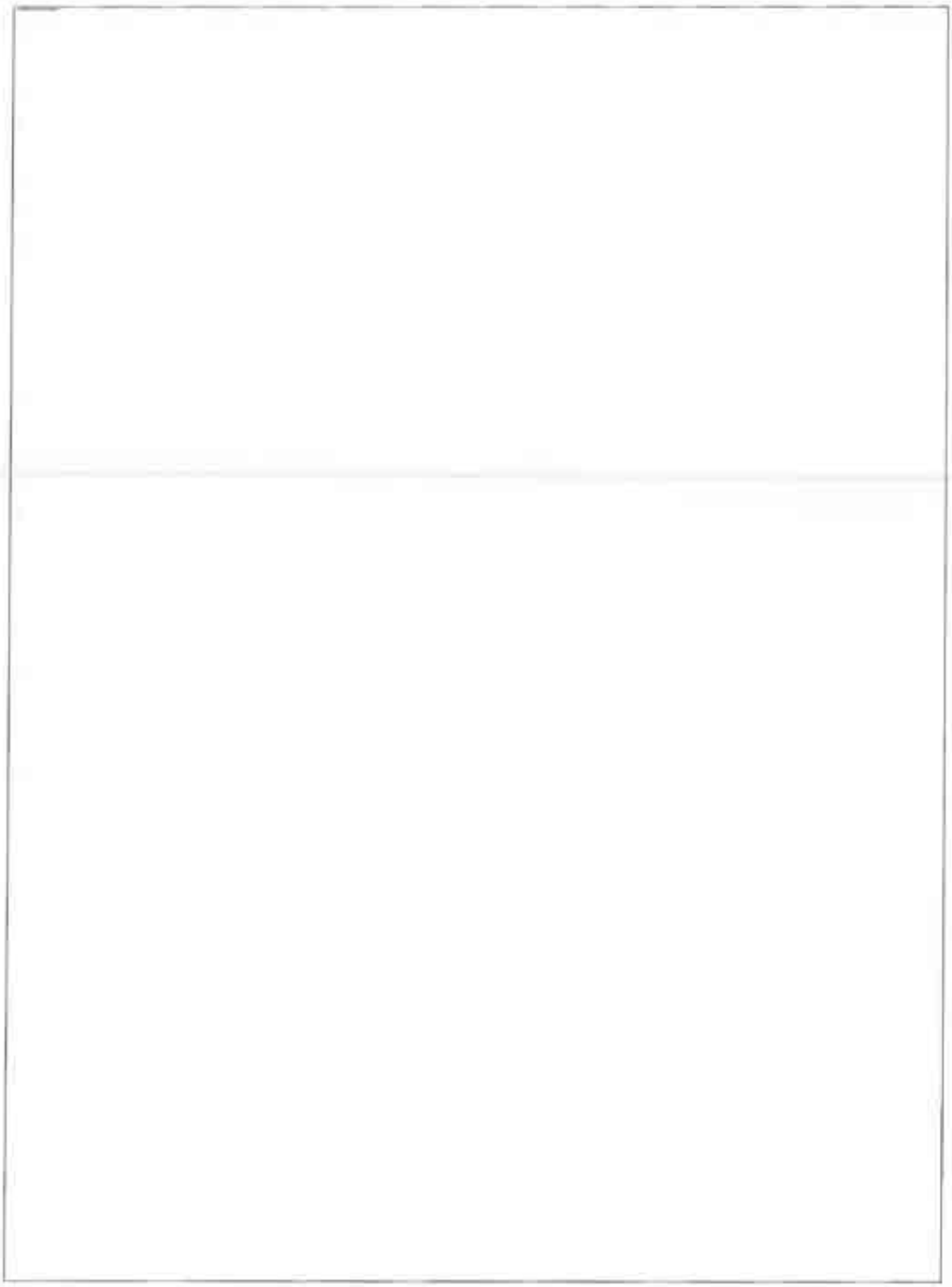

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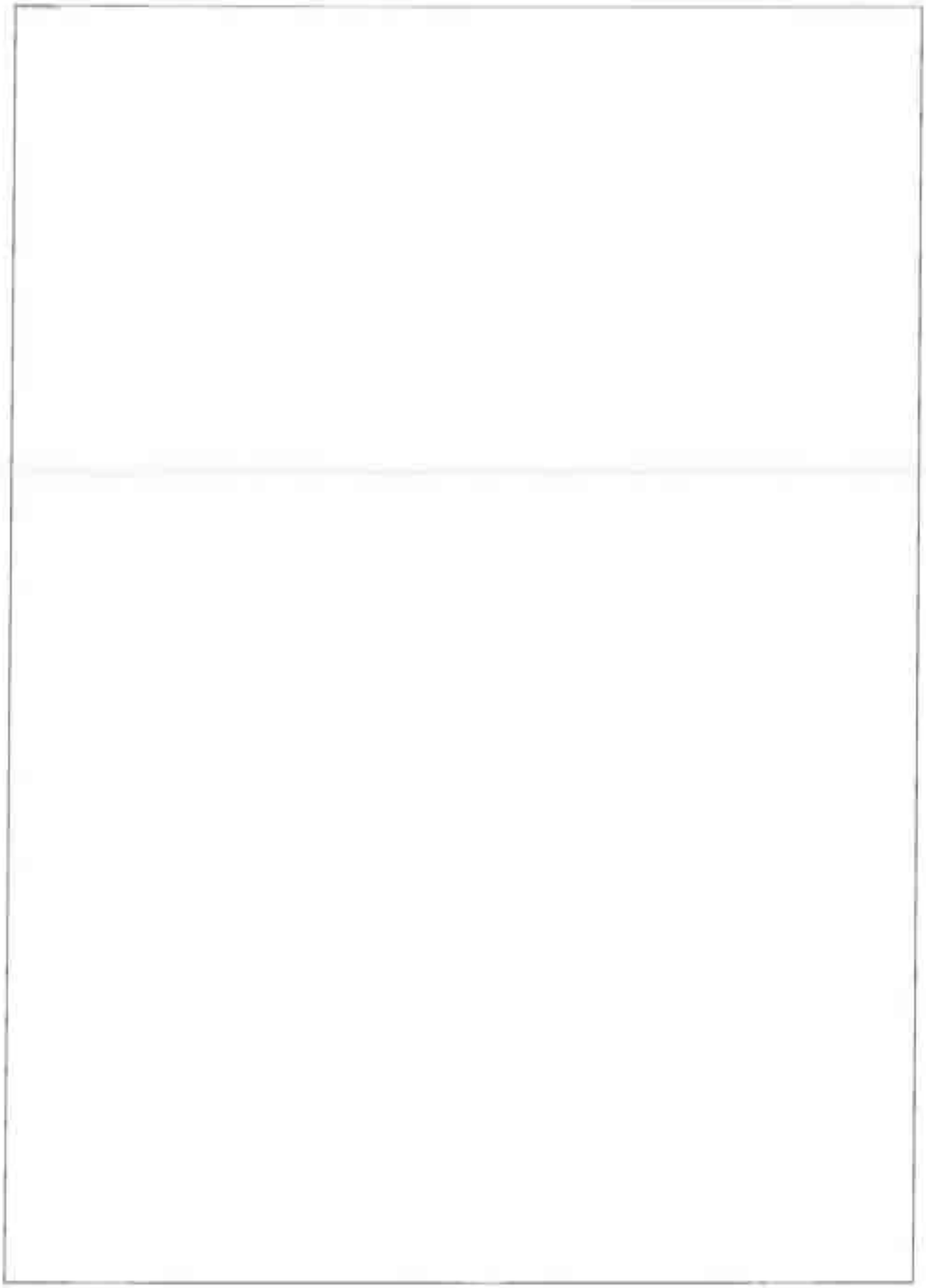

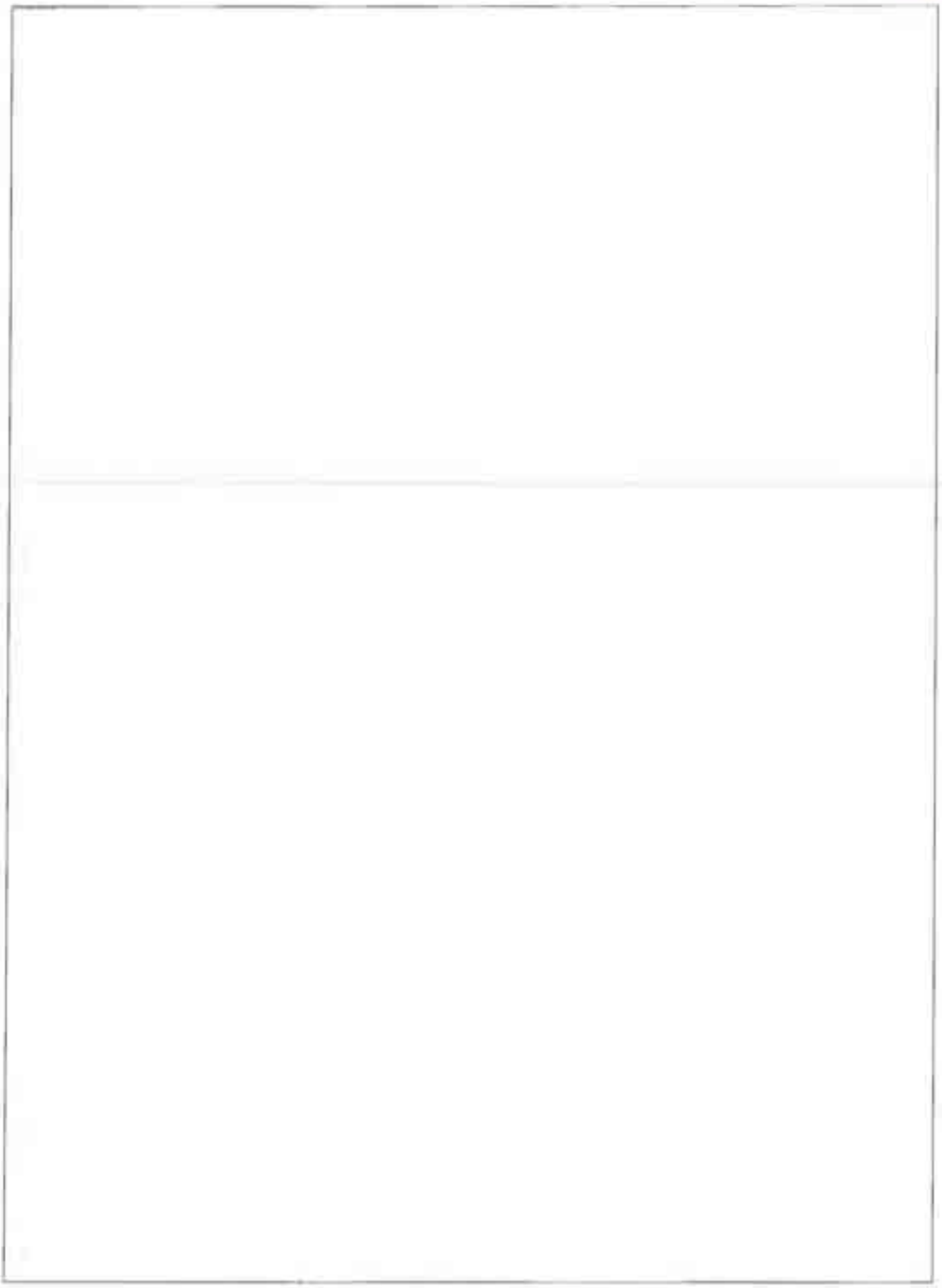

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07/09 2011 11:16 FAX 002510335511110 KALU WOR ADMINISTRATION 001

በአማራ ብሔራዊ ክልላዊ መንግስት
የደቡብ ወሎ መስተዳድር ዞን
የቃሉ ወረዳ አስተዳደር ጽ/ቤት

ቁጥር ወ04/228/2003

ቀን 02/13/2003

ለሲቪል ወርክስ አማካሪ መሀንዲሶች ኃ.የተ.የግ.ማህበር

<u>አዲስ አበባ፣</u>

ጉዳዩ፡- <u>መጠይቅ ሞልተን ስለመላክ፤</u>

ከላይ ለለገለጽነው ጉዳይ በቁጥር CWCE /2603/2011 በቀን 30/05/2011 የባቡር መስመር የሚያልፍበት ቦታ ሊከሰት የሚችለውን ጉዳት ተጽእኖ ለማጥናት እንዲያግዝ መጠይቆችን ሞልተን እንድንልክ በጠየቃችሁን መሠረት መረጃውን ሞልተን ___ ገጽ የላክን መሆኑን እንገልፃለን፡፡

ከሠላምታ ጋር

አንዋር ሰይድ ኢብራሂም
የቃሉ ወረዳ አስተዳደር ኃላፊ

07/08 2011 11:15 FAX 00251033 6511110 KALU WOR ADMINISTRATION 002

Civil Works Consulting Engineers Pvt. Ltd. Co.
Consultancy Services for the Detailed Engineering Design and Construction Supervision for Kemissie-Hayk Railway Project

COST ESTIMATE FOR PROPERTIES
[illegible]

Zone ዞን [illegible]
Woreda ወረዳ ቃሉ

1. INFRASTRUCTURE / BUILDINGS/HOUSES
ቤትና ሌሎች ግንባታዎች

No. ተቁ	Type of Infrastructure/building/house [illegible]	Unit Price Per m^2 [illegible]
1	Mud and wood Gojo house ([illegible])	560
2	Mud and wood houses ([illegible])	650
3	Mud and wood houses but have ceiling ([illegible])	1860
4	Mud and wood houses but have cemented screened floor finished ([illegible])	2010
5	Mud and wood houses but cement plastered and painted wall and ceiling ([illegible])	2300
6	Mud and wood houses but have masonry foundation, cement plastered and painted wall, have ceiling ([illegible])	2800
7	Mud and wood houses but have masonry foundation, cement plastered and painted wall, have ceiling and cemented screened floor finished ([illegible])	3050
8	Mud and wood toilet ([illegible])	1120
9	Mud and wood toilet with cemented screened floor finished [illegible]	1250
10	10% HCB and RC and 90% mud and wood have masonry foundation, cement plastered and painted wall, have ceiling and cemented screened floor finished ([illegible])	3350
11	HCB and RC column and beams and have masonry foundation, cement plastered and painted wall , have ceiling and cemented screened floor finished ([illegible])	3980

[illegible] [illegible] 11/10/03

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PROJE ve MÜHENDISLIK
Dr. Medine Eldem Sok. No:
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Ethiopian Railways Corporation

07/08 2011 11:16 FAX [illegible] KALU WOR ADMINISTRATION 003

Civil Works Consulting Engineers Pvt. Ltd. Co.
Consultancy Services for the Detailed Engineering Design and Construction Supervision for Kemissie-Hayk Railway Project

COST ESTIMATE FOR PROPERTIES
የንብረት ግምት በወረዳ መስተዳድር በኩል የሚሞላ

Zone ዞን ደቡብ ወሎ

Woreda ወረዳ ቃሉ

2. COST ESTIMATE FOR FENCES የአጥር ግምት

No. ተቁ	Type of fence የአጥሩ ዓይነት	Cost estimate per m ግምት በሜትር በብር
1	'Chiraro' Fence (የጭራሮ አጥር)	35 ብር/ሜ
2	Wood fence(የእንጨት አጥር)	90.00 ብር/ሜ
3	Barbed wire with wood pole stand (ቋሚው የእንጨት ሆኖ የሽቦ አጥር)	150 ብር/ሜ
4	Wire fence (የሽቦ አጥር)	320 ብር/ሜ
5	Masonry /stone fence (የግንብ ወይም የድንጋይ አጥር)	
	[illegible]	180 ብር [illegible]
	[illegible]	950 ብር [illegible]

የአዘጋጁ ሙሉ ስም [illegible] ፊርማ [illegible] 03/12/03

የማለፊያ ደረጃ [illegible]

Civil Works Consulting Engineering/ CWCE PLC

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ተራ ቁ.	የተክል/ዛፍ/እጽዋት ዓይነት	የአንድ ዛፍ/ተክል/ ዋጋ በተከሉ						
		በማም ጎልቶ	ጎልቶ	መካከለኛ	ቁሜ 1 አውራጅ	ማገር	ጨፈቃ	ችግኝ
1	ባህር ዛፍ	600	400	300	500	30	10	5
2	ዋንዛ	--	800	300	150	50	10	5
3	ጽድ	600	400	300	50	50	10	5
4	ግራቪሊያ	600	400	300	50	45	10	5
5	ሰበንሳ	400	300	200	50	30	10	5
6	ቀውት	400	300	200	50	30	10	5
7	ግራር	400	300	200	50	30	10	5
8	ወይራ	400	300	200	50	30	10	5
9	ቁ/በርበሬ	400	300	200	50	30	10	5
10	አካያ	400	300	200	50	30	10	5
11	ብሳና	400	300	200	75	30	10	5
12	ጉብሬ	400	300	200	50	30	10	5
13	ሸውሸዋ	400	300	200	50	30	10	5
14	ብርብራ	400	300	200	50	30	10	5
15	ቁርቁራ	400	300	200	50	30	10	5
16	ስስፖኒያ	--	--	200	50	30	10	5
17	ሉሲኒያ	--	300	200	50	30	10	5
18	ጃካራንዳ	400	300	200	50	30	10	5
19	ፖሊካንታ	400	300	200	50	30	10	5
20	ድግጣ	--	--	--	--	--	10	5
21	ደደሆ	--	--	--	--	--	10	5
22	ሆርፋማ	--	300	200	50	30	10	5
23	ድሬደዋ	400	300	200	50	30	10	5
24	ኒም	400	300	200	50	30	10	5
25	ስፖቶዳ	400	300	200	50	30	10	5
26	ሚንገቤር	400	300	200	50	30	10	5
27	ሄና		--			30	10	5
28	ወይባ	400	300	200	50	30	10	5
29	ዋርካ	600	400	300	50	30	10	5
30	በድሟ	600	400	300	50	30	10	5
31	ጉሮሮ	--	--	--	--	--	10	5
32	ሸብርቅ	--	--	--	--	--	10	5

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Kızılay - ANKARA
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የዋጋ ዝርዝር

ተራ ቁ.	የሰብል ዓይነት	መለኪያ	ያንዱ ዋጋ	ምርታማነት ኩ/ል በሄ/ር	ምርመራ
1	ጤፍ	ኩ/ል	8.50	16	
2	ገብስ	”	7.80	18	
3	በንዴ	”	7.00	28	
4	አጃ	”	7.00	15	
5	ሻጉሳ	”	7.00	12	
6	በቆሎ	”	4.50	35	
7	ማሽላ	”	6.50	25	
8	ባቄላ	”	16.00	17	
9	አተር	”	16.00	14	
10	ሽምብራ	”	13.00	16	
11	ምስር	”	2000	15	
12	ሳያ	”	1600	13	
13	ሰሊጥ/አደንግራ/	”	900	15	
14	አስተር	”	900	15	
15	ማሾ	”	900	10	
16	ኑግ	”	1100	5	
17	ጎመን	”	1100	5	
18	ሱፍ	”	900	7	
19	አቮካዶ /ሰውነሽ/	”	1800	20	
20	ሰሊጥ	”	1000	16	
21	ጉመን ዘር	”	1000	12	
22	አብሽ	”	2400	8	
23	በርበሬ /ቃሪያ	”	5500	15	
24	ነጭ እንሰሙድ	”	2400.00	12	
25	ጥቁር እንሰሙድ	”	4000	12	
26	ድንች	”	500	200	
27	ስኳር ድንች	”	300	180	
28	ቀ/ሽንኩርት	”	1000	80	
29	የፈረንጅ ቀ/ሽንኩርት	”	500	180	
30	ነጭ ሽንኩርት	”	4000	65	
31	ቲማቲም	”	500	225	
32	ጥቅል ጐመን	”	200	4166	
33	ካሮት	”	300	200	
34	ቀይስር	”	300	72	
35	ሰላጣ	”	300	222	
36	ቆስጣ	”	300	166	
37	ጥቦ	”	3000	18	
38	ጎመ	”	900	666	
39	ሚጥ	”	2000	500	
40	ሽንኩራ አገዳ	ቁጥር	6.00	8800	
41	የሽንኩርት ፍል	በኩ/ሜ	40.00	--	
42	የቲማቲም ፍል	”	8.00	--	
43	የበርበራ ፍል	”	30.00	--	
44	የእንስሳት መኖድርቆ ሣር	ኩ/ል	225.00	20	

ማሳሰቢያ ፦ የሽንኩራ [illegible] ኩ/ል ማይሆን በቁጥር መሆኑ ይታወቅ

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Annex 9: Checklist for Socio-Economic Survey of the Project

Part One: Demography

1. Population size of Woredas by Kebele, please mark at the Kebele that traverse by the railway line.

No	Kebele	Male household heads	Female household heads	Total household heads	Total Male population	Total Female population	Total population

2. Ethnic groups, type of affiliated religions in the Woreda?

2.1 Ethnic groups in the Woreda

No	Ethnic composition	Population number (percentage)

2.2 Population size by religion

No	Religion Type	Population number (percentage)

3. Main livelihoods of the Woreda people?
4. Available development potentials in the Woredas?
5. Major problems of the Woreda?
6. Historically, culturally or archeologically important sites in the Woreda?
7. Settlement pattern and house types in the Woreda

Part Two: Agriculture and Land Use

1. Land use pattern of the Woreda?

No.	Types of land use	Land coverage (ha)	Percent

2. Average land holding size per household in the Woreda?
   - Minimum ------ ha; Maximum ----- ha; Average ----- ha

3. The major crops grown and yields per hectare in the Woreda?

No.	Major crops	Yield per ha	Current market Price per quintal in Birr

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4. Livestock population of the Woreda

No.	Livestock type	Number

5. Livestock related problems including types of animal diseases in the Woreda?

6. Animal health service problems and Number and conditions of veterinary services in the Woreda?

Part Three: Education

1. Number of schools at different level, students, and teachers.

Kg	1 to 4	5 to 8	9 to 10	11 to 12	College

2. Number of students at different level, and teachers.

Number of Students at Different Level of Schools											
Kg		1 to 4		5 to 8		9 to 10		11 to 12		College	
F	M	F	M	F	M	F	M	F	M	F	M

3. Number of teachers at different level

Number of Teachers by Different Levels of Schools																	
Kg			1 to 4			5 to 8			9 to 10			11 to 12			college		
F	M	T	F	M	T	F	M	T	F	M	T	F	M	T	F	M	T

4. Education coverage of the Woredas (primary and secondary education,)

5. Female-male ratio (students enrolment and dropouts, and room-students ration)

6. Reasons for dropouts

Part Four: Health

Conditions of health services by project influence Woreda

1. Health service coverage?

2. The 20 top diseases of the areas and other major health problems?

3. Numbers of health posts, clinics, health centres, etc and health personnel/ practitioners?

4. Ratio of doctor, nurse, etc to population in the Woreda?

Part Five: Water Supply and Sanitation

Water supply services conditions at Woreda level?

1. Potable water supply coverage at Woreda level?
2. Main sources of drinking water in the Woreda?
3. How people dispose garbage?
4. Percentage of people use toilets?
5. Major problems with regard to water supply and sanitation services in the Woreda.

Part Six: Other Social Services

1. Communication services at Woreda level (postal service, transport, telephone, etc)?
2. Energy/light services at Woreda level?
3. The major market areas in the Woreda, the average population attend the market, means of transport use to reach at the market, major items for market, and market days and frequency?

Part Six: Gender Issues in the Woreda

1. Harmful traditional practices observed in the Woreda and measures taken to alleviate the problem?
2. Gender base division of labour

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Annex 10: Important Photos of the Project Influence Areas

Pastoralists' village, Kemissie Woreda (left); farmers' village, Dawa Chefa (Iright)

Market day in Kemissie Town

Surveyors at work (right); demolished survey mark by unknown individuals

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Railway line crosses croplands trees and settlements (left); Dessie town (right)

Means of transport during market day, Kemissie town

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APPENDIX NO. 7: LOT 13 – ESIA Report (MAY 2012)

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Final

May 2012

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LIST OF ABBREVIATIONS

ARCCH	Authority for Research and Conservation of Cultural Heritage
AEC	Associated Engineering Consultants
AIDS	Acquired Immune Deficiency Syndrome
ARDO	Agriculture and Rural Development Office
asl	above sea level
CSC	Construction Supervision Consultant
^{0}C	Degree Celsius
EIA	Environmental Impact Assessment
EI	Environmental Inspector/Supervisor
ESIA	Environmental and Social Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
EPE	Environmental Policy of Ethiopia
ERC	Ethiopian Railway Corporation
EPLAUA	Environmental Protection, Land Administration and Use Authority
FDRE	Federal Democratic Republic of Ethiopia
ha	hectare
HIV	Human Immune Virus
IUCN	The International Union for Conservation of Nature and Natural Resources
km	kilometre
LAEPO	Land Administration and Environmental Protection Office
NRDCO	Natural Resources Development and Conservation Office
LHS	Left Hand Side
m	metre
mm	millimetre
NRS	National Regional State
PAP	Project affected people
RAP	Resettlement Action Plan
RE	Resident Engineer
RHS	Right Hand Side
RoW	Right of Way
SWC	Soil and Water Conservation
WHO	Woreda Health Office

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EXECUTIVE SUMMARY

1. Introduction

In line with the railway infrastructure development program of Ethiopia, the FDRE, represented by the Ethiopian Railway Corporation (ERC) has allocated sufficient budget for the consultancy services for the Detailed Engineering Design, ESIA studies, Tender Documents Preparation and Construction Supervision for Lot 13: Hayik – Robit of the Awash - Kombolcha – Mekelle – Shire Route. Hence, ERC has entered into contract agreement with Associated Engineering Consultants to perform the aforementioned consultancy services. This EIA study is part of the services and its main objective is to ensure that the envisaged railway project is environmentally sustainable. The EIA study is based on review of national environmental policies, strategies, legislations and guidelines, review of relevant former studies and literature, collection of secondary data from relevant government offices, detailed field investigations along the proposed rail line and collection of primary baseline data, and conducting consultations with key stakeholders in the project area including the project affected people.

2. Description of the Railway Project

The proposed Hayik- Robit Railway Project is located in South and North Wollo Zones of the Amhara National Regional State. The project starts at about 14km north of Hayik town and terminates at about 4km south of Robit town entirely running on right hand side of the Addis Ababa – Mekalle Trunk Road. In general, the proposed rail line runs in the lowest and flatter parts of the route corridor with mostly valley alignment between adjacent mountains, but it also crosses mountain ranges through tunnels. The project generally follows the corridor proposed by the ERC. However, realignments have been proposed by the Consultant to about 66% portion of the alignment formerly proposed by the ERC in order to improve its technical and economic feasibility as well as to reduce environmental and social impacts of the project. The total length of the project is 84.50km.

According to the preliminary engineering design, implementation of the proposed railway will involve construction of about 10.24km long tunnels, 30km long deep cut sections, and 26km long high embankment fill sections in order to achieve the maximum vertical gradient requirement of ±2%. The remaining potion comprises about 16km long level sections and 2.8km structure sections (culverts, bridges and viaducts). In order to avoid excessive land acquisition and ensure its stability, retaining walls are considered for certain portions of the high embankment sections. In addition, viaducts are proposed for the sections crossing very deep valleys. Construction of the rail line will involve installation of about 44 bridges and major culverts with span ranging from 8m to 450m. In addition, it will require numerous small and medium size drainage structures to cross the drainage channels intercepted by the rail line.

3. Environmental Policies, Legislations and Guidelines

The Constitution of the FDRE is a prime legal document that has provisions, which have direct policy, legal and institutional relevance for the appropriate implementation of environmental protection and rehabilitation action plans to avoid, mitigate or compensate the adverse effects of development actions. The concepts of sustainable development and environment rights are entrenched in the rights of the people of Ethiopia through Articles 43 and 44, which state among others the right to development and the right to live in a clean and healthy environment.

The Environmental Policy of Ethiopia (EPE) is a major policy document concerning environmental protection and it supports Constitutional Rights through its guiding principles. The EPE has an overall policy goal to improve and enhance the health and quality of life of all Ethiopians, to promote sustainable social and economic development through sound management and use of natural, human-made and cultural resources and their environment as a whole. The EIA policies are included in the cross-sectoral environmental policies and they emphasis the early recognition of environmental issues in project planning, public participation, mitigation and environmental management, and capacity building at all levels of administration.

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The FDRE has issued a number of legislations and regulations that are aimed to foster environmental protection and sustainable social and economic development. Among these, the most relevant ones include the Proclamation on Establishment of Environmental Protection Organs, Proclamation on EIA, Proclamation on Environmental Pollution Control, Proclamation on Expropriation of Land Holdings and Payment of Compensation, and Regulations on Payment of Compensation for Property Situated on Landholdings Expropriated for Public Purposes. The former Proclamation assigns responsibilities to organizations for environmental development, management, regulations and monitoring activities at both federal and regional levels. It also re-establishes the federal EPA as an autonomous public institution of the FDRE. It also empowers every Sector Ministry or Agency to establish or designate an Environmental Unit and each regional state to establish an independent regional environmental agency or designates an existing agency.

The EIA Proclamation makes an EIA mandatory for specified categories of development activities and is the legal tool for environmental planning, management and monitoring. The proposed railway project has been assigned under the category of projects likely to have significant negative environmental and social impacts and thus requires EIA. Therefore, in accordance to this legislation, EIA has been conducted to determine the project's potential impacts and to develop appropriate mitigation measures and environmental management plan (EMP) to prevent, reduce or offset the significant negative impacts to acceptable levels. In addition, other pertinent legislations, EIA Guidelines, and Environmental Institutions have been reviewed and incorporated into this EIA Report.

4. Description of the Baseline Condition

4.1 Physical Environment

The proposed corridor is aligned inside a marginal graben, which is relatively favorable for a rail line since it traverses predominantly rolling terrain followed by flat terrain. However, outside the graben, both to the east and west, it is mountainous terrain, which is relatively difficult and rugged topography. Geologically, the route corridor is dominantly covered with sand, silty gravel covered without crops of boulders, alkaline basalt and silicics around river-banks with weathered to decomposed rock observed intermittently. The project alignment mostly runs through flatter and gently sloping areas at the foot of mountain ranges that are mostly covered by deep and fertile alluvial soils, which are moderately to highly productive. The dominant soils along the project route are black cotton soils, which are deep soils with clayey or silty clay texture. Soil erosion is not a major problem in most parts of the flatter and gently sloping parts of the project area. However, erosion of fragile riverbanks and expansion of river courses is a major problem for most of the rivers and streams crossed by the project alignment. In addition, land-sliding problem is observed at some spots along Mille River.

4.2 Climate

The climate of the project area is classified as Weyna Dega with mild temperature varying between 14°C and 20°C. The mean annual rainfall of Hayik and Robit areas is 1200mm and 1000mm respectively. In terms of water resources, the corridor of the proposed railway is drained by four major perennial rivers (Mille, Gelana, Chireti, and Ala Wuha) and numerous streams and minor drainage channels. In addition, the route corridor particularly the flat plains at the foot-slopes of the mountain ranges is rich in groundwater resources. Ambient air quality in the project area is generally good as most part of the project route corridor is rural in nature, absent of any industrial pollution sources, major traffic and transportation emissions. Similarly, ambient noise levels in most part of the project area are relatively low. In terms of land use and land cover pattern, the project route corridor is characterized by intensively farmed lands except a few relatively short stretches that run through natural vegetation areas and settlements. Of areas covered by natural vegetation, the area traversed by the section km 29.40 to km 31.35 is more important since it is located in a Protected State Forest, namely Faji PF.

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4.3 Biological Environment

The primary natural vegetation of the project area has been severely modified by human activities including extensive land clearing for agricultural activities and human settlements and overexploitation for construction materials and fuel wood purposes. Consequently, now only some patches of highly degraded natural vegetation and solitary trees have remained in the area. Of the existing natural vegetation areas, the Faji Protected State Forest (FPF), which is crossed by the proposed railway at station 29+400 – 31+350, is relatively an important vegetation area. The FPF comprises mainly woodland and bush land vegetation, which is dominated by Acacia species.

The project area has little undisturbed habitats that could support diverse wildlife. As a result, the project corridor contains only some wildlife species. Most of the mammalian fauna found in the area are those adapted to disturbed or degraded habitats, and the majority of the fauna are confined to the patches of 'protected habitats' found in some parts of the project corridor. The mammals reported to be found in the project area include antelopes such as Common duiker, Bushbuck, Salt's Dik-dik, and Klipspringer, Grivet monkey, Anubis baboon, Common jackal, Abyssinian hare, Hyena, Crested porcupine, Warthog, Bush pig, Abyssinian Genet and Slender mongoose.

4.4 Public Health and Cultural Heritage Issues

According to the health statistics obtained from Woreda Health Offices (WHO), the health service coverage in the woredas of the project area has shown major improvement over the last several years. Besides the curative health services, most attention has been given to primary health care services, which focus on preventive measures through expansion of health extension works. Based on morbidity statistics collected from the respective WHOs, the most common diseases affecting public health in the project area are upper respiratory tract infections, intestinal parasites, diarrheal diseases and pneumonia. Other important health problems include gastritis, malaria, eye diseases and skin infections. Many of the health problems are closely related to the low socio-economic status of the population such as lack of safe drinking water and poor sanitation.

The man-made physical cultural resources found in the project corridor include mosques, churches and cemeteries. In addition, there are some hot springs that have cultural and medicinal values to the local communities. Moreover, there are natural features such as extensive mountain ranges and river valleys that have high visual attractions.

5. Public and Stakeholders Consultations

Consultations with key stakeholders were conducted during the environmental field survey in the project area, and public consultations were carried out at three key locations along the project alignment. Information on the prevailing environmental and socio-economic problems in the project area, baseline environmental and socio-economic data, potentials of the project influence area, possible benefits and adverse impacts of the proposed railway project and their enhancement/mitigation measures, and social acceptability of the project were obtained from the consultations. These information have been utilized in this environmental impact analysis. According to the opinions forwarded during the public and stakeholders consultations, the proposed railway project is highly accepted assuming that the potential adverse impacts of the project would be adequately mitigated or compensated, and the potential benefits would be enhanced by fully considering the mitigation, compensation and benefit enhancement measures suggested during the consultations.

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6. Potential Environmental Impacts and Mitigation Measures

6.1 Positive Environmental and Social Impacts

Positive environmental impacts: The main positive environmental impact of the railway project will be its contribution to reduce air pollution by using rail transport instead of road transport particularly in supporting the increasing mobility demands for passengers and freight. In addition, it will have a positive effect in controlling climate change by reducing emission of gases that contribute to climate change.

Positive socio-economic impacts: The basic positive socio-economic impacts of rail transportation emanate from supporting the increasing mobility demands for passengers and freight at more efficient and economical way. Rail transport system is faster, cheaper and more efficient compared to road transport, therefore, it is more economical. Rail is the most energy efficient land transportation mode, and with the growing energy prices, use of rail transportation esp. with electric power as source of energy, would be more efficient and economical. The project will create job opportunities and income generation for the unemployed local people during the construction as well as operation phases. The significant potential positive effect of operation of rail transport includes creation of easy outlet for agricultural products to market centers at lower transportation costs, and boosting trade activities.

6.2 Negative Impacts

The main potential negative environmental impacts identified in this study and their key mitigation measures are concisely described below.

6.2.1 Loss of Land under Various Uses and Impacts on Land Use

Implementation of the planned railway project will involve acquisition of substantial area of land for rail right-of-way requirements (RoW) and other project activities, and this will result in a permanent loss of land under various uses. The total area of land take for the RoW is estimated to be about 361ha, of which about 318ha is under cultivation, 34ha is under forest and other natural vegetation cover, and the remaining about 9ha is occupied by settlements.

Recommended mitigation and compensation measures include payment of fair cash compensation for loss of farmlands and grazing areas, designing and construction of viaducts and retaining walls for the sections that require excessively high embankment fill and tunnels for the sections that require very deep cut to reduce the width of RoW, avoiding side-tipping of excavation/spoil materials onto adjacent agricultural lands and grazing areas, restoration of areas affected due to temporary activities to productive state, and provision of appropriate pedestrian/animal crossings at habitual crossing locations and at additional locations above or below the rail to allow easy and safe movements of pedestrians and animals across the railway for agricultural and other economic and social activities.

6.2.2 Soil Erosion and Other Impacts on Soils

The activities involved in the execution of the proposed railway project such as extensive cutting in soil and earthmoving activities is expected to cause significant adverse impacts on soils particularly increased soil erosion and soil compaction. In addition, it is likely to result in soil contamination due to spillage of hazardous substances (like fuel, oils and used oils), inappropriate disposal of wastewaters and sewage, and equipment cleaning.

Proposed mitigation measures include execution of the potentially impacting project activities (like land clearing, excavation in soil and earthmoving works) during the dry season, limiting land acquisition and construction works to the imperative area necessary for the project, designing and construction of effective drainage structures, reducing the time surface remains bare following completion of works by preparing the surface for grassing or re-vegetation and implementing the re-vegetation activities immediately following the completion of the works, planting appropriate plant species on erosion-prone slopes, and preventing pollution of the soil by hazardous substances, wastewater, and salvage by adopting the measures recommended in section 6.2.2 (5th bullet).

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6.2.3 Impacts on Landscape Quality and Slope Stability

As estimated from the preliminary engineering design profile, approximately 36% and 30% length of the proposed railway will involve deep cutting and high embankment filling of variable depth and height respectively in order to meet the minimum standard requirement. Consequently, construction of the planned railway will result in significant alterations to the natural features of the landscape. In addition, it may trigger slope failures along several stretches esp. along the deep cut sections located in areas with weak soils and weathered rock formation. Moreover, exploitation of construction material sources, and establishment of contractors' site facilities would affect the landscape quality.

Mitigation measures recommended to minimize impacts on landscape quality and slope stability include designing and construction of viaducts for the sections that require very high embankment fill and tunnels for the sections that require very deep cut, designing and construction of retention structures like retaining walls or gabions for the sections vulnerable to slope instability problem, avoiding or minimizing disposal of spoil materials on down-slope or in adjacent areas, preservation and use of excess or unsuitable excavation materials for back-filling of borrow sites and quarries, proper compaction of embankment slopes, and spreading the fill slopes and cut slopes with topsoil and grassing by seeding or planting grass strips, and restoration of borrow sites and campsites through back-filling, landscaping, spreading topsoil and establishing appropriate vegetation cover.

6.2.4 Impacts on Water Resources and Existing Water Use

Implementation of the railway project is likely to bring a number of adverse impacts on the rivers, streams and other water bodies intercepted by the rail line or on those found below the alignment. The significant potential impacts include increased sediment loading and turbidity of rivers, streams and lake, flooding, channel modification and water pollution through spillage of fuel and oils, improper disposal of used oils or discharge of sewage and other fluid wastes at campsites.

Proposed mitigation measures include designing and constructing culverts and pipes that have adequate openings to pass the design flood in order to minimize flooding, scouring or erosion downstream of the structures, execution of the railway construction and drainage works during the dry season, avoiding disposal of surplus excavated materials on river banks or in river courses, implementing soil and water conservation/watershed treatment measures to reduce the rate of erosion and silt transport from the adjacent catchments, proper handling of hazardous to avoid water pollution by spillages, avoidance of leakages from vehicles and construction equipment by regular and effective maintenance, avoidance of withdrawal of water for the railway project requirements from sources used by the local communities, locating Contractor's site facilities at sufficient distance (min. 2km) from streams, rivers, or community water supply sources, provision of satisfactory disposal of solid and liquid wastes generated by construction camps, and avoidance of disposal of used oils in the field.

6.2.5 Air and Noise Pollution

During the construction phase, heavy-duty operations involved in the construction of the planned railway such as heavy excavation works, extraction and haulage of construction materials (borrows and quarries), aggregate production, filling of the embankment with select materials and aggregates, and compaction using heavy equipment, concrete batching, and haulage of spoil materials to disposal sites are expected to result in significant air and noise pollution until completion of such bulk operations. During the operation phase, there will be increased noise emissions along the railway emanating from the operation/movement of trains, while there will be minimal air pollution problem as the trains on this railway are expected to be operating basically with electric power supplied by trackside systems instead of diesel fuel.

Recommended mitigation measures include limiting traffic speeds and applying water regularly on dusty roads, use of modern and well-maintained equipment, regular maintenance of diesel powered machinery and vehicles to reduce exhaust emissions and noise levels, regular maintenance of emission intensive plants like aggregate production plants and application of dust suppressant

mechanisms, locating the aggregate production plants and concrete mixing plants at a minimum distance of 2km from any sensitive receptors, implementing well-designed traffic management plan that considers traffic safety and working hours for materials transport, carrying out noisy construction activities during normal working hours, and informing local people in advance when there will be blasting or unusual unavoidable noise.

6.2.6 Impacts on Natural Vegetation and Flora

Construction of the planned railway will cause loss of some parts of the remnant natural vegetation and many indigenous trees and bushes located within the RoW, along access routes, and at construction material sources. Of the natural vegetation areas available along the project route, the impact on the Faji Protected Forest is likely to be significant since the rail line directly passes through the forestland. Potential impacts on forestland, other natural vegetation and remnant trees will be minimized by limiting land taking and land clearing/earthworks to the area absolutely necessary for the project, avoiding locating of access roads, construction camps and materials processing plants within areas, which have significant vegetation or trees cover, avoiding disposal of spoil/excess excavation materials on down-slope or in adjacent areas where it will affect vegetation/trees, avoiding locating/selecting quarries and borrow pits at areas which have significant vegetation or trees cover, and implementing replanting of appropriate tree species at areas affected due to temporary activities (campsites, materials processing sites, access roads, borrow sites etc.), along the railway and at other places to compensate for the trees/vegetation lost.

6.2.7 Impacts on Fauna

Implementation of the railway project is expected to cause some impacts on wildlife, mainly due to loss, disturbance or fragmentation of habitats and disruption of habitat use patterns of wild animals along or across the rail line and access roads as well as at construction material sources. In addition, noise generated from vehicular movements and operation of heavy equipment may cause disturbances to wildlife, and may result in temporary migration of animals. Impacts on habitats and wildlife will be minimized by applying good site practices incorporating appropriate mitigation measures that reduce nuisance noise levels, posting appropriate signs and applying speed limits for the sections passing through important wildlife areas esp. in the Faji PF by setting speed limits to safe levels, strictly prohibiting unnecessary destruction of habitats, cutting of trees or vegetation, strictly forbidding hunting, trapping or killing of wild animals by the project workers, implement restoration of affected habitats through artificial landscaping and replanting of trees, and increasing the awareness of drivers and equipment operators towards wildlife conservation.

6.2.8 Impacts on Cultural Heritage Sites

Of the physical cultural resources found in the project corridor, two mosques and one graveyard/ cemetery site may be affected by the project since they are located within the impact zone around station 62+080, 63+000 and 63+280. In addition, implementation of the project may affect hot springs located on the banks of Mille river at station 21+800. Recommended mitigation measures include designing and construction of a tunnel for the section km 61.30 to about km 64.00 where mosques, cemeteries, villages and existing access road would be affected if this section was constructed through deep cutting works, at sections nearby religious sites avoiding producing of excessive noise levels during the time when spiritual programs are underway, and in the event of accidental discovery of any archaeological remains or properties of cultural value, halting works at that particular section or spot and immediately notifying the relevant authority and protecting and keeping same intact until the authority takes delivery thereof.

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6.2.9 Disruption of Existing Roads/Tracks and Creation of Obstruction

The proposed railway intercepts the Woldiya-Hara-Mille main road, three access roads, about 18 major foot tracks and many other footpaths that are used by the local communities. Therefore, construction of the railway will damage those existing roads and tracks, and thus, create physical barriers that will prevent pedestrians, animals and vehicular traffic from moving across the rail particularly at the elevated or deepened sections of the rail. Proposed mitigation measures include designing and construction of adequate and appropriate under or over passage crossing structures at the existing roads and tracks and at additional locations to allow easy/free and safe movements of people, animals and motorized traffic, designing and construction of viaducts for the sections that require high embankment fill and tunnels for the sections that require deep cut, fencing of the highly risky sections of the railway like the deep cut sections for safety reasons, provision of appropriate information to potentially affected local communities prior to the beginning of any works, and strict prohibition of risky areas for safety reasons, e.g. deep cut and high fill sections, rock-blasting sites, borrow pits and quarries, and materials storage and processing places.

6.2.10 Safety Issues

During the construction phase, there will be potential accident risks mainly related to operation of construction vehicles and equipment, blasting activities, and operation of quarries and borrow pits. During the operation phase, the trains operating on the railroad with higher speeds may pose some accident risks to people and animals that may move across the railway along the low-grade sections. Recommended mitigation measures include provision of necessary information such as speed limits, direction, hazard locations, sensitive sites by putting appropriate signals and hazard markings, provision of awareness trainings for drivers and equipment operators in traffic safety measures, informing all the vulnerable people about the danger of possible hazards from blasting and earth moving activities so that they would take necessary precautions, assigning traffic regulators or traffic police to control traffic flows at critical sections or periods, and establishing speed limits and controls for construction vehicles and discipline for the drivers.

6.2.11 Impacts of Construction Camps and Immigrant Workers

Establishment and operation of construction camps and other site facilities may bring a number of environmental and social impacts, including loss of land under agricultural activities, contamination of water sources and soils, health risks to local people due to environmental sanitation problems and spreading of HIV/AIDS and other STDs, and competition for limited resources or services like potable water supply, health care services, and law enforcement by the workforce. In addition, conflicts among the local people and immigrant workers could occur due to competition for job opportunities created by the project. Proposed mitigation measures include proper siting and management of the site facilities, and restoration of the sites as soon as the construction works are completed, keeping appropriation of land for camps to the absolute minimum and effecting suitable compensation for the affected land owners, proper disposal of solid and liquid wastes generated by the camps and other facilities, avoidance of siting camps at ecologically or socially sensitive areas, and avoidance of overloading of existing facilities like potable water supply and health care.

7. Consideration of Alternatives

In terms of route location, there is little option to locating the rail line inside a marginal graben or valleys situated between mountainous regions because of mostly mountainous and hilly terrain of the project corridor. The railway project mostly follows the ERC alignment but a number of realignments are proposed by the Consultant in order to improve its technical as well as economic feasibility plus to reduce environmental and social impacts.

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A comparison of the environmental impacts of the ERC alignment and the modified alignment has revealed that almost all the proposed realignments (modified alignment) are much better than the ERC alignment in terms of avoiding or minimizing potential environmental and social impacts. Therefore, it is recommended that the proposed realignments are approved by the Client since the magnitude and significance of the environmental and social effects of the realignment sections is comparatively much less and the impacts are likely to be manageable to acceptable levels.

8. Environmental Management and Monitoring Plan

8.1 Environmental Management Plan

The potential negative environmental impacts associated with the implementation and its subsequent operation of the proposed railroad project have been identified and described in Chapter 6. In addition, appropriate mitigation measures that would be adopted to prevent, reduce or offset the potential adverse impacts are proposed in the same section. Furthermore, Environmental Management Plan (EMP) is needed to ensure that the mitigation measures recommended in this EIA document will actually be complied with when the project is approved for implementation. Therefore, Chapter 8, section 8.1 of the EIA Report provides an EMP that comprises the mitigation and monitoring measures to be applied during the following phases of the project together with responsibilities for their implementation, the time framework and where necessary, cost estimate of the mitigation plan.

8.2 Environmental Monitoring Plan

It is important to have a well-planned environmental monitoring program for both the implementation as well as operation phases of the project. Environmental monitoring is required to ensure the proper implementation of the proposed environmental mitigation plan. It helps to detect the scale and extent of impacts caused by the project activities over time and to assess whether mitigation actions have been properly and timely implemented and are working effectively. Monitoring of environmental parameters will identify potential problems from the railroad construction and operation activities and will allow for prompt implementation of effective corrective measures. The proposed environmental monitoring plan is provided in Chapter 8, section 8.2 of the EIA Report.

8.3 Environmental Mitigation, Management and Monitoring Costs

The majority of the environmental mitigation and management measures recommended in the relevant section of this EIA Report will not entail separate costs since they are engineering features, good engineering practices, or good housekeeping matters, which will be part of the Contractor's construction items. They can be implemented following proper organization/ planning of works and construction methods, which shall be specified in the tender document, technical specifications and construction contract documents. The environmental mitigation measures, management and monitoring activities that may have separate cost items are estimated to be around 11.3 Million Birr. The major costs related to physical construction works are referred to be included in the engineering cost estimates, whereas the costs related compensation of agricultural lands and properties are considered to be part of the Resettlement Action Plan (RAP) that will be worked out separately.

9. Conclusions and Recommendations

9.1 Conclusions

The assessment of potential environmental impacts is based on the project location and the proposed project activities. The assessment acknowledges that the construction and operation of the Hayik – Robit Railway will bring positive as well as negative environmental and social impacts. The key positive environmental effects will be reduction of air pollution and effects on climate that would have been caused by using the road transport in supporting the increasing mobility demands for passengers and freight. The railway project will support the local as well as national socio-economic

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development by meeting the increasing mobility demands for passengers and freight in much more efficient and economical way compared to the road transport.

Conversely, implementation of the proposed railway project is expected to bring a number of undesirable environmental and social impacts, most of which will occur during the construction phase. Most of the significant potential impacts are related to project location, land acquisition for the rail right-of-way requirement and for construction material sources, the rail construction activities, installation of drainage structures, extraction, haulage and processing of construction materials, opening and use of access roads, establishment of construction camps, and disposal of spoil or excess excavation materials. Considering the location and scale of the project, the potential impacts are not unexpected ones, but they need due attention and corresponding mitigation measures. The potential impacts/issues that will require particular attention and mitigation include loss of agricultural lands, erosion, siltation/sedimentation, slope instability, disfiguring of landscape, disruption of existing roads/tracks and obstruction of pedestrian/ animal/ vehicular movements, and safety concerns. Other significant issues include air and noise pollution, soil and water contamination by pollutants, loss of natural vegetation and habitats and remnant indigenous trees, impacts on private and cultural properties, and public health concerns esp. spreading of HIV/AIDS.

In summary, the assessment did not identify any severe environmental or social issue that will prevent the proposed railroad project from proceeding to the implementation stage provided the mitigation measures recommended in this EIA document are properly considered. It is expected that all potential negative impacts identified in this EIA study could be mitigated or compensated to reduce severity and significance to lower levels through good engineering design and good construction methods, as well as through implementation of appropriate environmental and social mitigation measures.

9.2 Recommendations

For all significant impacts/issues identified in this EIA, corresponding mitigation or compensation measures are recommended in Chapter 6 and summarized in Chapter 8 in the form of environmental management plan (EMP). To ensure implementation, the recommended mitigation measures shall be included in the engineering design or in the tender documentation, either as contract and/or special technical specification clauses. In addition, adequate budget shall be allocated for the mitigation and management actions not included in the obligations of the Contractor and the Construction Supervision Consultant, and necessary institutional/specialist arrangement is made for their implementation before the commencement of the construction works. Further, a well-planned monitoring program should be instituted in order to follow up the proper implementation of the EIA recommendations and their effectiveness, as well as to monitor incidence of any unforeseen issues.

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1. INTRODUCTION

1.1 Project Background

In line with the railway infrastructure development program of Ethiopia, the FDRE, represented by the Ethiopian Railway Corporation (ERC) has allocated sufficient budget for the consultancy services for the Detailed Engineering Design, Environmental and Social Impact (ESIA) studies, Tender Documents Preparation and Construction Supervision for the various Routes located in different parts of the Country. Among these Routes is the Awash - Kombolcha – Mekelle – Shire Route, which is designated as Route V. In order to facilitate the design and construction of the railway project, Route V has been divided into several Lots, amongst which Lot 13: Hayik – Robit is one. Hence, ERC requires the services of a relevant Consultant to carry out the Detailed Engineering Design, ESIA studies, Tender Documents Preparation and Construction Supervision for Lot 13. Therefore, ERC has entered into contract agreement with Associated Engineering Consultants to perform the aforementioned consultancy services. The consultancy service agreement was signed on September 23, 2010 while the date of notification to commence the services was given on September 29, 2010.

As part of the contract agreement requirement, this EIA study has been carried out in conformity with the Ethiopia's Environmental Impact Assessment (EIA) Guidelines and Legislations. This Report presents the findings of the EIA study essentially following the requirements stated in the TOR of the consultancy assignment as well as the requirements of the Federal EPA EIA Guideline Document.

1.2 Objectives and Scope of the Consultancy Services and the EIA Study

1.2.1 Objectives of the Consultancy Services

The main objectives of the consultancy services of Lot 13: Hayik - Robit Railway Project are:

i. To carry out Detailed Engineering Design of the Railway Project at ballast level,

ii. To prepare complete set of Tender Documents that will serve as a basis for tendering the project on procurement method based on National Competitive Bidding (NCB) as Design-Bid- Build using FIDIC Condition of Contract,.

iii. To undertake Environmental and Social Impact Assessment of the Railway Project,

iv. To produce a confidential Engineering Cost Estimate for the Project, and

v. To carry out Construction Supervision of the Railway Project during its construction phase

1.2.2 Objectives of the EIA Study

The main objective of this Environmental Impact Assessment (EIA) study is to ensure that the envisaged railway project is environmentally sustainable. It is intended to ensure that the potential environmental impacts of the construction and operation of the railway project are adequately identified and appropriately considered during the design, implementation and operation phases so that it does not cause serious adverse effects.

1.3 Approach and Methodology of the ESIA Study

1.3.1 General

The approach and methodology followed for acquisition of relevant data and information, prediction and evaluation of potential environmental impacts, and development of mitigation and management plan include the following:

- Review of national environmental policies, strategies, legislations and guidelines,
- Review of relevant former studies and literature,
- Secondary data collection from woreda government offices,
- Detailed field investigations along the entire section of the proposed rail alignment and collection of site specific baseline data and identification of potential issues,
- Conducting consultations with key stakeholders in the project area including the project affected people,
- Conducting impact analysis (identification, prediction and evaluation) using methods used in good EIA practices, and
- Developing appropriate mitigation plan as well environmental management and monitoring plan.

1.3.2 Review of Relevant Policies and Legislations

In carrying out environmental and social impacts of development projects, it is necessary to understand and follow the national environmental policy and conservation strategy, as well as pertinent legislations and EIA procedures. In view of that, Ethiopia's environmental policy and national conservation strategy, relevant legislations and EIA guidelines were collected from different sources and reviewed. Then, the requirements of the policy and legal framework were followed in conducting this ESIA study and producing this Environmental Statement. A concise description of the policies, laws and guidelines reviewed is presented in Chapter 3 and their list is provided at the end of the main body of this report.

1.3.3 Review of Previous Studies and Literature

A number of former studies in the project area were collected from woreda government organizations. Additional pertinent documents and literature were obtained from the Consultant's Archive. All these were reviewed and relevant data and information presented in the documentation was extracted and used in the baseline description and identification of the potential impacts of the project. The full list of the documents consulted is given in the list of references.

1.3.4 Field Surveys and Data Collection

Subsequent to the review of the policy and legal framework and initial review of available previous studies, the EIA Specialist conducted a field visit to the project area with the main objective to undertake the following major tasks:

- To collect relevant secondary data from woreda government offices,
- To conduct consultations with the key stakeholders including the project affected community, and
- To survey the environment of the proposed rail alignment, collect primary baseline data and identify environmental and social issues likely to arise with implementation of the proposed project.

Relevant secondary data were collected from the various government offices of all the woredas connected by the railway project . These offices include Woreda Administration Offices, Agriculture and Rural Development Offices, Water Resources Development Offices, Environmental Protection and Land Administration Offices, Finance and Economic Development Offices, Health Offices, and Culture and Tourism Offices.

In parallel with the secondary data collection from local offices, the EIA Expert conducted intensive field surveys along the project alignment. This task, besides the acquisition of baseline data on environmental and social characteristics of the project area, enabled the Consultant to identify and

register potentially affected resources located within the direct impact zones, existing environmental issues, and to have a clear understanding of the potential environmental impacts of the planned railway construction and operation activities. During the surveys, special attention was paid to environmentally or socially sensitive areas or issues so that due emphasis would be given during the significance analysis of the identified impacts and development of corresponding mitigation measures.

1.3.5 Public and Stakeholders Consultations

Consultations with key stakeholders including the project-affected people (PAP) located along the project alignment were made in order to inform them about the planned railway project, consult them and obtain relevant information on existing conditions or constraints of the study area. In addition, their opinions and concerns about potential environmental and social issues and their mitigation measures were gathered through informal discussions and interviews. The information and ideas obtained during the consultations are considered in the impact analysis and the key issues are summarized in Chapter 5, and the list of consulted persons and organizations are given in Appendix 1.

In addition, Public Consultation was conducted at three key locations along the project route. The key stakeholders participated in the public hearings include kebele administrators and executive committee members, and representatives of the local community including elders, religious leaders, farmers, traders, women, youth and others.

Information related to existing environmental and socio-economic features of the project influence area, as well as the attitudes of the consulted people towards the envisaged project were obtained during the meetings. These information and opinions have been considered in the impact analysis and development of mitigation, management and monitoring plans. The details of the public consultation process and the key findings are described in Chapter 5, and the minutes of the meetings are presented in Appendix 5.

1.3.6 Impact Analysis

Succeeding the evaluation of the baseline condition and analysis of stakeholders opinions, positive as well as negative environmental and social impacts likely to result from construction and operation of the proposed railway project have been identified, predicted and analyzed for significance. The possible impacts have been assessed being classified as impacts on physical environment, biological environment, and other environmental issues. Corresponding to the significance of impacts, appropriate mitigation measures have been recommended to prevent or minimize the adverse impacts. The details of the impact analysis are presented in Chapter 6.

2. DESCRIPTION OF THE RAILWAY PROJECT

2.1 Project Location

The proposed Hayik- Robit Railway Project is located in South and North Wollo Zones of the Amhara National Regional State. Hayik town is geographically located at 573836E, 1250450N, and 2022m elevation. The railway project starts at about 14km north of Hayik town at the right hand side of the Addis Ababa – Mekalle Trunk Road at about 1km distance off. The proposed rail line mostly runs inside a marginal graben between mountainous regions and some stretches cross elevated (mountainous or hilly) areas as well. The project terminates at about 4km south of Robit town and about 3.7km off to the right side of the Addis Ababa – Mekalle main road. The geographic location of Robit town is 567831E, 1327838N and 1612m elevation. The total length of the project is 84.50km.

Administrative wise, the railway project is situated in South and North Wello Administrative Zones of the Amhara NRS. The project alignment starts in Tehuledere Woreda of the South Wello Zone and crosses Ambassel Woreda of the same administrative zone. Then, it travels through Habru and Gubalafto Woredas and ends in Raya Kobo Woreda; all the three woredas are located in North Wello Zone. The only town directly connected by the project railway is Hara town, which is located at station 66+500 – 67+500.

2.2 Project Features

In general the proposed rail line runs in the lowest and flatter parts of the route corridor with mostly valley alignment between adjacent mountains, but it also crosses mountain ranges through tunnels. The project generally follows the corridor proposed by the ERC. However, realignments have been proposed by the Consultant to about 66% portion of the alignment formerly proposed by the ERC in order to improve its technical and economic feasibility as well as to reduce environmental and social impacts of the project. The total length of the realignments is 56km (66.3%).

According to the preliminary engineering design, implementation of the proposed railway will involve construction of tunnels with a total length 10.24km (12%), about 30km (36%) long deep cut sections, and about 26km (30%) long high embankment fill sections in order to achieve the maximum vertical gradient requirement of ±2%. The remaining potion comprises about 16km (19%) level sections and about 2.8km (4%) structure sections (culverts, bridges and viaducts); see Appendix 3 for the details. In order to avoid excessive land acquisition and ensure its stability, retaining walls are considered for certain portions of the high embankment sections. In addition, viaducts are proposed for the sections crossing very deep valley like around station 21+800, 59+000 – 61+000 and 74+500 – 76+000.

Implementation of the railway project will require building of new cross drainage structures including bridges, slab culverts and pipe culverts on the rivers, streams and other watercourses. Construction of the rail line will involve installation of about 44 bridges and major culverts over rivers and streams with span ranging from 8m to 450m. In addition, the project will require numerous medium and small size drainage structures to cross the drainage channels intercepted by the rail line.

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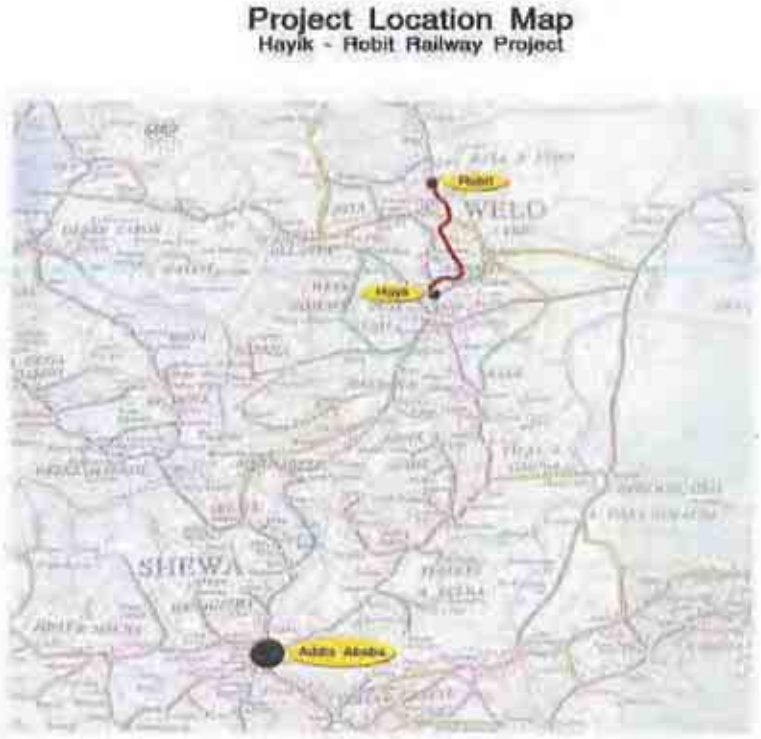
Figure 2.1 Location Map of the Project Alignment



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3. ENVIRONMENTAL POLICIES, LEGISLATIONS AND GUIDLINES

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

3.1 The Constitution of FDRE

The Constitution of Ethiopia (Procl. No. 1/1995), adopted in August 1995, 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 forms the fundamental basis for the development of specific environmental legislative instruments.

In the section, which deals with democratic rights, Article 43 gives the right to people to improved living standards and to sustainable development. Article 92 of Chapter 10 (which sets out national policy principles and objectives), includes the following significant environmental objectives:

- Government shall endeavour to ensure that all Ethiopians live in a clean and healthy environment (Article 44 states that all persons have the right to a clean and healthy environment)
- 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. Peasants have the right to obtain land without payment, and are protected against eviction from land in their possession. Full right to immovable property and permanent improvements to land is vested in individuals who have built the property or made the improvements, but government may expropriate such property for public purposes, subject to the payment in advance of compensation commensurate to the value of the property or alternative means of compensation, including relocation with adequate State assistance.

3.2 Relevant National Policies and Strategies

3.2.1 Environmental Policy and Strategies

The Environmental Policy of Ethiopia (EPE) of the Federal Democratic Republic of Ethiopia (FDRE) was approved by the Council of Ministers in April 1997. It is based on the Conservation Strategy of Ethiopia (CSE), which was developed through a consultative process over the period 1989-1995. The policy has the broad aim of rectifying previous policy failures and deficiencies, which in the past, have led to serious environmental degradation. It is fully integrated and compatible with the overall long-term economic development strategy of the country, known as Agricultural Development-Led Industrialization (ADLI), and other key national policies.

The EPE's overall policy goal may be summarized in terms of the improvement and enhancement of the health and quality of life of 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 policy contains sectoral and cross-sectoral policies and also has provisions required for the appropriate implementation of the policy itself.
Environmental Impact Assessment (EIA) policies are included in the cross-sectoral environmental policies. The EIA policies emphasis the early recognition of environmental issues in project planning, public participation, mitigation and environmental management, and capacity building at all levels of administration.

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

3.2.2 Conservation Strategy of Ethiopia

Since the early 1990s, the Federal Government of Ethiopia has undertaken a number of initiatives to develop regional, national and sectoral strategies for environmental conservation and protection. Paramount amongst these was Conservation Strategy of Ethiopia (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 approved by the Federal Government, and it is an important policy document. 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 programmes, as well as providing the basis for development of appropriate institutional and legal frameworks for implementation.

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

Regional States were given the responsibility to prepare regional conservation strategies, detailing with the specific conditions and environmental issues prevalent in their territory, and outlining the ways in which problems were to be addressed. Following CSE, the Regional States have prepared Conservation Strategy document for their respective Regions.

3.2.3 Policies on Land Tenure, Expropriation and Compensation

The constitution of the FDRE spells out the situation regarding the ownership of rural and urban land, as well as all natural resources, and states that land is the property of the state/ public and does not require compensation. The Constitution gives every person the ownership right for the property he has invested on the land, and in this regard Article 40 (7) states that every Ethiopian shall have the full right of ownership of the immovable property he builds and to the permanent improvements he brings about on the land by his labour or capital investment.

If the land that is legally occupied by an individual is expropriated by the government for public use, that person is entitled to compensation. In this regard, Article 44 (2) of the Constitution states that all persons who have been displaced or whose livelihoods have been adversely affected as a result of state programs have the right to commensurate monetary or alternative means of compensation, including relocation with adequate state assistance. Moreover, the government shall pay fair compensation for property found on the land, but the amount of compensation shall not take into account the value of the land.

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3.2.4 Sectoral policies

The Government of Ethiopia has issued several sectoral and cross sectoral policies that considers environmental issues for sustainable development. Among these, the ones which are most relevant are described below.

i) Water Resource Policy

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

ii) Wildlife Policy

The Wildlife Policy was developed in 2006 by the Ministry of Agriculture and Rural Development. The prime objective of the policy is to create conducive environment for the preservation, development and sustainable utilisation of Ethiopia's wildlife resources for social and economic development and for the integrity of the biosphere/ biodiversity. It covers a wide range of policies and strategies relating, amongst others, to wildlife conservation and protected areas with four categories from the highest protection ranking *'National Park'*, followed by *'Game Reserve'* and *'Sanctuary'* to *'Controlled Hunting Area'*.

iii) National Policy on Biodiversity Conservation, Research and Development

The policy contains policy directives with regard to the need to explore, collect, characterize, evaluate, conserve and utilize biodiversity. The need to regulate access to genetic resources through various measures, including legislation and building appropriate institutional structures and mechanisms is also mentioned. Strengthening capacity for information collection and documentation, encouraging networking and generally integration of biodiversity conservation, research and development elements in education and general awareness programmes are considered important. The policy directives emphasize the importance of community participation in the conservation and sustainable utilization of biodiversity resources together with the need to provide for access and benefit sharing for communities to and from biodiversity resources.

iv) National Population Policy

This Policy was issued in April 1993 and aims at closing the gap between high population growth and low economic productivity through a planned reduction in population growth combined with an increase in economic returns. With specific reference to natural resources, the main objectives of National Population Policy are:

- making population and economic growth compatible and the over-exploitation of natural resources unnecessary;
- ensuring spatially balanced population distribution patterns, with a view to maintaining environmental security and extending the scope of development activities;
- improving productivity of agriculture and introducing off-farm/ non-agricultural activities for the purpose of employment diversification; and
- Maintaining and improving the accommodating capacity of the environment by taking appropriate environmental protection and conservation measures.

v) Ethiopia's 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 fields of Information, Education and Communication (IEC) of health to create awareness and behavioural change of the society towards health issues. Emphasis is placed on

- the control of communicable diseases, epidemics, and of diseases that are related to malnutrition and poor living conditions,
- promotion of occupational health and safety,
- the development of environmental health,
- rehabilitation of health infrastructures,
- appropriate health service management systems,
- attention to traditional medicines,
- carrying out applied health research,
- provision of essential medicines, and
- expansion of frontline and middle level health professionals.

vi) National HIV/AIDS Policy

Ethiopia is one of the countries in the world that is facing HIV/AIDS pandemics. Having understood the magnitude of the HIV/AIDS pandemic and its paramount impacts on the socio-economic development of the country, the FDRE issued a Policy on HIV/AIDS in 1998, which calls for an integrated effort of multi-sectoral response to control the epidemic. The National HIV/AIDS Policy urges communities at large, including government ministries, local governments and the civil society to assume responsibility for carrying out HIV/AIDS awareness and prevention campaigns. The general objective of the policy is to provide an enabling environment for the prevention and control of HIV/AIDS in the country. In order to address the problem and coordinate the prevention and control activities at national level, in 2000 National AIDS Council was established under the Chairmanship of the country's President, and in 2002 HIV/AIDS Prevention and Control Office was established.

vii) National Policy on Women

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

3.3 Environmental Framework Legislations

This section describes briefly the legislations that are aimed at advancing environmental protection and sustainable use of natural as well as man-made resources.

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3.3.1 Proclamation on Establishment of Environmental Protection Organs

This Proclamation (No. 295/2002) came into effect in 20002 and its objective was to assign responsibilities to separate organizations for environmental development and management activities on one hand, and environmental protection, regulations and monitoring on the other, in order to ensure sustainable use of environmental resources, thereby avoiding possible conflicts of interest and duplication of effort. It is also intended to establish a system that fosters coordinated but differentiated responsibilities among environmental protection agencies at federal and regional levels.

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

3.3.2 Proclamation on Environmental Impact Assessment

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

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

3.3.3 Proclamation on Environmental Pollution Control

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

3.3.4 Proclamation on Development, Conservation and Utilization of Wildlife

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

Wildlife Conservation Areas to be designated and administered by the Federal Government, Regional States, Private Investors, and Local Communities.

Part three of the Proclamation contains provisions related to economic activities that may be undertaken within a wildlife conservation area, wildlife resource based tourism, and trading in wildlife and their products. Finally, Part four of the Proclamation comprises Miscellaneous Provisions that include Powers and Duties of the MoARD, Regional States and Wildlife Anti-Poaching Officers, Penalty, Repeal and Savings, and Inapplicable Laws.

3.3.5 Proclamation on Forest Development, Conservation and Utilization

Proclamation No. 542/2007, issued in September 2007, provides for the development, conservation and sustainable utilization of forests in satisfying the needs of the society for forest products and in the enhancement of national economy in general. It provides the basis for sustainable utilization of the country's forest resources. The Proclamation categories types of forest ownership as private forest and state forest. The Proclamation then goes on to give some specific direction for the development and utilization of private and state forests. Part two of the Proclamation contains provisions for the Promotion of the Utilization of Private Forest, while Part three gives provisions for Conservation, Development and Administration of State Forest. Lastly, Part four comprises Miscellaneous Provisions that, among others, include prevention of forest fire, production and movement of forest products, prohibitions, forest guards and inspectors of forest products movement, and powers and duties of the MoARD and Regional States.

3.3.6 Proclamation on Expropriation of Land Holdings and Payment of Compensation

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

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

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3.3.7 Proclamation on Rural Land Administration and Land Use

This Proclamation, Proc. No. 456/2005, came into effect in July 2005, and its objective was to conserve and develop natural resources in rural areas by promoting sustainable land use practices. In order to encourage farmers and pastoralists to implement measures to guard against soil erosion, the Proclamation introduces a Rural Land Holding Certificate, which provides a level of security of tenure.

The MoARD is charged with executing the Proclamation by providing support and coordinating the activities of the regional authorities. Regional governments have an obligation to establish a competent organization to implement the rural land administration and land use law.

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

3.3.8 Proclamation on Research and Conservation of Cultural Heritage

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

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

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

3.3.9 Proclamation on Ethiopian Water Resources Management

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

3.3.10 Proclamation on Public Health

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

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

3.3.11 Proclamation for Establishment of Amhara EPLAUA

Proclamation No. 47/2000 of the Council of the Amhara NRS establishes the Environmental Protection, Land Administration and Utilization Authority (EPLAUA) as an autonomous body that is accountable to the executive committee and the president of the NRS. According to the Proclamation, the main objective of the EPLAUA is ensure that the region's social and economic development activities are carried out in a manner that will protect the welfare of human beings as well as sustainable protection, development and utilization of the resources. In addition, it has the objective to create conducive atmosphere by which the management, administration and use of rural land of the region could be appropriately decided pursuant to federal and regional constitutions.

3.3.12 Proclamation on Rural Land Administration and Use of Amhara NRS

The Amhara Regional Council, in accordance with the powers vested on it under Sub-article 3(1) of Article 49 of the Regional Constitution and Sub-article 1 of Article 17 of the federal Proclamation No. 456/2005, issued a Proclamation (Procl. No. 133/2006) to provide for the Revised Rural Land Administration and Use of the Amhara NRS. According to Article 5(1) of this Proclamation the right to ownership of land is vested in the state and the public, and it is impossible to transfer the land holding to other in sale or in exchange by another property. Article 11(1) proclaims that the holdings of any person are respected by law, and no person shall be expropriated from his holdings without his consent, unless it is done by re-distribution according to decision of people or for the purpose of public interest.

3.3.13 Regulations on Payment of Compensation for Property Situated on Landholdings Expropriated for Public Purposes

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

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

3.4 International Conventions and Protocols

In addition to national environmental legislations, the Federal Democratic Republic of Ethiopia is also a party to a number of Regional and International Conventions and Protocols on Environment. The Government has established an Environmental Protection Authority, and this Authority is

designated as focal point for the implementation of these conventions and protocols. These Conventions and Protocols are as follow:

3.4.1 Convention on Biological Diversity

The general objectives of the biological diversity convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. The convention encourages countries to establish a system of protected areas where special measures need to be taken to conserve biological diversity. Ethiopia signed this convention on 10 June, 1992 at the Earth Summit in Rio de Janeiro, and ratified it through proclamation 98/94 on May 31, 1994.

3.4.2 Framework Convention on Climate Change

The ultimate objective of this convention is to stabilize greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interferences to the climate system. This convention takes into account the fact that climate change has trans-boundary impacts. The convention commits countries to adopt national policies and take corresponding measures on the mitigation of climate change by limiting its anthropogenic emission of greenhouse gases and protecting and enhancing its greenhouse sinks and reservoirs. Ethiopia has ratified the convention by Proclamation No. 97/1994on May 2/1994.

3.4.3 Kyoto Protocol to the UN Framework Convention on Climate Change

To further strengthen the commitments of countries to implement the Convention on Climate Change there was a need for a refined protocol that helps in implementing and elaborating polices and measures in accordance with national circumstances. The Kyoto protocol promotes sustainable development through protection and enhancement of sinks and reservoirs of greenhouse gases.

3.4.4 The Vienna Convention on the Protection of the Ozone Layer

The basic objective of the Convention is to combat the negative impact on the environment and human beings resulting from ozone depleting substances by reducing the amounts released and eventually banning their commercial use through internationally agreed measures. The Montreal Protocol entered into force in 1989 to facilitate the implementation of the convention.

Ethiopia ratified and become party to the Vienna Convention and the Montreal Protocol in January 1996. The National Meteorological Services Agency has been mandated for the coordination and supervision of implementation of this convention.

3.4.5 The United Nations Conventions to Combat Desertification

The objective of the convention is to combat desertification and mitigate the effects of droughts in countries experiencing serious drought and /or desertification, particularly in Africa. Ethiopia has ratified the convention through its proclamation no. 80/1997.

3.4.6 The Basel Convention

The objective of the Basel Convention is to control and regulate the trans- boundary movement of hazardous wastes. The Bamako Convention of 1991 plays a similar role at the level of the African continent. Ethiopia ratified the Basel Convention through its Proclamation No. 357/2002. Its

amendment was ratified through Proclamation No. 356/2002. The country has also ratified the Bamako Convention through Proclamation No. 355/2002.

3.4.7 The Stockholm Convention

In the year 2002, Ethiopia fully accepted and ratified the Stockholm Convention on persistent organic pollutants by Proclamation No. 279/2002 designed to ban the use of persistent organic pollutants. The Environmental Protection Authority has the full mandate to implement the convention at the national level.

3.4.8 Convention on International Trade in Endangered Species of Fauna and Flora

The objectives of the convention are to control international trade in endangered species and to ensure that international trade in non-endangered species is carried out in a manner which ensures stable markets and economic benefits for the exporting countries as well as to control and regulate illegal trade in such non endangered species, fossils and/ or their derivatives.

Ethiopia ratified the convention through Proclamation 14/1970. The mandate to implement the convention at federal level is the responsibility of the Ethiopian Wildlife Protection and Development Organization.

3.5 Environmental Assessment Guidelines

3.5.1 EPA's EIA Guideline

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

The technical guideline (Guideline Document, 200) provides a background to environmental impact assessment and environmental management in Ethiopia. The document aims at being a reference source to ensure effective environmental assessment and management practice in Ethiopia for all parties who engage in the process. The long-term objectives of the EIA system as set out by the EPA are:

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

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

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

Schedule 1: Projects which may have adverse and significant environmental impacts and therefore require a full Environmental Impact Assessment.

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

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

However, projects located in environmentally sensitive areas such as land prone to erosion, land prone to desertification, areas of historic or archaeological interest, scenic landscape, religiously important areas etc. should be treated as equivalent to schedule 1 activities irrespective of the nature of the project.

According to the guidelines the Hayik – Robit Railway Project falls under schedule 1, requiring a full EIA. The main reason being that the size and scale of the project requires full scale EIA. In addition, it is located in areas categorized as 'environmentally sensitive areas', including prime agricultural lands, areas with erosion-prone soils and scenic landscape.

3.6 Institutional and Administrative Framework

3.6.1 Federal and Regional Administration

The Federal Democratic Republic of Ethiopia (FDRE) was formally established on August 21, 1995. The FDRE comprises of the Federal States with nine Regional State members. The new government structure takes power from the center to regions and localities. The relative roles of government at the different levels (Federal, Regional and Local) in terms of power and duties, including on fiscal matters, have been defined by the Constitution, Proclamations Nos. 33 of 1992, 41 of 1993, and 4 of 1995. Under these proclamations, duties and responsibilities of Regional States include planning, directing and developing social and economic programs, as well as the administration, development and protection of natural resources of their respective regions.

The duties and responsibilities of the Regional States include planning, directing and developing social and economic programs as well as the administration, development and protection of natural resources of their respective regions. The basic administrative units in each Regional Government are the Woredas, which sub-units are the Kebeles. Further, based on their authority and responsibilities the regional governments have established Sectoral Bureaus, Commissions and Authorities.

3.6.2 Environmental Protection Authority

The National Environmental Protection Authority (EPA) was re-established under Proclamation No. 295/2002 as an autonomous public institution of the Federal Government of Ethiopia entrusted with the protection and conservation of natural resources in Ethiopia. The general role of the EPA is to provide for the protection and conservation of the broad environment, through formulation of policies, strategies, laws and standards, which foster social and economic development in a manner that enhance the welfare of humans and the safety of the environment sustainable.

One of the environmental policies of the EPA is to protect and rehabilitate the fundamental causes that lead to degradation, adverse effects and determine mitigation measures. The policy is usually integrated and compatible to fit to a long term economic development strategy known as agricultural development-led industrialization (ADLI) and other key policies. As per sub-article 2 of article 6 of Proclamation No.9 of 1995, environmental development and management as well as protection in Ethiopia are designated. In this case the socio-environmental assessment needs to be reviewed and incorporated into different road project phases: at designing & planning, construction, monitoring, post-project evaluation and maintenance phases.

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The EPA is the Competent Agency at the Federal level in Ethiopia. It is, therefore, the responsibility of this authority in the EIA process to:

- ensure that the proponent complies with requirements of the EIA process;
- maintain co-operation and consultation between the different sectoral agencies throughout the EIA process;
- maintain a close relationship with the proponent and to provide guidance on the process; and
- evaluate and take decisions on the documents that arise from the EIA process.

3.6.3 Sectoral Environmental Unit

The Proclamation No. 295/2002, which is briefly described in section 2.2.2, requires at the Federal level each sectoral ministry to establish in-house Environmental Protection Unit to ensure harmony with respect to implementation of the environmental proclamations and other environmental protection requirements. This Unit forms a lower level inter-sectoral co-ordination structure.

3.6.4 Regional Environmental Agencies

In accordance with the principles of government decentralization and the Proclamation no. 295/2002, each national regional state shall establish an independent Regional Environmental Agency or designate an existing agency that shall, based on the Ethiopian Environmental Policy and Conservation Strategy and ensuring public participation in the decision making process, be responsible for:

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

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

The Amhara Environmental Protection, Land Administration and Use Authority is responsible for environmental protection matters in the Region. The Authority is responsible for the review and approval of EIA of development proposals under the mandate of the Regional Government and follow-up of the implementation of EIA recommendations of such proposals. Therefore, project proponents in the Region should operate in close cooperation with the Authority to ensure that the adverse environment effects of development proposals are properly identified and their mitigation or management actions incorporated in the project design or planning and implemented at the right time. Similar to the federal level, an Environmental Impact Study Report should be prepared by the project proponents and examined, commented and approved by the Authority.

3.6.5 Ethiopian Railway Corporation

The Ethiopian Railway Corporation (ERC) was established in 2007 through Council of Ministers Regulation No.141/2007 as a public enterprise that would be governed by the Public Enterprises Proclamation No.25/1992. As stated in the Regulation, the purposes for which the Corporation established are:

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- to build railway infrastructure,
- to operate cargo railway transport services,
- to operate passengers railway transport services, and
- to engage in other related activities necessary for the attainment of its purpose.

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4. DESCRIPTION OF BASELINE CONDITION

4.1 Physical Environment

4.1.1 Topography

The proposed corridor is aligned inside a marginal graben which is favorable for a rail line since it is situated mainly in flat and rolling terrain. However, outside the graben, both to the east and west, it is mountainous terrain, which is relatively difficult and rugged topography.

The altitude of the project route corridor ranges from about 1700m to 1326m asl. The project starts at 1655m asl and traverses rolling terrain up to about station 30+000. Along this section, the alignment descends from 1660m at station 0+100 to 1326m asl at station 21+800 at Mille river crossing with a drop in elevation of about 334m over 21.7km distance. From station 30+000 to 49+000 it travels over flat or gently sloping terrain at the foot-slope of mountainous region with elevation ranging from about 1362m to 1541m asl. From station 49+000 to 53+460 it runs through rolling landscape with altitude varying from about 1541m to about 1585m asl. Then the route crosses a mountainous region through about 4.82km long tunnel up to station about 58+280. From 58+280 to 61+100 it goes through rolling terrain, then it traverses a mountainous region through about 1.78km long tunnel up to station 63+000. The remaining section of the alignment runs through predominantly rolling terrain with short stretches over flat lying topography. The elevation along the last about 20km section ranges from about 1385m asl at Ala Wuha River to about 1612m asl at station 83+480 and 1590m asl at the end of the project.

In summary, the project alignment traverses predominantly rolling terrain, which approximately counts about 70% of the total project length. The remaining section of the project runs through flat and mountainous terrain, which comprises about 23% and 7% respectively. The approximate terrain classification of the project route is provided in Table 4.1 below.

Table 4.1: Approximate Terrain Classification of Project Route

Station		Terrain Type	Length (Km)	%	Notes
From	To				
0+000	30+000	Rolling	30	35.67	This section crosses Mille R. three times
30+000	49+000	Flat	19	22.59	Crosses Galana R. at 34+000
49+000	54+250	Rolling	5.25	6.24	
54+250	57+950	Mountainous	3.70	4.40	Tunnel section
57+950	61+100	Rolling	3.15	3.74	Crosses Chereti R. at 59+400
61+100	63+400	Mountainous	2.30	2.73	Tunnel section
63+400	84+100	Rolling	20.70	24.61	Crosses Ala Wuha R. at 74+800
		Total	**84.1**	**99.98**	
Summary		Flat	19.00	22.59	
		Rolling	59.10	70.27	
		Mountainous	6.00	7.13	
		Total	**84.1**	**99.99**	

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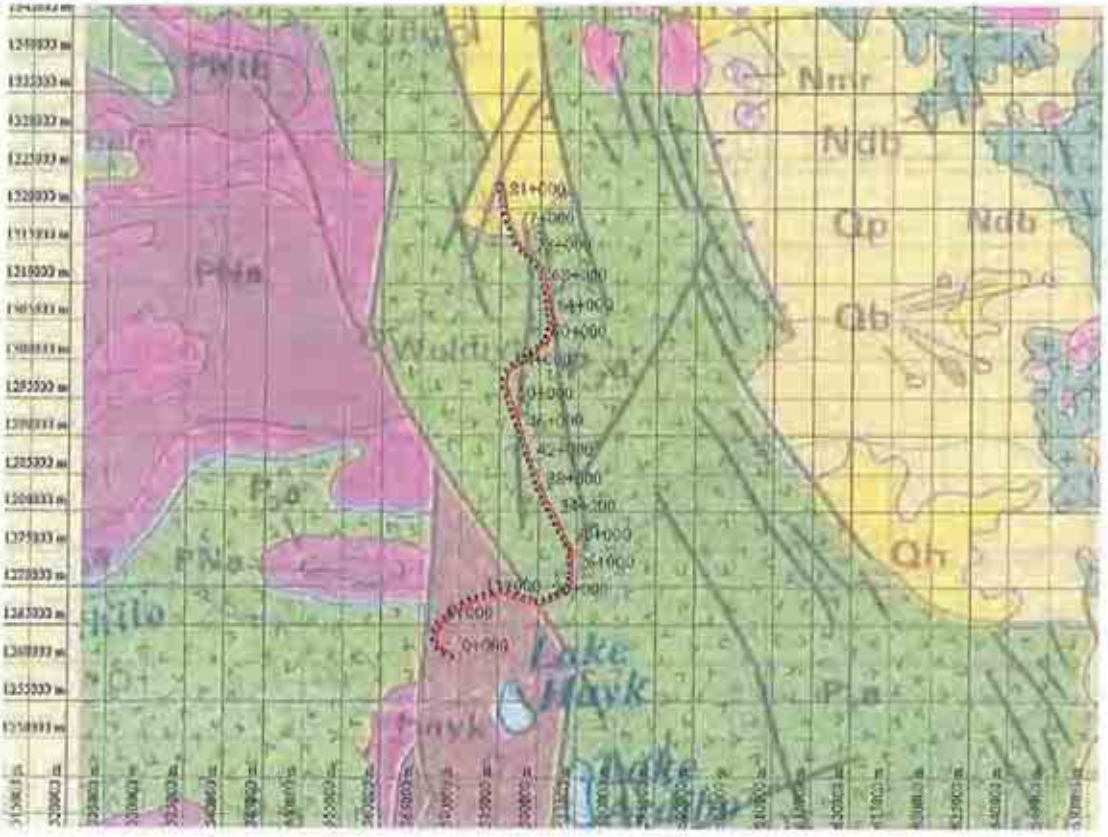
4.1.2 Geology

Geologically, the route corridor is dominantly covered with sand, silty gravel covered without crops of boulders, alkaline basalt and silicics around river-banks. Weathered to decomposed rock observed intermittently and silty sand. The subgrade soil extension of the route corridor is dominantly silty clay with gravel in small-size.

The route corridor is characterized by three main types of geological formations. The first about 19km section is covered by Tarmaber Megezez Basalt Formation, which is weathered to fresh hard transitional and alkaline basalt and trachyte. The section from km 20 to km 75 is dominated by Ashangi Formation that is deeply weathered alkaline and transitional basalt with rare intercalations of tilted stuffs. The corridor of the last 9km stretch is covered by alluvial and lacustrine deposits, which is relatively weak. The geological setup of the project area is shown in Figure 4.1 below.

Figure 4.1: Geological Formations of the Project Corridor



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4.1.3 Soils, Erosion and Siltation

The project route mostly runs through flatter and gently sloping areas at the foot of mountain ranges that are drained by major river such as Mille, Gelana, Gololsha, Chereti, and Ala wuha rivers. These areas mostly have relatively deep and fertile alluvial soils, which are moderately to highly productive. The dominant soils along the project alignment are black cotton soils/Vertisols, which are deep soils with clayey or silty clay texture. They occur on both low, poorly drained plains and on gently sloping or rolling areas. Vertisols have good natural fertility and have swelling clay minerals that predisposes them to difficulties in working on the soils when they are wet or very dry. On the plains, these soils have poor internal drainage, i.e. they are imperfectly drained since they are dominated by expandable clays. Vertisols develop cracks in the dry season which close on wetting in the rainy season. However, external drainage is better for these soils where they have formed on steeper slopes. These soils are dark greyish brown to very dark brown or grey in colour, clay to clay loam in texture with deep profiles. These soils are highly used for annual crops production in the project area.

Soil erosion is not a major problem in most parts of the flatter and gently sloping parts of the project area. However, erosion of fragile riverbanks and expansion of river courses is a major problem for most of the rivers and streams crossed by the project alignment. In addition, land-sliding problem is observed at some spots along Mille River. These events have resulted in loss of productive agricultural lands and felling of trees. Not only soil erosion and land-sliding, heavy siltation and accumulation of stones and boulders at the foot of some degraded hills and mountain ranges or along riverbanks is also a significant problem. These are related to serious erosion from the degraded (deforested) hills and mountains and occurrence of flooding in the flatter or gently sloping areas at the foot of those hills and mountains. Examples of such environmental problems were observed around km 31 – 32, km 45 and km 75 being caused by flooding of Melka Hida, Zenjero Gedel and Ala Wuha rivers. These have claimed substantial areas of fertile agricultural lands resulting in loss of crop production. The erosion, instability (fragile) of riverbanks and/or siltation problems are particularly significant or serious along significant part of the first 56km, and along km 58 – 73. Photos 1-4 depict examples of erosion, slope instability on riverbanks and siltation problems along the project route.

In particular, gully erosion is common on the deforested or overgrazed mountainous and hilly areas along the alignment. On the other hand, the well-protected and vegetated areas have less erosion problem on the slopes and less siltation in the flat areas below the mountains and hills. This situation justifies the benefits of watershed management through soil and water conservation practices and through enhancement of the regeneration rate of natural vegetation instead of deforestation and exposure of the land to erosion by runoff water.

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Photos Depicting Erosion, Slope Instability and Siltation Problems

Photo 1: An example of severely degraded or deforested hillside forming gullies & siltation at foot-slope around km 44 - 47 RHS.

Photo 2: A deep & long gully around km 68 LHS along the road connecting Hara town.

Photo 3: Over 10m high fragile left bank of Ajewa R. just at upstream of RW crossing point

Photo 4: An example of heavy siltation and boulders accumulation at ~stat. 45+500 crossed by the RW line

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4.1.4 Climate

The Ethiopian climate is mainly controlled by seasonal migration of the Inter-Tropical Convergence Zone (ITCZ), which is conditioned by the convergence of trade winds of the northern and southern hemisphere and the associated atmospheric circulation. It is also highly influenced, regionally and locally, by the complex topography of the country. The annual rainfall varies considerably with location but is generally a function of altitude. The rainfall is concentrated in two rainy seasons, the small rainy season from March to May and the big rainy season from June to September.

Based on the Metrological Map of Ethiopia (1979), the climate of the project area is classified as Weyna Dega. The effective temperature of the whole stretch of the project route is mild temperature, which varies between 14°C and 20°C. The mean annual rainfall of Hayik and Robit areas is 1200mm and 1000mm respectively.

4.1.5 Drainage and Water Resources

The corridor of the proposed Hayik – Robit railway line is drained by four major perennial rivers and numerous streams and minor drainage channels. The major rivers are Mille, Gelana, Chireti, and Ala Wuha rivers, which are crossed by the railway line at station (1+300, 15+200 & 21+800), 34+000, 59+400 and 74+800 respectively. The list of major rivers and streams crossed by the project alignment is provided in Table 4.2 below, and Photos 5-7 show some of the major rivers crossed by the proposed railway line. The route corridor particularly the graben/flat plains at the foot-slopes of the mountain ranges is also rich in groundwater resources. During the field survey, it was observed that deep wells (boreholes) were under development in the Girana and Kobo valleys to exploit the groundwater resources for irrigation development and some of the boreholes are located within a few hundred meters from the proposed railway line (see Photo 9 as an example).

Most of the rivers and streams deeply cut through thick alluvial and lacustrine deposits. These deposits are essentially formed by soil and weathered rock materials transported from the surrounding mountains and hills through erosion by runoff water. Since these formations are relatively loose or unconsolidated, they are easily eroded or subject to land-sliding problem in places where they are exposed to water. Therefore, the majority of the rivers, streams and other drainage channels are characterized by deep and wide river courses, some of them are over 10m deep and over 150m wide. It was noted that expansion of river courses due to erosion of the fragile or loose riverbanks is a major problem for most of the rivers and streams crossed by the proposed railway line. In addition, land-sliding was evident at some spots along Mille River. As already described under section 3.1.3 above, flooding and siltation are also major environmental problems in some parts of the project area.

Almost all the rivers and streams are used for livestock water supply and some used for domestic water supply. In addition, most of the perennial rivers and streams are utilized for irrigation development. The rivers used for irrigation include Mille, Ajewa, Gelana, Chireti and Ala Wuha. Cereal crops (like maize, teff), vegetables (like onion, tomatoes, potatoes, red pepper), fruits (like bananas, papaya, mango) and sugarcane are widely cultivated through irrigation. For example, Mille river is diverted on both banks at the railway line crossing point (at 1+200) to irrigate small scale sugarcane plantations and fruit trees like banana and papaya. Ajewa river is diverted at downstream of the railway crossing point for a nursery site development on left bank of Mille river; seedlings of different species of trees and shrubs including fruit trees as well as grass strips are raised at the site. Ala Wuha river is diverted at the bridge on the Addis – Desse – Mekelle highway through modern diversion schemes on both banks of the river and is used for crop production on extensive areas on both sides of the river as well as for two major nursery sites.

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At opposite to station 43+000, there is a drainage impeded plain or a semi-wetland area on RHS of Mersa and Gololsha Rivers, which are the major contributors to Gelana River. The presence of springs or semi-wetland nature of the site and poor internal drainage has precluded the soils of this area from being used for cropping. Nevertheless, it is an essential livestock grazing ground particularly during the dry season (see Photo 10).

Table 4.2: Major Rivers and Streams crossed by the Proposed Railway Route

Station	River Name	Approximate Span (m)	Notes
1+200	Mille	60	Low
7+500	Ajewa	100	Medium
10+400	Chercher		
15+200	Mille		
21+800	Mille	450	High (Viaduct)
34+000	Gelana	90	Medium
48+600	Weydu	20	Low
56+100	Chireti	12	Low
70+800	Ulaula	40	Low
74+800	Ala Wuha	220	High
76+600	Hado	35	Low

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Photos Illustrating Water Resources

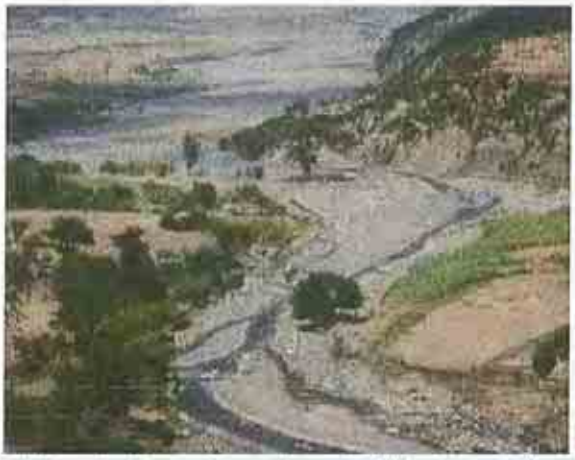

Photo 5: Downstream view of Mille river at the railway crossing point at station 1+100; it is diverted to both banks for irrigation development.

Photo 6: Downstream view of Ajewa river at ~200m upstream of the crossing point, at 7+500.

Photo 7: Downstream view of Ala Wuha river course (~200m wide) at RW crossing point.

Photo 8: Part of Lake Hara Beni at east of Hara town on RHS of the RW line at 66+800.

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Photos Illustrating Water Resources

Photo 9: One of the newly developed boreholes for irrigation development around km 32.

Photo 10: A semi-wetland area on RHS of Mersa & Gololsha Rivers at opposite to station 43+000 LHS – an essential livestock grazing ground for the local community.

Photo 11: Traditional irrigation canal on right bank of Mersa R. at opposite to station 43+000.

Photo 12: Sand extraction from the river bed of Ala Wuha R. at nearby the RW crossing pt.

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4.1.6 Air Quality

Ambient air quality in the project area is generally good. Most part of the project route corridor is rural in nature, absent of any industrial pollution sources, major traffic and transportation emissions. Similarly, ambient noise levels in most part of the project area are relatively low.

Nevertheless, the corridor crossed by the Woldiya – Mille Road has some air and noise pollution problem caused by dust and exhaust emissions as well as noise generated by vehicular traffic especially heavy trucks using this road. Currently the road is being upgraded to asphalt pavement, which would avoid dust pollution when its construction is completed. Presently dust pollution is posing some nuisance to residential and business areas especially in Hara town. In addition, the vehicular traffic using the Desse – Mekelle main asphalt road generate exhaust emissions and noise that may cause minor to moderate air and noise pollution problem.

4.1.7 Land Use and Land Cover

The land use pattern in the project route corridor is very intensive, resulting in deforestation of natural vegetation and serious land degradation particularly in the hilly and mountainous areas. The entire proposed railway alignment traverses intensively farmed lands except a few relatively short stretches that run through areas covered by natural vegetation. Of the natural vegetation areas, the area traversed by the section km 29.40 to km 31.35 is more important since it is located in an area designated as Protected State Forest, namely Faji Protected Forest Area. The other section that runs through an area that has relatively important vegetation cover is km 54 to km 58. In addition, there are some patches of highly disturbed bush lands and shrub lands along km 0.00 – 1.20 and km 15.00 – 25.00. Moreover, there are numerous remnant trees and bushes within farmlands and around homesteads.

Annual crops particularly cereals are predominantly cultivated in the project area. The crops dominantly cultivated in the project corridor are sorghum and teff. Other significant crops include maize, wheat, barley, and pulses (field pea, faba bean and chickpea). Moreover, fruits (mainly bananas and papaya), sugarcane and vegetables (onion, tomatoes, red pepper etc.) are grown by irrigation at some spots along the project route or within its corridor. The fruit, vegetables and sugarcane growing areas along the alignment include around km 1.20 – 1.60 (on left & right banks of Mille River), km 31 – 33 (Girana village area ~3km LHS & along Gelana River), km 43 – 45 (LHS on right bank of Gololsha River), and km 78 – 79 (crossed by the alignment).

The intensity of land use reflects the land cover. The predominant land cover along about 90% of the project route is cultivated lands. There are also other land use/land cover elements that are mixed with cultivated lands and these include grassland spots, remnant indigenous trees, plantation trees (predominantly eucalyptus trees), patches of bush and shrub lands, and settlement areas. The dominant land cover along the remaining about 10% of the alignment is natural vegetation cover mainly comprising woodland and bush land areas and most of it is found at about station km 28 – 30 and km 55.50 – km 58.00. Photos 13 - 16 show some examples of the characteristic land use and land cover patterns along the project route.

Data on land use and land cover of the project-affected woredas have been collected from each Woreda ARDO and these data are presented in Table 4.3 below. As these data indicate, the land use pattern in the woredas is very intensive. Most of the land is used for agricultural activities, predominantly for annual crops production. Of the total surface area of the woredas, the proportion of cultivated land ranges from about 26% in Ambasel Woreda to 55% in Habru Woreda. The share of grazing land ranges from about 1.3% in Tehulderie Woreda to about 19% in Gubalafto Woreda.

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The area of forestland and woodland including shrub and bush lands varies from about 8.8% Ambasel Woreda to 37.8% in Habru Woreda.

Table 4.3: Land Use and Land Cover Patterns of Project Affected Woredas

Ser. No	Land Use/L. Cover Type	Tehulderie		Ambasel		Habru		Gubalafto		Raya Kobo	
		Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
1	Cultivated	20,941	47.6	14744	26.4	78856	54.99	35261	36.42	58692	36.60
2	Grazing	583	1.3	4214	7.6	6962.6	4.86	18443	19.05	4464.7	2.78
3	Forestland	1557	3.57	4886	8.8	54154.5	37.77	20203	20.87	29335	18.29
4	Woodland (shrub and bush land)	12271	27.88								
5	Water body & gullies	3800	8.63	-	-	-	-	-	-	1078	0.67
6	Built up areas (infrastructures and settlement areas)	3880	8.82	2835	5.1	3422.9	2.38	22908	23.66	13537	8.44
7	Bare-land or unutilized land	978	2.22	29029	52.1					53276	33.22
	Total	**44010**	**100**	**55708**	**100**	**143396**	**100**	**96815**	**100**	**160383**	**100**

Source: Woreda Agriculture and Rural Development Offices

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Photos Illustrating Land Use and Land Cover Patterns

Photo 13: A view of extensive farmland traversed by the proposed railway line on left bank of Mille R., from km 3 onwards.

Photo 14: A view of extensive farmland in Girana area crossed by the railway line at km 31 - 34.

Photo 15: A large cattle population feeding on crop residues around km 32 in Girana Valley.

Photo 16: A vast cultivated land in Hara area crossed by the railway line at km 66 - 67.

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4.2 Biological Environment

4.2.1 Vegetation and Flora

The primary natural vegetation of the project area has been severely modified by human activities. Presumably, the main causes of the degradation of natural vegetation are extensive land clearing/deforestation for agricultural activities and human settlements and overexploitation for construction materials and fuel wood purposes. Consequently, now only some patches of highly degraded natural vegetation and solitary trees have remained in the area. Of the existing natural vegetation areas, the protected forest, which is designated as Faji Protected State Forest (FPF) is an important vegetation area, and its surface area is reported to be about 468ha (Habru Woreda EPLAUO, 2010). The proposed railway directly crosses through the forestland at station 29+400 – 31+350 for about 2km stretch. The FPF is not as such a high forest, but it comprises mainly woodland and bush land vegetation. The trees in the forestland are dominated by Acacia species, including *Acacia tortilis, A. seyal, A. albida and A. senegal*, with *A. tortilis* usually forming emergent and canopy trees (see Photo 17 as an example). Other characteristic trees and shrubs include *Balanites aegyptiaca, Zizyphus spina-christi, Carissa edulis, Capparis tomentosa, Ximenia americana, Grewia* spp. etc. It also comprises succulent plant species such as *Ficus carica* (*Meka Beles*) and *Aloe* sp. (*Rel*). Moreover, it contains several species of scrambling and climbing plants. Although the FPF is designated as a protected state forest area and observed by a number of guards, it is usually encroached by some local people for obtaining construction materials and fuel wood as well as for livestock grazing and browsing.

The other relatively important vegetation cover is found in the corridor of km 15 to km 25 and km 54 to km 58. Most of these areas are characterized by steep and rugged topography/hilly and mountainous terrain that are considered as marginal lands not suitable for agricultural activities or human settlements. Therefore, some parts of these areas are designated as protected areas to allow for environmental rehabilitation in general and for regeneration of natural vegetation in particular. They contain shrub land, bush land and woodland vegetation, which is open to relatively dense in cover. In addition, the steep slopping hilly and mountainous areas on both or either side of the alignment are mostly covered by bushy and shrubbery vegetation. Most of these vegetation areas are highly disturbed and degraded while some areas are well-protected and have relatively good vegetation cover. The areas that have well-protected vegetation cover include the ridges and escarpments at ~km 2 – 4 (on both sides of the route), km 4 – 10 (RHS of Mille R.), km 39 – 50 (RHS of the route but intermittently) and km 61 – 64 (on the route & its corridor). Photo 18 depicts an example of well-protected area covered with dense natural vegetation.

Moreover, there are abundant remnant trees and bushes within farmlands and around settlement areas that are preserved by farmers for socio-economic and ecological services. The major tree species observed in these areas include Acaci spp. (*A. tortilis, A. albida, A. seyal, and Acacia sp./Girar), Cordia africana (Wanza), Zizyphus spina-christi (Kurkura), Balanites aegyptiaca (Bedena), Croton macrostachys (Bisana), and Tamaridus indica*. Photos 19 - 21 depict examples of areas covered by significant remnant trees. The sections of the proposed railway that have significant remnant trees cover include km 7 – 28, km 43 – 55.50, km 58 – 64 and km 73 – 75.

In some areas, there are also planted trees and bushes, which are mostly found either in clusters or in alignment along rivers/streams, around homesteads or at nursery sites. Most of these are located off the proposed railway route, but crossed at a few localities. There are a number of nursery sites along the project route; some of these are found around km 7.60 RHS (on left bank of Mille & Ajewa rivers, see Photo 23), km 59.40 RHS (on left bank of Chireti) and km 74.80 (~2km LHS) (on right & left banks of Ala Wuha river, see Photo 24). The dominant planted tree species in the area is *Eucalyptus camaldulensis* (Key Bahir Zaf). Other species include *Gravillea robusta, Cuppressus lustinica, Spathodea, Shinus molle, Shewshwe, Jacaranda*, etc. In some areas,

Euphorbia tirucallii (*Kinchib*) is planted as live fencing mainly around homesteads. In addition, *Jatropha curcas (Ayderke)* is planted particularly in some areas designated for environmental rehabilitation. The list of the plant species identified from the project corridor is presented in Table 4.4 below.

Furthermore, there are several plant species that are considered as weeds and these pose significant problem to crop production. Some of them are alien weeds like Parthenium, Straiga and Orobanch.

Photos Showing Vegetation Cover in the Project Route Corridor

Photo 17: Emergent Acacia trees (*A. tortilis*) in northern part of the Faji PF around km 30.

Photo 18: A view of well-rehabilitated or dense vegetation cover on escarpment terrain on LHS of the railway line around station 3+000.

Photo 19: Example of remnant indigenous trees (mainly *Wanza*) conserved in farmlands around km 48.

Photo 20: Example of remnant indigenous trees conserved in extensively cultivated areas around km 44 - 45.

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Photos Showing Vegetation Cover in the Project Route Corridor

Photo 21: West-East view of relatively dense indigenous & exotic trees & shrubs conserved as agro-forestry around km 62 - 63.

Photo 22: A view of dense plantation trees (mainly Eucalyptus) on left bank of Ajewa R. between the railway crossing point & confluence of Mille R.

Photo 23: Part of a large nursery site (9.5ha) on left bank of Mille R.at km 7.60 – 8.00 (on RHS of the rail line) – seedlings of fruit trees & variety of species for forestry development programs plus grass strips are raised.

Photo 24: Part of a large nursery site on right bank of Ala Wuha R. at km 74.80 (~2km LHS) used for raising seedlings of fruit trees & variety of trees and shrubs plus grass strips for forestry development, SWC and livestock fodder devt.

4.2.2 Wildlife

As the project area is intensively used for agricultural activities, livestock grazing and human settlements, it has little undisturbed habitats that could support diverse wildlife. As a result, the project corridor contains only some wildlife species most of which are with low population size. Most of the mammalian fauna found in the area are those adapted to disturbed or degraded habitats. Most of the fauna are confined to the patches of 'protected habitats' found in some parts of the project corridor. The relatively important wildlife habitats found in the project area include the following:

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- The protected bush and shrub lands found on hill-slopes (mountainous and hilly areas) on east and west of Mille river around km 2 - 4 LHS and km 1 - 19 RHS,
- The Faji Protected Forest area at km 29.40 – 31.35, and
- The protected bush land habitat in the mountainous area found along km 55 to km 58.

These habitats support particularly a number of mammals and a variety birds. Based on the information obtained from local government offices and interviews of local people, the mammals found in the above indicated habitats and elsewhere in the route corridor include some species of antelopes, primates, pigs, hyenas, cats and hare. These include Common duiker, Bushbuck, Salt's Dik-dik, Klipspringer, Grivet monkey, Anubis baboon, Common jackal, Abyssinian hare, Hyena, Crested porcupine, Warthog, Bush Pig, Serval cat, Abyssinian Genet, Slender mongoose and Ground squirrel. In addition, there are some species of nocturnal and burrow mammals such as Hyena, Crested Porcupine, Aardvark, Bats and Rodents. None of these mammal species is endemic to Ethiopia and threatened. In addition, none of species is included in the list of the IUCN Red List of Threatened Species. The list of main wildlife found in the project area is provided in Table 4.5 below.

Birdlife

The route corridor has different habitats (including woodlands, bush lands, scattered trees, cultivated lands etc.) that support a variety of birdlife. The main species identified during the field survey or reported by local informants or documented in published literature include Helmented Guinea-fowl, Erckel's Francolin, Pigeons, Doves, Herons, Egrets, Eagles, Vultures, Storks, Hornbills, Starlings, Weavers, Swallows, Woodpeckers, Ravens and Pied Crow. The detail list of bird species found in the area is presented in Appendix 2.

Aquatic Fauna

The streams and rivers draining through the project corridor have very poor potential for aquatic fauna owing to very low flows during the dry seasons and heavy silt load during rainy seasons in both the perennial and intermittent streams and rivers.

Table 4.4: Major flora found within the corridor of the proposed Railway Line

	Scientific Name	Local Name (Amharic)	Notes
I	**Trees & Shrubs**		
1	*Acacia abyssinica*	Grar, Lafto	Tree
2	*Acacia albida*	Garbi	Tree
3	*Acacia ethbaica*	Kesele	Tree, some
4	*Acacia senegal*	Sebansa	S. tree/ shrub
5	*Acacia seyal*	Wachu	Tree, preserved in farm lands & grazing areas
6	*Acacia tortilis*	Korara	Tree, dominant
7	*Achyranthes aspera*	Teleni	Shrub
8	*Acokanthera schimperi*	Keraru	S. tree/shrub
9	*Agave sisalana*	Chiret, Kacha	
10	*Aloe sp.*	Ret	Succulent
11	*Balanites aegyptiaca*	Bedena	Tree
12	*Calotropis procera*	Tobiya	Shrub
13	*Calpurnia aurea*	Digita	Shrub

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	Scientific Name	Local Name (Amharic)	Notes
14	*Capparis tomentosa*	Gimero	Shrub
15	*Carissa edulis*	Agam	Shrub
16	*Cassia sp.(C. didymobotrya)*	Gimagime	Shrub
17	*Ceiba pentandra*	Yetit zaf	Planted tree
18	*Celtis kraussiana*	Fertekoma	Tree
19	*Cissus quadrangularis*		Succulent climber
20	*Coleus comosus*	Gimie	Climber
21	*Combretum collinum*	Korasuma	Tree
22	*Cordia africana*	Wanza	Tree
23	*Cordia ovalis*	Mentero	S. tree
24	*Croton macrostachyus*	Makanisa	Tree
25	*Cuppressus lusitanica*	Yeferenj – Tid	Tree, at nursery sites
26	*Delonix regia*	Diredawa zaf	Tree
27	*Dichrostachys cinerea*	Ader	Shrub/bush, thorny plant
28	*Dodonaea angustifolia*	Kitkita	Shrub
29	*Echinops ellenbeckii*	Kosheshila	Herb
30	*Ehretia cymosa*	Oolaga	Tree
31	*Eucalyptus camaldulensis*	Bahir Zaf	Exotic Tree
32	*Euclea schimperi*	Dedeho	Shrub
33	*Euphorbia abyssinica*	Kulkual	Tree
34	*Euphorbia tirucalli*	Kinchibit	Shrub usually planted as live fencing
35	*Ficus carica*	Meka Kulkual	Succulent shrub
36	*Ficus sycomorus*	Shola	Tree
37	*Ficus vasta*	Warka	Canopy tree
38	*Flueggia virosa*	Kechachilo	Shrub
39	*Gravillea robusta*	Gravillea	Tree, usually planted around homesteads & at nursery sites
40	*Grewia bicolar*	Aroresi	Shrub
41	*Grewia ferruginea*	Lenquata	Shrub
42	*Grewia vilosa*	Agobdi	Shrub
43	*Helichrysum hochstetteri*	Nechilo	Herb (wood)
44	*Hyperium revolutum*	Gorgoro	Shrub
45	*Jacaranda mimosifolia*	Yetebmenja Zaf	Tree, planted around homesteads & at nursery sites
46	*Jatropha curcas*	Ayderke	Shrub/s. tree up to 4.5m high planted as live fencing along farmlands etc.
47	*Justicia schimperiana*	Sensel	Shrub, planted as live fencing
48	*Lantana sp.*	Yewof Kolo	Shrub
49	*Olea africana*	Weira	Tree, around Churches
50	*Parthenium sp.*	Mech/Kinche Arem	Highly invasive weed
51	*Petrolobium stellatum*	Arangama/ Kentaffa	Shrub
52	*Prunus africanus*	Tikur Inchet	Tree
53	*Rhoicissus tridentata*		Woody climber
54	*Rhus spp.*	Debobesha, Embis	Shrub

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	Scientific Name	Local Name (Amharic)	Notes
55	*Rumex nervosus*	Imbwacho	Herb
56	*Schinus molle*	Qundo Berbere	Tree, exotic planted around homesteads & at nursery sites
57	*Tamarindus indica*	Roka	Tree
58	*Ximenia americana*	Inkoy	Shrub
59	*Ziziphus mucronata*	Ado Kurkura	Tree
60	*Ziziphus spina-christi*	Kurlcura	Tree
II	**Grasses and Sedges**		
61	*Andropogon gayanus*	Gaja	Grass
62	*Arundo donax*	Shenbeko	Reed
63	*Bothriochloa insculpta*	Nech Sar	Grass
64	*Cynodon dactylon*	Serdo	Bermuda Grass
65	*Digitaria abyssinica*	Wariyat	Grass
66	*Eragrostis spp.*		Grass
67	*Hyperhenia sp.*		Grass
68	*Pennisetum villosum*	Gofere Sar	
69	*Cyperus rotandus*	Gicha	Sedge

Source: Identification by the Consultant

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Table 4.5: Main Wild Animals found in the Project Area

Ser. No.	Scientific Name	English Common Name	Local Name (Amharic)
I	**Mammals**		
1	*Tragelaphus scriptus*	Bushbuck	Dikula
2	*Sylvicapra grimmia*	Common Duiker	Midako
3	*Phacochoerus aethiopicus*	Warthog	Kerkero
4	*Potamochoerus larvatus*	Bush Pig	Asama
5	*Papio anubis*	Anubis baboon	Zinjero
6	*Madoqua Saltiana*	Salt's Dikdik	Enshu
7	*Felis silvestris*	Wildcat	Yedur Dimet
8	*Procavia capensis*	Rock Hyrax	Shikoko
9	*Cercopithecus aethiops*	Grivet Monkey	Totta
10	*Felis serval*	Serval Cat	Anner
11	*Hystrix Cristata*	Crested Porcupine	Jart
12	*Genetta abyssinica*	Abyssinian Genet	Shelemetmat
13	*Galerella sanguinea*	Slender Mongoose	Faro Dimet
14	*Canis aureus*	Common Jackal	Tera Kebero
15	*Oreotragus oreotragus*	Klipspringer	Sessa
16	*Crocuta crocuta*	Spotted Hyena	Tekateko jib
17	*Orycteropus afer*	Aradvark	Awaldigessa
18	*Lepus habessinicus*	Abyssinian Hare	Tinchel
19	*Hetrocephalus sp.*	Molerat	Filfel
20	*Xerus erythropus*	Ground squirrel	
21		Bats (not identified to species level)	Yelelit Wof
22		Rodents (not identified to species level)	Ayit

Source: Woreda ARDOs and EPLAOs, and Local Informants

4.3 Public Health and Cultural Heritage Issues

4.3.1 Public Health

According to the discussions made with the health officials of the project area woredas, there is a significant improvement in the status of public health over the last several years. The health service coverage in the woredas has shown major improvement with increasing number of health facilities and health professionals. Besides the curative health services, most attention has been given to primary health care services, which focus on preventive measures through expansion of health extension works. It was indicated that this has contributed greatly to reduction of the prevalence of preventable diseases like those related to drinking water and sanitation. Yet, much works remain to be done to reduce the preventable health problems of the population to minimal levels. Each rural kebele has a health post and health extension workers to run primary health care services and some curative treatments.

In order to identify the prevailing health problems of the population in the project area, morbidity statistics reported by the health units in the project area have been collected from the respective Woreda Health Offices. As these health data indicate, the most common diseases affecting public health in the project area are upper respiratory tract infections, intestinal parasites, diarrhoeal diseases and pneumonia. Other important health problems include gastritis, malaria, eye diseases and skin infections. Many of the health problems are closely related to the low socio-economic status of the population such as lack of safe drinking water, poor sanitation and poor hygienic conditions. Health statistics showing disease prevalence in the project affected woredas are presented in Tables 4.5 and 4.7 below.

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Table 4.6: Top ten diseases in the Project Affected Woredas (in 2002 E. C.)

No.	Ambassel Woreda			Habru Woreda		
	Diseases	**No. of Cases**	**% of all cases**	**Diseases**	**No. of Cases**	**% of all cases**
1	Pyrexia (fever) of unknown origin	758	14.15	Acute upper respiratory tract infections	1442	7.9
2	Gastritis and duodenitis	669	12.48	Pneumonia	1360	7.5
3	Acute upper respiratory tract infections	475	8.86	Intestinal parasites	1354	7.4
4	All other respiratory diseases	420	7.84	Diarrheal diseases	1291	7.1
5	All other infective parasitic diseases	356	6.64	Skin infections	1127	6.2
6	Typhoid fever	269	5.02	Other heleminthes	951	5.2
7	Infection of skin & subcutaneous tissue	262	4.89	Gastritis	896	4.9
8	Other heleminthes	256	4.77	Eye diseases	894	4.9
9	Muscular rheumatism & rheumatism unspecified	247	4.61	Other infections of respiratory system	888	04.9
10	Pneumonia	231	4.31	Unconfirmed malaria	805	4.4
	Total of top ten diseases	**3943**	**73.60**	**Total of top ten diseases**	**11008**	**60.6**
	Other diseases	**1414**	**24.40**	**Other diseases**	**7156**	**39.4**
	All cases (diseases)	**5357**	**100**	**All (cases) diseases**	**18164**	**100**

Source: Woreda Health Offices, 2010

Table 4.7: Top ten diseases in the Project Affected Woredas (In 2002 E. C.)

No.	Gubalafto Woreda			Raya Kobo Woreda		
	Diseases	No. of Cases	% of top ten	Diseases	No. of Cases	% of all cases
1	Diseases of respiratory system	2240	12.7	Pneumonia	6243	16.3
2	Gastritis	1583	9.0	Diarrheal diseases	4472	11.7
3	Intestinal parasites	1297	7.4	Malaria all types	3055	8
4	Diarrheal diseases	1282	7.3	Upper respiratory tract infections	2702	7
5	Diseases of musculoskeletal & connective tissues	959	5.5	Intestinal parasites	2230	5.8
6	Fever of unknown origin	908	5.2	Eye diseases	2009	5.2
7	Tooth and gum infections	891	5.1	Other unspecified diseases	1722	4.5
8	Pneumonia	784	4.5	Acute pneumonia	1513	3.9
9	Malaria	727	4.1	Diseases of musculoskeletal & connective tissues	1409	3.7
10	Eye diseases	628	3.5	Skin infections	1222	3.2
	Total of top ten diseases	**11299**	**64.3**	**Total of top ten diseases**	**26577**	**69.3**
	Other diseases	**6277**	**35.7**	**Other diseases**	**11797**	**30.7**
	All diseases	**17576**	**100**	**All diseases**	**38374**	**100**

Source: Woreda Health Offices, 2010

4.3.2 Cultural Heritage Sites

There are a number of man-made physical cultural resources within the corridor of the proposed railway. These include mosques, churches and cemeteries, and these particularly have major religious values to the local communities.

Not only man-made physical resources, there are also natural features such as extensive mountain ranges and river valleys that have high visual attractions. In addition, there are some hot springs that have cultural and medicinal values to the local communities. The list of sites of value that are located within about 2km radius of the proposed railway route is provided in Table 4.8 below.

Table 4.8: List of Cultural Heritage Sites in the Project Corridor

Ser. No	Woreda	Site Name	Location			Site Value(s)
			Approx. Station	Approx. offset from project route	Kebele Name	
1	Ambasel	Tis Aba Lima Mosque	7+000	~1.5km LHS	Tis Aba Lima (Kebele 02)	Religious
2		Medhanealem Church (T.A. Lima)	7+000	~2km LHS	Tis Aba Lima (Kebele 02)	Religious
3		Waltoke Mikael	12+500	2km LHS	Wuchale Rural (Kebele 01)	Religious
4	Habru	Darimo Mikael Church	~50+000	~2.3km LHS	Kule (Kebele 07)	Religious
5		Derse Jilo Mikael Church	56+400	~200m RHS	Humo (Kebele 05)	Religious; this section is tunnel
6		Merkota Hot Springs	~21+800	?	Merkota (Kebele 17)	Medicinal value ('Tebel')
7	Guba-lafto	Mendera Mosque	62+080	?	Sibil Kay (K. 02)	Religious
8		Sibil Kay Mosque	63+000	?	Sibil Kay (K. 02)	Religious
9		Cemetery Site	63+280	?	Sibil Kay (K. 02)	Religious
10		Hara Maryam Church	66+700	~200m LHS	Hara (Kebele 01)	Religious
11		Mosque (at Hara T)	66+800	~500m LHS	Hara (Kebele 01)	Religious
12		Korke Mosque	68+200	~800m RHS	Laste (Kebele 03)	Religious
13	Raya Kobo	Sheneti Hotspring	76+000	~2km RHS	Gobiye	Medicinal- people use for bathing to cure from sicknesses
14		Hado Merkoryos Church	80+300	~400m RHS	Afaf	Religious
15		Werkertu Maryam Church	83+000	~800m RHS	Afaf	Religious

Source: Woreda Culture and Tourism Offices, Observation by the Consultant and 1:50,000 Scale Topographic Maps Published by EMA (1984)

5. PUBLIC AND STAKEHOLDERS CONSULTATIONS

5.1 General

During the environmental field survey, consultations were made with key stakeholders at woreda and kebele administrative levels. The authorities and experts consulted during the visit include woreda and kebele administrators, head or representatives and experts of concerned sector offices such as Environmental Protection and Land Administration, Agriculture and Rural Development, Finance and Economic Development, Health, Education and Culture and Tourism Offices.

In addition, individuals met along the proposed rail line were interviewed in order to obtain information related to the particular locality and opinions on the proposed railway project. The information and opinions obtained from the discussions and interviews have been utilized in the baseline description, impact analysis and environmental mitigation and management plans presented in the various chapters of the EIA Report. The list of consulted persons and organizations is given in appendix 1.

Furthermore, public consultation was conducted at three key locations along the project route. These places are Hara town, and Girana and Genda Ganfo villages; Photos 25 – 27 depict the public consultations. The participants of the public consultations included kebele administrators and executive committee members, representatives of different community groups such as elders, women, farmers, traders and youth. The topics of discussion included, among others, the issues outlined below. The key findings of the consultations are briefly described in Section 5.2 below and the minutes of the meetings are presented in appendix 5.

Main issues discussed during the stakeholders as well as public consultations include the following:

- Current economic, social and environmental problems in the project area,
- Potentials of the project influence area that, together with other factors, may justify the need for the railway project,
- Potential benefits of the railway construction and operation – its roles for socio-economic development of the influence region as well as at national level,
- Potential negative impacts of the rail construction and operation activities,
- Possible mitigation measures for the potential undesirable effects,
- Suggestions for enhancement of potential impacts, and
- Social acceptability of the planned railway project.

5.2 Main Findings of Public and Stakeholders Consultations

The main findings of public and stakeholders consultations are summarized in the following sub-sections.

5.2.1 Key Current Problems of the Area

As discussed during the public consultations, the key current problems of the area include the following:

- Lack of road network and poor condition of existing roads; most kebeles are not yet connected by road network. In addition, there is a high need to be connected to adjacent woredas, regions or key market centres like Chifra in Afar and Bati town in Bati Woreda of Oromia Zone, but no existing access roads. Most of the existing access roads are in poor condition like the road between Highway/Libso and Girana village. This road crosses Tiliku Gotu, other drainage channels and irrigation canals which are not provided with crossing bridges or culverts. Therefore, the road has been damaged due to lack of drainage systems and crossing the river courses esp. during wet seasons is hardly possible. The Girana area is agriculturally highly productive as cereals mainly sorghum and teff, and vegetables (onion, tomatoes, pepper etc.) and various fruits are produced through rainfed as well as irrigated farming. Therefore, good access road and railway transport systems are highly required for easily outlet of the agricultural produces and for importing consumable goods. Currently the existing poor access roads and pack animals mainly camels are used for transportation. The agriculturally productive valleys (Girana, Wera Lalo, Ala Wuha etc.) are major supplies of grains, vegetables and fruits for the major towns such as Mersa, Woldiya, Kobo etc. and Tigray areas.
- Lack of crossing bridges over many rivers and streams, thus, creating obstruction to social and economic activities like movements to markets, schools, health centres, administrative centres etc. especially during peak wet season.
- Shortage of drinking water supply, thus, the local people are forced to depend on unsafe sources and exposed to water-borne diseases. In some places like Girana village and Hara town although there is adequate water supply source, the coverage of distribution system is very low or inadequate.
- Poor telecommunication system, in some places like Girana and Hara town the mobile network is very poor with frequent disconnections or complete absence.
- Environmental degradation due to deforestation, serious soil erosion and gully formation, sedimentation of rivers and streams, intensive land use practices.
- Occurrence of severe flooding causing severe erosion of river banks or heavy deposition of sediments in the valleys at the bottom of the escarpments resulting in loss of prime farmlands. As observed during the environmental field survey, areas affected by flooding and accumulation of sediments and boulders include the following:
  - Around station 32+000 substantial tract of farmland affected by flooding caused by Melka Hida stream in south of Girana village.
  - At station 45+500 a highly productive agricultural land affected by flooding caused by a creek draining from a degraded catchment in the eastern escarpment.
  - At station 75+000 - 75+300 a highly productive agricultural land on the left bank of Alawuha River has been affected by overflow of Alawuha R. and flooding caused by an ephemeral creek draining into Alawuha river.
  - Around station 34+000 - 35+000, a modern diversion weir built on Gelana River for irrigation development has been damaged during the wet season of 2010 (July to September).
  - Mersa and Hara towns are repeatedly affected by flooding, siltation and gully formations.
- Large unemployment rate especially the young generation, and thus, vulnerable to addiction to "Chat" and other unwanted behaviours.
- Low standard of the buildings of schools.

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- Dust pollution on the unpaved section of the Woldiya – Chifra-Mille Road especially in Hara town.

5.2.2 Expected Benefits/ Potential Positive Impacts

If stations are provided at appropriate locations like at nearest places to Girana and Hara towns and access roads are provided to the stations, the construction and operation of the proposed railway is expected to bring several economic and social benefits, including the following:

- Railway transport system is faster and cheaper, therefore, it is more economical.
- It will create easy outlet for agricultural products to market centres at lower transportation costs. The route corridor is agriculturally highly productive and surplus producing area, dominantly cereal crops, but also vegetables and fruits.
- It will boost trade activities since commercial goods are easily and cheaply transported or imported to the area.
- It will create job opportunities for the unemployed local people particularly the young people.
- 'Dry-port' could be established at Hara town, which may create substantial employment opportunities and this is expected to reduce the prevailing economic and social problems in the area.

5.2.3 Potential Concerns/Adverse Impacts of the Railway Project and Mitigation Measures

The main concerns or potential negative impacts of the construction and operation of the proposed railway project include the following:

- The most significant potential negative impact of the railway project is permanent loss and fragmentation of farmlands since it traverses prime extensive agricultural lands. It was highlighted that in the entire part of the project area, it is hardly possible to arrange land replacement for the affected households due to serious shortage of land in the area. Therefore, cash compensation according to the government laws and regulations on compensation was recommended.
- Temporary loss of farmlands due to opening and use of access roads and operation of equipment and construction vehicles during the construction phase. Fair cash compensation is recommended to mitigate the impact.
- Damaging of irrigation structures – the railway may cross irrigation structures (canals) at stations 32+000 – 34+000 (along Gelana River), 58+600 – 60+000 (along Chireti River) and 74+000 – 76+000 (along Alawuha River), thus, it may cause damages to those structures. Provision of culverts at crossing points is recommended to allow uninterrupted flow of irrigation water and these shall be implemented before the irrigation season.
- Loss of grazing lands – there would be loss of some grazing areas from the railway right-of-way (ROW), material sources and campsites.
- At a few places like around station 66+600 – 67+000 and 68+000 – 68+400, some residential houses could be affected. Proposed mitigation measure is payment of cash compensation for the affected households to enable them to reconstruct the demolished houses.

- Loss of natural vegetation – the most prominent on natural vegetation would be the impact on Faji Forest around station 29+000 – 32+000, which is a protected state forest. In addition, there would be impacts on bushes, shrubs and remnant trees along several sections of the railway route. Possible mitigation is implementing a replanting program to compensate for the loss.
- During construction period, there could be accident risks to local people esp. children and animals in relation to movements of construction vehicles esp. dump trucks hauling construction materials. Recommended mitigation measures are imposing speed limits for construction vehicles and provision of awareness education for drivers and local people.
- Increased dust pollution resulting from movements of construction vehicles and this may cause nuisance and health problems to local residents. Proposed mitigation measures include implementing dust minimization measures such as spraying water and reducing traffic speeds.
- Impacts on the water quality of water resources in the project corridor due to excavation works in river courses, increased soil erosion and possible contamination by hazardous substances like fuel and oils.
- Disfiguring of landscape due to cut and fill works and extraction of construction materials. As observed from road projects in the region, quarry and borrow sites are not properly rehabilitated, but they are just left open in such a way that they unaesthetic, risky for animals and could create breeding sites for malaria causing mosquitos due to formation of stagnant water pools.
- Spreading of HIV/AIDS and other sexually transmitted diseases during the construction period. Possible mitigations include implementing awareness creation for project workers and local communities and provision of protective measures like distribution of condoms.
- Accident risks to animals and local people during the operation period is a major concern. There are many foot paths and cattle tracks crossed by the railway line. In addition, local people and their animals may frequently move across the railway for agricultural activities as well as for grazing and watering purposes. The project area is characterized by free grazing of livestock. Therefore, there could be serious accident risks to animals and people while they move across the railway. Recommended mitigation measures include provision of under- or over-passage at the major junctions/ crossing points, constructing steel fences along highly risky areas, and provision of awareness creation program for local people.

5.2.4 Social Acceptability of the Railway Project

According to the public and stakeholders consultations carried out with the project affected local communities and concerned officials and experts of the affected woredas, the proposed railway project is highly accepted. The social acceptability of the project is based on the assumption that the potential adverse impacts would be adequately mitigated or compensated, and the potential benefits are enhanced by fully considering the mitigation, compensation and benefit enhancement measures recommended in the above sections.

Photos Depicting Public Consultations

Photo 25: Public consultation held at Hara Town.

Photo 26: The consultation made with community representatives at Girana Village.

Photo 27: Participants of the consultation conducted at Genda Ganfo Village (Wera Lalo Kebele) while they were constructing irrigation canal for diverting water from Mersa River.

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6. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The main potential positive and negative environmental impacts of the construction and operation of the envisaged railway project are identified and described in the following sections.

6.1 Positive Environmental and Social Impacts

6.1.1 Positive Environmental Impacts

Transportation is a major use of energy, and burns most of the world's petroleum. This creates air pollution through emission of pollutant gases and particulates, and is a significant contributor to global warming through emission of carbon dioxide. Studies indicate that, by subsector, road transport is the largest contributor to global warming. Since energy use and emissions vary largely between modes, there is a strong recommendation for a transition from air and road transport to rail and human-powered transport, and increase transport electrification and energy efficiency.

In this regard rail is the most energy efficient land transportation mode and studies indicate that it is about three times more energy efficient than road transport. With the growth in oil demand, which is mainly attributed to the growth in transportation demand, and the growing energy prices, use of rail transportation that depends on electrical power is more efficient and environmentally friendly. Use of rail transport that depends on electricity means minimal release of pollutant gases. Therefore, implementation of the proposed railway project will contribute in reducing air pollution by using rail transport instead of road transport particularly in supporting the increasing mobility demands for passengers and freight.

Use of rail transport also has a positive contribution in controlling climate change by reducing emission of gases that contribute to climate change. The gases that are released into the atmosphere by the activities of the transport industry include carbon dioxide (CO2), carbon monoxide (CO), nitrogen oxides (NOx), nitrous oxide (N2O), sulphur dioxide (SO_2) and lead (Pb), and these emissions may be linked to climate change although their extent is not yet well established. Since the rail transport minimizes emission of those gases, it will have a positive effect in reducing the impacts on climate due to the activities of the transport sector.

In terms of traffic safety, compared to the road transport, rail transport would cause less accident risks if necessary safety measures or facilities are provided. The safety measures that need to be considered include provision of appropriate and adequate vehicular/pedestrian/animal crossing structures under or over the railroad, fencing of the highly risky stretches (like the deep cut sections), posting of warning signs and awareness creation for the local communities.

6.1.2 Positive Socio-economic Impacts

Details of the potential socio-economic benefits of the railway project will be provided in a separate Social/Socio-economic Impact Assessment Report. However, some possible positive socio-economic impacts of the project are indicated below based on the expectations of the consulted stakeholders and the Environmental Expert's views. The main positive socio-economic impacts of rail transportation emanate from supporting the increasing mobility demands for passengers and freight at more efficient and economical way. The main potential socio-economic effects of the railway project include the following:

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- Rail transport system is faster, cheaper and more efficient compared to road transport, therefore, it is more economical. Rail is the most energy efficient land transportation mode as it is about three times more energy efficient than trucking. With the growing energy prices, use of rail transportation esp. with electric power as source of energy, would be more efficient and economical.
- The project will create job opportunities and income generation for the unemployed local people during the construction phase. In addition, it will create some employment opportunities during the operation phase particularly at the train stations.
- Operation of rail transport will create easy outlet for agricultural products to market centres at lower transportation costs. The route corridor is agriculturally highly productive and surplus producing area, dominantly cereal crops, but also vegetables and fruits.
- Rail transport may boost trade activities since commercial goods are easily and cheaply transported or imported to the area.

6.2 Negative Impacts on Physical Environment

6.2.1 Loss of Land under Various Uses and Impacts on Land Use

Implementation of the planned railway project will involve acquisition of substantial area of land particularly for right-of-way (RoW) requirements. This will result in a permanent loss of land under various uses. It is estimated that approximately 77km (91%) length of the railway line is located in agricultural lands, of which about 68km (80%) is in intensively cultivated lands and 9km (10%) in moderately farmed lands. The width of RoW varies from section to section depending on the terrain type and the extent of cut depth or embankment fill requirements. Based on the preliminary engineering design profile, the average width of RoW along the deep cut sections ranges from about 20m to 268m with overall average width of 65m. Along the high embankment fill sections, it varies from about 25m to 84m with overall average width of 49m. Along the level sections, the width of RoW ranges from 20m to 48m with average of about 28m.

The total area of land take for the RoW is estimated to be about 361ha along 71.43km (84.5%) of the project length. The tunnel sections, which is about 10.24km (12.1%), as well as structures sections (~2.83km/3.4%) are excluded from the land loss estimate as the prior land use along these sections is expected to be maintained. Based on rough estimates, about 318ha of the potentially affected land is under cultivation and about 34ha is under forest and other natural vegetation cover. The remaining about 9ha is occupied by settlements such as Hara town at km 66.50 – 67.50 (4ha), Korke village at km 68.20 – 69.00 (3.7ha) and unnamed village at km 79.80 – 80.00 (1.2ha). Details of the land requirement for the RoW and area of land take is presented in Appendix 3. Based on the current average farmland landholding in the project area, the affected land is equivalent to the land area that could support the livelihood of about 318 households. Thus, presumably, loss of agricultural lands will be the most significant impact of the railway project and thus, this impact will require particular attention and mitigation.

In addition, there will be impacts on lands under various uses due to exploitation of construction material sources and opening and use of access roads. Since it is a new project that will require tremendous embankment filling, its construction will entail use of huge quantities of borrow and quarry materials. Extraction of such bulk materials may affect substantial area of land under agricultural uses and vegetation cover. As the project alignment is new and most of it is located in inaccessible areas, presumably its construction will necessitate construction of a number of new access roads that will link the project route to existing roads as well as to quarries and borrow sites as well as to materials processing and storage sites. Construction of most sections of the access roads is likely to affect agricultural lands at least on temporary basis.

Moreover, construction of the proposed railway line is expected to generate enormous amounts of spoil materials that have to be dumped somewhere in the project corridor. Disposal of such huge quantities of materials may result in loss of significant area of lands under agricultural uses as well.

Further, implementation of the project is likely to cause fragmentation of agricultural lands, which may affect the existing land use patterns and productivity of the land. In addition, it is likely to cause impediment of human and animal movements across the deep cut and high fill sections of the railway as well as other sections that might be fenced for safety reasons. All these situations may affect the land use along the project corridor, which eventually may affect the livelihood of the affected households.

Mitigation Measures

Since the impacts on agricultural lands as well as on land use patterns of the route corridor is likely to be significant, appropriate mitigation and compensation measures need to be implemented. The proposed mitigation measures include the following:

- Payment of fair cash compensation for loss of farmlands and grazing areas according to relevant government laws and regulations such as the Proclamation No. 455/2005 and the Regulations No. 135/2007, which deal with compensation issues for expropriation of landholdings for public projects,
- Designing and construction of viaducts for the sections that require excessively high embankment fill and tunnels for the sections that require very deep cut. Adopting this measure will reduce land requirement for the RoW and disposal sites for excess excavation materials, land fragmentation, safety risks due to deep cut sections and obstruction of human and animal movements across the railway. The sections with high embankment fill that may be replaced by viaducts include km 0.80 – 2.00, km 3.40 – 4.05, km 13.24 – 15.30, km 16.80 – 18.90, km 21.94 – 23.24, km 58.30 – 61.10 & km 73.00 – 79.80. And the deep cut sections that are recommended to tunnels include km 15.40 – 15.60, km 23.35 – 24.150, km 37.80 – 38.35, km 54.150 – 57.80 & km 61.40 – 63.100, and km 70.00 – 70.40,
- Designing and construction of retaining walls for the sections that require high embankment fill to reduce the width of RoW and thereby to reduce loss of land under agricultural or other uses,
- Avoiding side-tipping of excavation/spoil materials onto adjacent agricultural lands and grazing areas,
- Avoiding designing and construction of culverts and side-drains in such a way that they would release runoff or flood water onto agricultural lands,
- Restoration of areas affected due to temporary activities like access roads to the railway line, material sources and campsites to productive state by removal of existing pavement materials, loosening of compacted soils and spreading of the topsoil preserved for this purpose,
- Restoration of contractor's site facilities (camps and materials processing plants sites), and borrow areas by removing all concrete and other materials on site, and through back-filling, landscaping and spreading of the topsoil,

- Provision of appropriate pedestrian/animal crossings at habitual (existing paths/tracks) crossing locations and at additional locations (above or below the rail) to allow easy and safe movements of pedestrians and animals across the railway for agricultural and other economic and social activities, and
- Restriction of vehicular movements to defined access routes to avoid unnecessary impacts like soil compaction and trampling effects on lands under agricultural or other uses.

6.2.2 Soil Erosion and Other Impacts on Soils

The activities involved in the execution of the proposed railway project is expected to cause significant adverse impacts on soils at local levels. The main likely impacts on soils include increased soil erosion, soil compaction and soil contamination by hazardous substances such as fuel, oils and used oils. Particularly during the construction phase, destruction of the soil physical structures and exposure to runoff erosion could be significant. The main possible causes of soil disturbance and erosion include extensive cutting in soil and earthmoving activities to remove the loose topsoil and replace by select materials to construct the railway embankment, drainage structures, access roads, and contractor's site facilities. Since it is a new railway project, certainly it will involve bulk excavations and earthmoving works that would damage the soil physical structures and eventually expose it to erosion by runoff water. Soil erosion can also result due to diversion and concentration of runoff water by the railway embankment at certain points. Since the railway line travels mostly at the foot-slope or bottom of mountain ranges, it would intercept and concentrate surface runoff water that naturally would spread over the landscape and ultimately drain to the natural watercourses. The concentrated runoff water may cause serious erosion problem in sloping areas or siltation in flatter areas unless appropriate erosion or siltation control measures are implemented. The soils along most part of the project route is alluvial and lacustrine deposits, which are relatively weak and easily vulnerable to erosion.

The rate of soil erosion is largely dependent on climatic and topographic features of the project area and the extent of physical disturbance in the soil and exposure to surface runoff water, which is the main causative agent of soil erosion in the area. In the project area, most of the annual rainfall occurs during the main rainy season that extends from June to September and the intensity of rain in those months is relatively high. In terms of topography, about 70% of the project length is located in rolling terrain and about 23% in flat terrain. However, as the alignment travels mostly at the foot-slope or bottom of mountain ranges, it is vulnerable to erosion by runoff water draining from the surrounding mountainous and hilly areas. The other important factor that may aggravate the risk of soil erosion is mostly poor/low vegetation cover, which means minimal interception in the raindrops, less infiltration and higher volume of surface runoff water. Thus, the railway embankment is likely to intercept and concentrate higher volume of surface runoff water, which may cause significant erosion problem in sloping areas and siltation problem in flatter areas.

In addition, soils in the areas adjacent to the rail line and other active construction sites are likely to be affected due to compaction by heavy-duty equipment used in the construction works and by dump trucks used for hauling construction materials. The use of unpaved access roads will also have compaction or trampling effects on soils.

Moreover, soils in the impact areas can be affected due to contamination by hazardous substances such as oils, fuel and used oils. This may result due to spills of oils and fuel from engines of vehicles and diesel operating equipment, accidental spillage and improper disposal of used oils and lubricants. In addition, at construction camps and other site facilities soil pollution can result from inappropriate disposal of waste waters, sewage, equipment cleaning, and storage and handling of pollutants such as oil, fuel, lubricants and detergents.

Mitigation Measures

Potential impacts on soils (soil erosion, compaction and pollution) can be minimized by adopting the following mitigation measures:

- Execution of the potentially impacting project activities including land clearing, excavation in soil and earthmoving works during the dry season thereby reducing soil erosion and soil compaction.
- Limiting land acquisition and construction works to the imperative area necessary for the project.
- Designing and construction of effective drainage structures such as paved side-ditches, diversion drains, check dams, culverts and sufficient turnouts to reduce the concentration of water flows, erosion and scouring along or downstream the railway, and at or downstream of the cross structures with particular attention given to sections or slopes vulnerable to erosion, siltation or flooding problems.
- Reducing the time surface remains bare following completion of works by preparing the surface for grassing or re-vegetation by other plants and implementing the re-vegetation activities immediately following the completion of the works at particular section.
- Avoiding designing and construction of culverts and side-drains in such a way that they would release runoff or flood water onto slopes vulnerable to erosion or onto important land uses; for unavoidable cases, providing erosion/scour protection structures.
- Planting appropriate plant species (grasses, shrubs and/or trees) on erosion-prone slopes such as cut and fill slopes and other disturbed or exposed surfaces. Plant species that are adaptable to the agro-ecology of the area and have the abilities to reinforce the soil profile by increasing its shear resistance are recommended. The possible list of plant species recommended for the planting program is provided in Table 6.1 below. There are about four major nursery sites in close proximity to the project route and these sites can supply most of the tree seedlings and grass strips or seeds required for the planting program.
- Preventing pollution of the soil by hazardous substances (e.g. oil, fuel and lubricants), waste water, and salvage by adopting the following measures:
  - Construction vehicles must be maintained regularly and services conducted in clearly demarcated areas designed to contain fuel and oil spillages,
  - Storage tanks shall be placed in bunds with sumps with a minimum bund capacity of 110% of the storage capacity,
  - Oils shall be stored in sealed drums in a bounded area, and used oils stored similarly and recycled or disposed of in a manner approved by the Resident Engineer, and
  - Construction camps shall be provided with latrines and septic tank system that shall be serviced regularly so as to prevent overflowing.

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Table 6.1: Plant Species Recommended for Planting Program to serve Ecological, Soil & Water Conservation and/or Slope Stabilization Purposes

	Plant Name		Availability	Main Uses
	Scientific Name	Common Name		
I	**Grass species**			
1	*Pennisetum villosum*	Kikuyu Grass	Available at Digude Chafe in Kebele 10 of Habru W. at opposite to station 43+000 LHS	Highly effective in protecting against erosion; thus, recommended for planting on fill/embankment slopes & cut slopes and other erosion vulnerable surfaces.
2	*Cynodon dactylon*	Serdo/Bermuda Grass	Widely available in project area (PA)	Effective in protecting against erosion; thus, recommended for planting on erosion vulnerable surfaces.
3	*Pennisetum purpureum*	*Elephant Grass*	Available at the nursery sites in the project area	For protecting against gully formation or for gully reclamation
4	*Vetiveria zizanioides*	*Vetiver Grass*	As above	For covering cut slopes, gully treatment & erosion protection
5	*Pennisetum typhoides*	*Bana Grass*	As above	Protection against erosion and slope stabilization
6	*Rhodes sp.*	*Rhodes Grass*	As above	As above
7	*Phalaris aquatica*	*Phalaris*	As above	As above
8	*Pennisetum sp.*	Green Gold	As above	As above
9	*Arundo donax*	Reed	Available at nursery sites & other places	Gully treatment & slope stabilization
II	**Succulents**			
10	*Aloe* sp.	Ret	Available in PA	Stabilizing loose check dams & for gully treatment
11	*Agave sisalana*	Chiret, Kacha	Available in PA	
III	**Shrubs & Trees**			
12	*Leucaena leucocephala*	Leucaena	Available at nursery sites and other places	SWC, slope stabilization & fodder value; Recommended for planting on cut slopes & for gully treatment
13	*Sesbania sesban*	Sesbania		
14	*Acacia tortilis*	Korara	Widely available in PA including at nursery sites	SWC, slope stabilization & Ecological Value
15	*Acacia seyal*	Wachu		
16	*Acacia abyssinica*	Yeabesha Grar	Available at nursery sites and other places	SWC, slope stabilization & Ecological Value
17	*Acacia decurrens*	Green Wattle	As above	Slope stabilization & SWC
18	*Cordia africana*	Wanza	As above	SWC & ecological value (EV)
19	Jacaranda mimosifolia	Jacaranda	As above	As above plus aesthetic value
20	*Dovyalis abyssinica*	Koshim	As above	slope stabilization & protection against erosion (SWC)
21	*Ficus sycomorus*	Shola	As above	SWC, slope stabilization & EV

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22	*Gravillea robusta*	*Gravillea*	As above	Slope stabilization & aesthetic value
23	*Spathodia campanulata*	Flame of the Forest	As above	Slope stabilization & aesthetic value
24	*Mangifera indica*	Mango	As above	Aesthetic value & food source (fruits)
25	*Persea ameicana*	Avocado	Available at nursery sites	As above
26	*Euphorbia tirucalli*	Kinchib	Available in PA	Gully treatment, slope stabilization & SWC
27	*Euphorbia abyssinica*	Kulkual	Available in PA	
28	*Justicia schimperiana*	Sensel	Available in PA	SWC & slope stabilization
29	*Zizyphus spp.*	Kurkura	Available in PA	Gully treatment, slope stabilization & SWC
30	*Schinus molle*	Qundo Bebere	Available at nursery sites and other places	Slope stabilization & aesthetic value

Note: PA = Project area; EV = Ecological Value
Source: Woreda ARDOs and Identification by the Consultant during the Environmental Field Survey

6.2.3 Impacts on Landscape Quality and Slope Stability

As estimated from the preliminary engineering design profile, approximately 36% (30.21km) and 30% (25.55km) length of the proposed railway will involve deep cutting and high embankment filling of variable depth and height respectively in order to meet the minimum standard requirement. These comprise about 66% (55.76km) of the total project length (84.5km). The maximum depth of the deep cut sections varies from about 6m to 48m and the average width of cut section at the top ranges from about 20m to 264m, with overall average width of 65m. Similarly, the maximum height of the high embankment fill sections ranges from about 5m to 63m and the average width of fill section at the foot ranges from about 25m to 84m, with overall average width of 49m (see Appendix 3 for the details).

Consequently, construction of the proposed railway will result in significant alterations to the natural features of the landscape. In addition, slope failures may occur along several stretches esp. along the deep cut sections located in areas with weak soils and weathered rock formation. Along the deep cut sections, deep and long cut slopes deprived of topsoil and vegetation cover are very likely to be formed and this situation will cause significant disfiguring of the landscape and visual pollution. Similarly, the high embankment fill sections are expected to bring discernible impacts on landscape quality. The deep cut and high fill sections that are likely to have major disfiguring of the natural beautiful of the landscape and detail data on these sections are presented in Appendix 3.

In addition, disposal of excessive spoil materials generated from the excavation activities esp. if it is side-casted on downslope can significantly damage the landscape and at the same time may induce slope de-stability problem. In particular, excavation of the deep cut sections and the tunnel sections is very likely to generate huge quantities of spoil materials that may cause appreciable adverse environmental and social impacts unless carefully disposed and site restoration measures are taken.

Other project activities that would affect the landscape quality include exploitation of construction material sources, and establishment of contractors' site facilities. Construction of the proposed railway will definitely involve extraction of enormous quantities of borrow materials and natural

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aggregates for sub-base construction and rock quarries for aggregate production and masonry works. Exploitation of borrow materials and quarries may create deep and wide pits and scarred landscape, which could be visually unsightly. Reinstatement of those highly damaged sites could be too costly or may not be feasible at reasonable cost. Thus, such aesthetically unacceptable sites could be left without reinstatement or as residual impacts after completion of the project construction. In addition to damaging of the landscape quality, those sites may pose safety risks for local people and their animals. Further, spoils disposal activities may affect farmlands, grazing areas, important trees and water resources (streams and rivers).

In terms of riverbank stability, it is important to note that most of the rivers and streams have weak riverbank formation as they run through alluvial and lacustrine deposits. As a result, they are highly vulnerable to riverbank erosion and slope instability problems due to steep slope and the characteristic nature of low shearing resistance of the soil. Most of the rivers and streams crossed by the rail line are characterized by excessively wide river courses, active expansion of river courses and land-sliding problems on some riverbanks. Therefore, excavations in such loose soil or geologic formation for building culvert, bridges and viaducts as well as for construction of the railway embankment may aggravate riverbank erosion and trigger slope failures unless appropriate mitigation measures are taken.

In summary, the sections vulnerable to slope stability problem include sections of deep cut, high embankment fill, river crossing points and sections running close to riverbanks. Details of the deep cut and high embankment fill sections are provided in Appendix 3 and several stretches or spots along these sections are expected to have slope failures unless appropriate mitigation measures are implemented. In addition, the majority of the river-crossing points are likely to face slope instability and riverbank erosion unless appropriate slope stabilizing and erosion protection structures are provided. Further, some of the stretches running along river courses may have slope stability problem and the stretches with such potential problem include km 0.80 – 2.00 (Lt &Rt bank of Mille R.), km 17.10 – 20.00 (Rt bank of Mille R.), km 33.20 – 33.90 (Rt bank of Gelana R.), km 34.40 – 34.60 (Lt bank of Gelana R.), km 78.80 – 79.10 (Rt bank of Hado R.), and km 79.30 – 79.80 (Lt bank of Hado R.).

Mitigation Measures

Potential impacts on landscape quality and slope stability can be minimized through the following mitigation measures:

- Designing and construction of viaducts for the sections that require very high embankment fill and tunnels for the sections that require very deep cut. This measure will reduce damaging or disfiguring of the landscape and possible slope instability problem due to deep cutting and high embankment filling works, extraction of excessive borrows and natural aggregates required for embankment filling, and disposal of excavation materials generated from the deep cut and fill sections. The sections recommended for this measure are listed in section 6.2.1, second bullet.
- Designing and construction of retention structures like retaining walls or gabions for the sections vulnerable to slope instability problem to reinforce the resisting forces,
- Changing slope geometry like reduction of slope height and inclination to decrease the driving forces.

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- Avoiding or minimizing disposal of surplus materials excavated from deep cut or tunnel sections on down-slope or in adjacent areas by reusing it in the construction of embankments along fill sections or in restoration of borrow and quarry sites, or by depositing it only in approved dumping sites and, on completion, by landscaping, spreading topsoil and planting with appropriate plant species (trees, shrubs and/or grasses) to improve the visual quality of those sites,
- Preservation and use of excess or unsuitable excavation materials for back-filling of borrow sites and quarries when exploitation of those sites is over,
- Proper compaction of embankment slopes, and spreading the fill slopes and cut slopes with topsoil and grassing by seeding or planting grass strips of appropriate species [recommended grass species are given in Table 6.1 above],
- Restoration (where practicable) of borrow sites and areas of the construction contractors' site facilities through back-filling, landscaping, spreading topsoil and establishing appropriate vegetation cover,
- Controlling surface water infiltration to reduce seepage forces by providing adequate side drains, interceptor drains, and diversion drains; the aim of this measure is to control infiltration into the vulnerable mass and relieve water pressures within the mass, and
- Re-establishing vegetation cover of affected areas such as borrow sites, cut-and-fill slopes, spoil disposal sites, and campsites with appropriate and ecologically adaptable trees, shrubs and/or grasses.

6.2.4 Impacts on Water Resources and Existing Water Use

The proposed railway crosses four major rivers and numerous streams and minor drainage channels. Thus, implementation of the railway project will require building of new cross drainage structures including bridges, slab culverts and pipe culverts on the rivers, streams and other watercourses. Based on preliminary hydrological assessment, the rail line intercepts about 44 rivers and streams that will require provision of bridges and major culverts with span ranging from 8m to 450m. The activities involved in the installation of the drainage structures and other project activities are likely to bring a number of adverse impacts on the water bodies intercepted by the railway or on those found below the alignment.

The main project activities that may cause impacts on water resources include:

- excavations for foundation of culverts, bridges and viaducts,
- earthworks involved in the building of the railway, access roads, and side ditches,
- mining of sand from river beds,
- abstraction and use of water from rivers and streams for the railway construction works,
- spillage of pollutant substances like fuel, oils, detergents, used oils, cement slug etc., and
- establishment and operation of contractors' site facilities (campsites & materials processing and storage sites).

The excavations/earthworks involved in the construction of the railroad, cross and longitudinal drainage facilities, access roads and exploitation of construction materials sources are likely to expose soils and other materials to runoff water erosion. This situation may greatly increase the rate of soil erosion or materials transport to rivers and streams, which in turn may contribute to increased sediment loading of the rivers and streams crossed by the railway or those found below it. In addition, disposal of excavation materials on riverbanks or in river courses may greatly increase the sediment loads of the rivers and streams.

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Further, construction of the planned railroad may cause some alterations to the natural flow of surface and sub-surface water and local drainage patterns along the rail line. These may result in concentration of water flows at certain points or changes in the volume, velocity or direction of water flows, which in turn may result in increased erosion, flooding, channel modification and increased sediment loading of the receiving water bodies. This situation may tend to increase the turbidity of the water bodies and may affect water quality as well. The runoff water intercepted by the railway embankment and concentrated in side ditches and diversion drains may cause gully erosion in the drains themselves as well in downstream areas unless prevention measures are in place.

There will also be possible impacts on water quality due to contamination through spillage of fuel, oils and other pollutants into watercourses, or due to improper disposal of used oils. Such spills of pollutants may contaminate the water resources through surface flows into streams and rivers or infiltration into the groundwater. Similarly, unrestrained discharge of sewage and other fluid wastes at campsites may cause water pollution through surface runoff into watercourses or infiltration into the groundwater. Moreover, cement slag during construction of bridges and culverts may pose water pollution risks to the streams and rivers crossed by the railway.

Implementation of the project will require sand for concrete and masonry works. The sand required for the project is expected to be mined from the major river courses such as Mille, Gelana, Chireti and Alawuha and this activity may have some local impacts on river courses. These sources have abundant sand deposits, which is annually renewable during the rainy seasons. Therefore, these sand deposits can be exploited for the sand quarries without any significant impacts on the resource potential. However, precautions should be taken to avoid pollution risks through leakage of fuel or oils from the equipment and trucks that would excavate and haul sand respectively.

Construction of the proposed railway will require water for compaction, mortar and concrete works, and drinking water for camp requirements. In the project area, there are several major perennial rivers (including Mille, Gelana, Gololsha, Mersa, Chireti and Alawuha) that can be reliable sources of water throughout the year and these can be used for the project requirements without appreciable reduction in downstream flows. Therefore, abstraction of water from the above mentioned rivers is not expected to cause any noticeable competition with existing uses for human, animal and/or irrigation water supplies.

Concerning drinking water supply, the towns and major villages in the project area have potable water supply systems that have been developed from deep wells (boreholes). Nevertheless, the yield of these water sources may not be sufficient to meet the water demands of the existing users plus the campsite requirements of the railway project. Therefore, the adequacy of those water supplies should be proved before decision is made to use them for the project.

Construction of the proposed railway is likely to damage traditional irrigation canals at station 1+2000 where the railway line crosses over Mille River. The canals are used to divert the river water to both banks of the river for irrigating small-scale sugarcane plantations and fruit trees.

Mitigation Measures

Potential impacts on water resources as well as on existing water uses will be minimized through the following mitigation measures:

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- Designing and constructing culverts and pipes that have adequate openings to pass the design flood in order to minimize flooding, scouring or erosion downstream of the structures; in addition, energy dissipating structures, check dams, appropriate inlet and outlet structures like end walls, drop inlets, and chutes shall be designed and constructed,
- Execution of the potentially impacting railway construction and drainage works during the dry season when river flows are minimal or non-existent, to minimize interference in river flows and reduce erosion, sedimentation and water pollution risks,
- Avoiding disposal of surplus excavated materials on river banks or in river courses by depositing it only at approved disposal sites,
- Implementing soil and water conservation/watershed treatment measures to reduce the rate of erosion and silt transport from the adjacent catchments,
- Proper handling of hazardous substances such as oil, fuel and cement to avoid water pollution by spillages; this can be done by establishing well-designed dispensing points for fuels and lubricants with adequate drip pans and fuel funnels for petroleum products and incorporating other good practices and precautions,
- Avoidance of leakages from vehicles and construction equipment by regular and effective maintenance,
- Replacing the irrigation canals affected by the project activities by appropriate structures as soon as possible in order to let an uninterrupted flow of irrigation water,
- Water for the railway project requirements shall not be withdrawn from water sources being used by the local communities unless its adequacy is approved by the relevant local authorities or woreda water offices,
- In case any existing community water supply sources or points are affected due to the project activities, alternative water sources shall be developed and provided for the users,
- Locating Contractor's site facilities (camps, fuel storage etc.) at sufficient distance (minimum of 2km) from streams, rivers, or community water supply sources.
- Provision of satisfactory disposal of solid and liquid wastes generated by construction camps and maintaining the facilities for sanitation at the campsites in good condition, and
- Avoidance of disposal of used oils in the field, by strictly controlling waste disposal process, which may be through use of only approved waste disposal and recycling techniques.

6.2.5 Air and Noise Pollution

During the project implementation phase, construction traffic particularly related to the haulage of construction materials will greatly increase traffic flows. In addition, implementation of the project will necessarily entail heavy-duty machinery that will be involved in heavy earthworks or excavations. All these heavy-duty operations inevitably will result in air and noise pollution on a temporary basis till completion of such bulk operations.

Operation of construction traffic and heavy-duty machinery may affect air quality due to emissions of particulate matters, notably dust, and pollutant gases such as carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and nitrogen oxides (NOx). Dust and toxic air pollutants may bring some human health problems such as respiratory diseases, eye inflammations, skin

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irritations, and various types of allergies. The accumulation of particulates in the atmosphere and deposition on leafs may reduce photosynthesis and plant growth.

The main project activities that are likely to cause significant dust, pollutant gases and noise emissions include:

- Heavy earthworks/excavations and blasting activities involved in the construction of the railway and drainage structures,
- Extraction of construction materials (borrows and quarries) and their haulage to the construction front or processing plant sites,
- Construction materials processing activities like aggregate production and concrete batching,
- Filling of the embankment with select (borrow) materials and aggregates, and compaction using heavy equipment, and
- Haulage of spoil materials to disposal sites.

In particular the dust and noise generated by these activities could be significant and may affect the local communities and business activities in the project impact zones. As most section of the proposed railway line passes through areas of high agricultural activities and close to several villages and town, dust and noise emissions may cause significant nuisance and result in increased incidence of some public health problems esp. respiratory diseases and eye inflammations. In addition, there are a number of other sensitive receptors such as mosques, churches, schools, public health units, and water supply sources within the project impact zones including at locations close to the railway and the route of possible access roads. Consequently, dust and noise pollution may cause discernible disturbances to a large number of people.

During the operation phase, there will be minimal air pollution problem as the trains on this railway are expected to be operating basically with electric power supplied by trackside systems instead of diesel fuel. However, they are expected to be designed with dual system, i.e. with electrical and diesel operating engines, in order to mitigate the circumstances of electric power interruption. As the duration it would operate with diesel is likely to be occasional and for short period, it is not expected to result in significant air pollution problem.

On the other hand, compared to the ambient noise levels, there will be increased noise emissions along the railway emanating from the operation/movement of trains. The sources of noise will be the engine, the friction of wheels over the rails, and whistle blowing. There may be additional source of noise pollution if rail-truck transshipment is involved, i.e. if convergence of trucks towards rail-yards is provided. This system is likely to be provided at Hara town (around station 66+500) where an existing major road (Woldiya-Mille Road) crosses the railway. Nevertheless, the noise emissions from operation of the rail transportation system are not expected to be serious and above the levels that may hamper the hearing capacity or that may affect human physical and psychological wellbeing. However, this assumption needs to be verified through proper monitoring activities.

Considering the significance of air and noise pollution during the construction phase, suitable mitigation measures need to be implemented to reduce dust and pollutant gases emissions, and noise levels. The recommended mitigation measures include the following:

- Limiting traffic speeds and applying water regularly on dusty roads esp. along those sections passing through or nearby human settlements (towns, villages), business/ agricultural areas, social services (health units, schools, water supply points), religious places (churches & mosques), and other sensitive areas,

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- Use of modern and well-maintained equipment (with mufflers where appropriate), regular maintenance of diesel powered machinery and vehicles to reduce exhaust emissions and noise levels,
- Regular maintenance of emission intensive plants like aggregate production plants and application of dust suppressant mechanisms,
- Locating the aggregate production plants and concrete mixing plants at a minimum distance of 2km from any sensitive receptors such as residential areas, religious places, health units, schools and drinking water supply sources,
- Construction works must comply with relevant health and safety standards pertaining to noise and emissions, such as wearing ear protection when operating plants or heavy machinery,
- Implementing well-designed traffic management plan that considers traffic safety and working hours for materials transport thereby minimize transport-related disturbances to local residents and road users, and reduce traffic accidents,
- The emission of inorganic gaseous substances, including sulphur dioxide and nitrogen dioxide, from vehicles and equipment should not exceed the limit values set in the EPA standards (2003).
- Carrying out noisy construction activities during normal working hours,
- Avoiding burning of materials such as tiers, plastic, rubber products or other materials that create heavy smock or nuisance odour,
- Avoiding disposing of any volatile chemicals to the air, and
- Informing local people in advance when there will be blasting or unusual unavoidable noise.

6.3 Negative Impacts on Biological Environment

6.3.1 Impacts on Natural Vegetation and Flora

The project corridor has only some patches of degraded natural vegetation and remnant or secondary growth trees and bushes scattered in some parts of the area. The main causes for the degradation of the natural vegetation are extensive deforestation for expansion of farmlands and establishment of human settlements as well as overutilization for construction materials and fuel wood.

Construction of the planned railway will cause loss of some parts of the remnant natural vegetation and many indigenous trees and bushes located within the right-of-way (ROW). Of the natural vegetation areas available along the project route, the impact on the Faji Protected Forest (FPF), located at station 29+400 – 31+350, is likely to be significant since the rail line directly passes through the forestland. Based on the width of land take for the RoW requirement, which is estimated to be 26m, the area of potentially affected Faji forestland is about 5.1ha. This is about 1% of the total area of the protected forest. Other sections that have significant natural vegetation cover include station 0+200 – 0+700, 14+800 – 16+100, 21+400 – 22+500, 23+250 – 25+000 and 54+000 – 58+000; bushes, shrubs and some remnant trees will be affected along these sections. Based on the land requirement for the RoW, the total area of potentially affected natural vegetation along these sections is estimated to be about 29ha. It is very likely that additional area of natural vegetation cover will be affected mainly resulting from disposal of excavation materials esp. due to side-tipping of cut materials on downslope in hilly and mountainous areas.

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In addition, there are significant remnant trees and some secondary growth or planted trees along station 45+000 – 54+000 and 58+000 – 64.00 that are conserved within farmlands and around homesteads. The main causes of the impact will be land taking and land clearing for the railway RoW. The project is likely to cause additional impacts on vegetation and/or solitary trees due to exploitation of material sources (borrows and quarries) and opening of new access roads.

The main potentially affected indigenous tree species include Acaci spp. (*A. tortilis, A. albida, A. seyal, A. abyssinica and A. senegal*), *Cordia africana (Wanza), Zizyphus spina-christi (Kurkura), Balanites aegyptiaca (Bedena*), and *Croton macrostachys (Bisana).* In addition, a variety of bushy and shrubby plants will be affected, and the major species include *Carissa edulis (Agam), Capparis tomentosa (Gimero), Cordia ovalis (Mentero), Ximenia americana (Inkoy), Grewia* spp. (*Aroresi, Lenquata & Agobdi*), *Euphorbia tirucalli* (*Kinchib*), *Rhus spp. (Dobobesha, Embis*), *Calpurma aurea* (Digita), *Acokanthera schimperi (Keraru), Dichrostachys cinerea (Ader), Petrolobium stellatum (Arangama*), and *Ficus carica (*Meka Kulkual). Moreover, a range of succulents like *Aloe* sp. (*Ret*), herbaceous plants and grass species will be affected by the project activities. Further, some planted tree species, mainly *Eucalyptus camaldulensis*, will be affected in some areas like at stations km 63+100 – 64+000 and km 68+300 – 69+000.

None of the plant species identified from the project impact areas is considered rare or threatened. Nevertheless, some tree species including *Cordia africana* and *Acacia abyssinica* are amongst the National Priority Species of conservation concern. As these tree species are widely distributed in many places in the country, losses/damages caused by the railway project is not expected to significantly reduce the distribution or threaten the survival of those conservation worthy indigenous tree species. However, it is likely to reduce the number or density of individual trees of those species at local level. In addition, it should be noted that the indigenous trees/natural vegetation in the project area play indispensable roles in soil and water conservation, maintaining/moderating the micro-climate, serving as habitats for wildlife, and in socio-economic activities of the local community such as serving as media for honey production, sources of fuel wood, construction materials and feed for livestock esp. during critical dry periods. Therefore, they have major roles in environmental protection like in sustaining ecological functions as well as in the livelihood of the pastoral community. Therefore, it is important to take possible measures to minimize damaging of vegetation/trees and mitigate the unavoidable losses through replanting program.

Mitigation Measures

Potential impacts on vegetation/trees can be minimised and unavoidable impacts compensated for through the following mitigation measures:

- Limiting land taking and land clearing/earthworks to the area absolutely necessary for the project,
- Avoiding locating of access roads, construction camps and materials processing plants within areas, which have significant vegetation or trees cover,
- Avoiding disposal of spoil/excess excavation materials on down-slope or in adjacent areas where it will affect vegetation/trees,
- Avoiding locating/selecting quarries and borrow pits at areas which have significant vegetation or trees cover, and
- Implementing replanting of appropriate tree species at areas affected due to temporary activities (campsites, materials processing sites, access roads, borrow sites etc.), along the railway and at other places to be recommended by the Woreda ARDOs/EPLAUO/ local environmental/natural resources conservation experts to compensate for the trees/vegetation lost due to the project activities and as environmental protection

enhancement measure. In the planting program, priority shall be given for indigenous species, but also exotic species, which are ecologically/environmentally friendly, can be used. The list of plant species (trees, shrubs & grasses) recommended for the planting program is given in Table 6.1 above, under section 6.2.2.

6.3.2 Impacts on Fauna

The important wildlife habitat that will be affected by the proposed railway project is part of the Faji Protected Forest, which is described in section 4.2.1 and 6.4.1 above. The other sections that have some wildlife habitats in their corridor are km 15 to km 25 and km 55 to km 58, which are covered by open to relatively dense bushes, shrubs and open woodland or scattered trees. Implementation of the proposed railway project unavoidably will affect some parts of these habitats mainly due to clearing/removal of the vegetation and trees along the railway RoW, access roads and at construction material sources (quarry and borrow sites) except for the section from km 55 – 58, which will be constructed underground (tunnel). Along the remaining sections of the railway, there are no as such important habitats that could support wildlife. However, there are many indigenous trees and patches of bushes and shrubs that serve as habitats for a variety of bird species.

Implementation of the project is expected to cause some impacts on wildlife, mainly due to loss or disturbance of habitats and disruption of habitat use patterns of wild animals along or across the rail line and access roads as well as at construction material sources. The railway and access roads may fragment habitats and decrease their intactness for wildlife use. In addition, noise generated from vehicular movements and operation of heavy equipment may cause disturbances to wildlife. Most wild animals may temporarily move away from sources of noise, and come back once the noise has ceased. Further, while hauling construction materials and moving within the construction sites, vehicles may cause some or a few animal fatalities. Impacts on wild animals (mammals) is expected to be localized mainly at the Faji PF and a few pocket areas, and low in magnitude and significance. Whereas impacts on birdlife could be more significant particularly along the rail line and access routes and at quarries and borrow sites. The birds in the impact areas are likely to be significantly disturbed by increased noise levels, which may affect nesting and the breeding success of the bird species.

During the operation period, the wild animals and birds in the habitats adjacent to the railway could be disturbed by noise pollution generated by the trains that will operate on the railway. In addition, the high embankment-fill and deep cut sections may cause impediment to movements of wildlife across the railway. Further, the trains operating on the rail may cause some occasional killings of wildlife. However, these impacts are not likely to contribute for the declining of wildlife numbers.

Mitigation Measures

Potential impacts on habitats and wildlife will be minimized through the following mitigation measures:

- Apply good site practices incorporating appropriate mitigation measures that reduce nuisance noise levels.
- Post appropriate signs and apply speed limits for the sections passing through important wildlife areas especially in the Faji PF by setting speed limits to safe levels, monitoring and enforcing it.
- Strictly forbid hunting and trapping of wild animals by the project workers, and animal killings due to reluctances of drivers like over speeding of vehicles.
- Strictly prohibit unnecessary destruction of habitats, cutting of trees or vegetation found outside the area absolutely needed for the project.

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- Increase the awareness of drivers and equipment operators towards wildlife conservation and encourage them to avoid or minimise animal fatalities.
- Implement restoration of affected areas through artificial landscaping and replanting of trees as recommended in sections 6.2.1, 6.2.2, 6.2.3 and 6.3.1 above.

6.4 Other Environmental Issues

6.4.1 Impacts on Cultural Heritage Sites

Of the physical cultural resources found in the project corridor, two mosques and one graveyard/ cemetery site are located within the impact zone and may be affected by the project activities. The mosques are found around station 62+080 and 63+000 at Mendera and Sibil Kay villages, whereas the Cemetery Site is located around station 63+280. All the sites are located in Sibil Kay Kebele of the Gubalafto Woreda. If construction of this section of the railway would involve deep cut, it is likely to damage the mosques and cemetery site as well as parts of the Mendera and Sibil Kay Villages. In order to avoid such serious potential impacts, safety risks and severance of social and economic activities of the local community, it is recommended that tunnel would be adopted for this section.

In addition, there is a mosque at station 68+640 (at 79m RHS) and cemetery site at 68+760 (at 329m RHS). These sensitive sites will not be directly affected. However, as the cemetery site is located on hilly area, which can be a potential quarry site for the project, precaution should be taken not affect the cemeteries.

Further, implementation of the project may affect hot springs located on the banks of Mille river at station 21+800. Since there are many hot springs upstream and downstream of the railway crossing point, the impact caused by the project is expected to be minor. The people who use hot springs for bathing and healing from some sicknesses, can use the hot springs found at upstream or downstream section of the river.

There are no known archaeologically sensitive sites in the corridor of the proposed railway route. However, the presence or absence of any archaeologically or culturally important properties underneath of the rail line or other possibly affected areas is not sure at this level, and assets of archaeological or cultural value may become apparent during excavation for the railway construction. Therefore, it is important that the Contractor is aware of this situation and take necessary precautions during the construction works and take necessary actions (as recommended below) if any properties of cultural value are uncovered.

Mitigation Measures

Mitigation measures recommended for the impacts on cultural heritage sites include the following:

- Designing and construction of a tunnel for the section km 61.30 to about km 64.00 where mosques, cemeteries, villages and existing access road would be affected if this section was constructed through deep cutting works. Since this section is the most sensitive area because of the presence of potentially affected religious sites, villages, social services (schools & health units), access road etc., particular attention and mitigation need to be taken.
- If the above mitigation measure is not feasible, consulting the local community and religious leaders and relocating the affected mosques prior to the commencement of the project construction works; to effect this measure the project shall pay fair compensation that will enable to reconstruct mosques at least equivalent to the existing ones.

- If protection of the likely affected cemeteries through the mitigation measure recommended under the first bullet above, relocating them before the commencement of construction at that particular section, and the costs related to the relocation activities including holding religious ceremonies shall be covered by the project.
- At sections nearby religious sites, activities producing excessive noise levels should be avoided during the time when spiritual programs are underway.
- In the event of accidental discovery of any archaeological remains or properties of cultural value, the Contractor shall immediately halt works at that particular section or spot and notify the Supervision Consultant/ Resident Engineer and shall protect and keep same intact until the relevant authority like the ARCCH or Regional/Zonal/Woreda Culture and Tourism Bureau/Office takes delivery thereof. The Contractor sets up rapid response system for physical cultural resources findings with concerned authorities.

6.4.2 Disruption of Existing Roads/Tracks and Creation of Obstruction

The proposed railway intercepts the Woldiya-Hara-Mille main road (at km 66.50), three access roads (at km 7.70, km 63.30 & km 67.00), about 18 major foot tracks and many other footpaths that are used by the local communities. The main road, the access road at km 63.30 and two of the major tracks (at km 33.30 and km 64.80) are crossed by deep cut sections while six of the major tracks (at km 41.20, km 42.50, km 50.00, km 60.67, km 68.50 and km 58.20) are crossed by high embankment fill sections. In addition, there are about eight main footpaths that cross at level sections of the rail line and these are located at about km 20.30, km 23.20, km 27.35, km 29.35, km 30.80, km 36.70, km 45.90 and km 71. 20. Moreover, there are about five tracks (located at about km 55.00, km 56.40, km 61.80, km 81.80 and km 83.00) that cross over the tunnel sections.

Therefore, construction of the railway will create physical barriers that will prevent pedestrians, animals and vehicular traffic from moving across the elevated or deepened sections of the rail particularly along the habitual routes (existing roads, tracks/paths). According to the preliminary engineering design, about 36% of the project length will be constructed in deep cut and 30% with high embankment fill that will cause complete obstruction of pedestrian/animal/vehicular movements. In addition, since almost the whole section of the rail line cuts across a corridor, which is intensively used for agricultural activities (cultivation and grazing), it is expected that a large number of local people and animals have to frequently move across the railway. Prevention of people and animals from moving across the railway is very likely to sever economic and social activities of the local population.

In addition to agricultural activities, a large number of people daily move across the rail line for economic and social services like for market, health and education services as well as for administrative purposes at the major towns and villages. These service centers include Tis Aba Lima, Wuchale, Mersa, Woldiya, Hara, and Gobiye towns and Girana village, all of which are situated on left hand side of the railway.

Mitigation Measures

Since construction of the planed railway is very likely to cause significant obstruction to movements of people, animals and vehicular traffic as well as safety risks, appropriate mitigation measures need to be included in the project design and implemented during construction. The proposed mitigation measures include the following:

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- Designing and construction of adequate and appropriate under or over passage crossing structures at the existing roads and tracks indicated above and at additional locations to allow easy/free and safe movements of people and animals, and some of which also for motorized traffic. The list of locations recommended for pedestrian/vehicular crossings is provided in Appendix 4 and acceptance of these locations by local authorities and/or local communities should be obtained or they amended according to their recommendations before they are implemented,
- Designing and construction of viaducts for the sections that require high embankment fill and tunnels for the sections that require deep cut. This will allow free human and animal movements under the viaducts and over the tunnels, and avoid safety risks that could have been caused by deep cut sections. The sections recommended for this measure are listed in section 6.2.1, second bullet,
- For the bridges and viaducts over major rivers or at elevated stretches, provision of appropriate facility for the passage alongside each river or deep crossing points for pedestrians and animals beneath the railway,
- Fencing of the highly risky sections of the railway like the deep cut sections to protect people and animals from falling onto the deep cut slopes and along sections where people and/or animals may tend to frequently move across the railway and thus, posed to accident risks due to collision with trains,
- Provision of appropriate information to potentially affected local communities prior to the beginning of any works in order to allay fears, complaints or potential risks due to lack of information or awareness about the project activities. The information that must be provided include locations of risky areas such as construction/work sites (esp. the deep cut and high fill sections), borrow pits and quarries, materials storage and processing sites, and access routes.
- Strict prohibition of risky areas for safety reasons, e.g. deep cut and high fill sections, rock-blasting sites, borrow pits and quarries, and materials storage and processing places.

6.4.3 Safety Issues

There will be potential accident risks mainly related to operation of construction vehicles and equipment, blasting activities, and operation of quarries and borrow pits. During the construction phase, there will be increased traffic volume in the project area and intensive movements of vehicular traffic and operation of equipment that could increase the risk of accidents to the local communities, road users and domestic animals. In particular, the communities residing or working in the vicinity of the construction sites, quarries and borrow pits, or alongside of access roads could be at a higher risk. Construction vehicles esp. dump trucks involved in the haulage of bulk construction materials may create high safety risks for local communities, domestic animals and road users. Since most part of the project route corridor is densely populated and intensively used for agricultural activities, the risk of traffic accidents could be an important issue unless necessary mitigation measures are implemented.

The other important safety issue is related to operation of heavy equipment during the construction of the deep cut sections as well as the high embankment fill sections. Excavations in rock for construction of the deep cut section or for extraction of rock materials for aggregate production or masonry works may involve blasting activities, which may produce fly rocks that may endanger the people or animals, or affect properties like residential houses found in the vicinity of the sites. In addition, it may produce rocks that may fall or roll down-hill slope. These falling rocks/boulders may jeopardize people or animals found below the sites.

During the operation phase, the trains operating on the railroad with higher speeds may pose some accident risks to people and animals that may move across the railway along the low-grade sections. Unless sufficient pedestrian crossings are provide above or below the rail and awareness trainings are given for the local communities, pedestrians and animals may continue to frequently move across the railroad and vulnerable to serious accident risks due to collisions with trains.

Mitigation Measures

Potential traffic accident problems and safety risks related to the implementation and operation of the proposed railway project should be minimized through a well-designed work program and traffic management plan. The recommended mitigation measures include the following:

- Provision of necessary information such as speed limits, direction, hazard locations, sensitive sites (e.g. schools, villages, animal crossing paths etc.) by putting appropriate signals and hazard markings.
- To minimize potential accident risks to domestic animals, provision of awareness trainings for drivers and equipment operators in traffic safety measures; in particular they would be well-informed and monitored so that they would take necessary precautions while driving along critical sections of access/main roads and construction sites that may be used by animals or during critical periods of the day like when animals move to grazing areas (mostly in the morning), to watering points (around noon) and back to home (in the evening).
- During access routes selection, sensitive sites like villages or residential areas, essential livestock grazing areas such as the semi-wetland on right bank of Gololsha and Mersa rivers, schools etc. will be avoided to the extent possible,
- Informing all the vulnerable people about the danger of possible hazards from blasting and earth moving activities so that they would take necessary precautions,
- The potentially affected properties such as residential houses, mosques and others shall be relocated prior to the commencement of the construction works at the deep cut sections,
- Assigning traffic regulators or traffic police to control traffic flows at critical sections or periods where/when traffic safety is a serious issue,
- Establishment of speed limits and controls for construction vehicles and discipline for the drivers, and
- Providing appropriate information on the location of risky areas to potentially affected local communities and prohibiting such areas for safety reasons, e.g. locations of working sites esp. the deep cut and high fill sections, borrow pits and quarries, rock blasting sites, and materials storage and processing places.

6.4.4 Impacts of Construction Camps and Immigrant Workers

Establishment and operation of construction camps and other site facilities such as materials processing and storage sites may bring a number of environmental and social impacts unless they are carefully designed, located and managed. The main potential impacts of campsites include loss of land under agricultural activities (crop cultivation and/or livestock), contamination of water sources and soils due to unrestrained discharge of effluents from campsites and spills of pollutants like fuel and oils, health risks to local people due to environmental sanitation problems and spreading of HIV/AIDS and other sexually transmitted diseases, and competition for limited resources or services like potable water supply, health care services, and law enforcement by the workforce. In addition, conflicts among the local people and immigrant workers could occur due to

competition for job opportunities created by the project. The skilled and most of the semi-skilled workforce is likely to be recruited from outside the immediate project area as a result of the shortage of suitably qualified workers, whereas the unskilled workers can be recruited locally.

Mitigation Measures

Potential impacts due to establishment and operation of Contractor's site facilities will be avoided or minimized by adopting appropriate mitigation measures including the following:

- Proper siting and management of the site facilities, and restoration of the sites to meld with the surrounding environment as soon as the construction work is completed,
- Keeping appropriation of land for camps to the absolute minimum and effecting suitable compensation for the affected land owners,
- Proper reinstatement of access roads to campsites by removing the pavement materials, ripping and spreading topsoil to restore the land to agriculturally productive state or planting with appropriate vegetation to prevent erosion and improve the landscape quality,
- Proper disposal of solid and liquid wastes generated by the camps and facilities and maintenance of the environmental sanitation of the campsites in good condition,
- Maintenance of proper management and discipline in the camps,
- Avoidance of siting camps and other facilities at ecologically or socially sensitive areas, e.g. in or nearby Fajl Forest (around km 29 – 31), at areas containing important indigenous trees, near rivers, streams and lake, near settlements, villages or religious sites, in prime agricultural lands, etc.
- Avoidance of overloading of existing facilities like potable water supply and health care by developing independent water sources for camp requirements, establishing onsite clinic for providing health services for the workforce, and providing garbage disposal facilities at campsites.
- In order to minimize the potential conflicts among the locals and immigrants, in recruitment of workforce, the Contractor should give priority for local labour as far as his skill requirements are met.

6.4.5 Uncertainties in Impact Assessment

Uncertainties regarding the location of the Contractor's base camp, construction materials sources and spoil disposal areas, their extent and the actual methods of operation, will remain unclear until the Contractor has been appointed and has provided details of his work program etc. to the Supervision Consultant/Engineer during the mobilization phase. The mitigation measures proposed in this EIA make provision for the Engineer to approve the Contractor's arrangements for impact minimization, as set out in Site Environmental Plans, thus providing a means of exerting control over the present unknowns.

For the purposes of this EIA, it has been assumed that the Contractor will use as much as possible existing borrow and quarry extraction works, consequently, only marginal incremental impact would be expected when compared with the major impacts associated with new site development. However, if the contractors require to develop new borrow and quarry sites, it is recommended that the following measures be adopted:

With regard to development and exploitation of borrow and quarry sites, the construction contracts should contain a clause requiring the Contractor(s) to prepare detailed Site Environmental Plans (SEPs) for approval by the Engineer prior to commencement of any site development, and to execute all works 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, quarry sites, 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
- measures which will be taken to reinstate the site
- measures should be taken to reinstate all sites and make the borrow pits and quarry site safe on completion of exploitation, and to rehabilitate any agricultural land which has been affected by access road construction and operation

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.

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7. CONSIDERATION OF ALTENATIVES

7.1 Consideration of Route Alternatives

In terms of route location, there is little option to locating the rail line inside a marginal graben or valleys situated between mountainous regions because of mostly mountainous and hilly terrain of the project corridor. The railway project mostly follows the ERC alignment but a number of realignments are proposed by the Consultant in order to improve its technical as well as economic feasibility plus to reduce environmental and social impacts. A brief description of the ERC alignment sections proposed for realignment, and technical and environmental benefits of the realignments are given in Table 7.1 below.

7.2 Comparison of Environmental Impacts of Route Alternatives

The key difference between the ERC alignment and the modified alignment, i.e. the alignment proposed by the Consultant, is the extent of traversing environmentally or socially sensitive areas, and the extent of earthworks, drainage structures and tunnel requirements. The potential environmental and social impacts of the modified alignment have been identified and their significance evaluated in Chapter 6. Therefore, in this section, only a comparison of the environmental and social impacts of the ERC alignment and the modified alignment has been made for the sections where they follow different routes.

A comparison of the environmental impacts of the ERC alignment and the modified alignment is presented in Table 7.1 below, see the last column. As indicated in the Table, almost all the proposed realignments (modified alignment) are much better than the ERC alignment in terms of avoiding or minimizing potential environmental and social impacts. Therefore, it is recommended that the proposed realignments are approved by the Client since the magnitude and significance of the environmental and social effects of the realignment sections is comparatively much less and the impacts are likely to be manageable to acceptable levels.

7.3 The "Without Project" Scenario

From a purely biophysical environment point of view and some aspects of the socio-economic environment, the "without project" scenario is preferable since it would avoid creation of any of the adverse impacts associated with implementation and operation of the proposed railway project. However, the potential social and economic benefits of the project to the local population as well as to the nation would be foregone.

Since the proposed railway project follows totally a new alignment with a significant portion of it located in difficult terrain, its implementation will entail acquisition of substantial area of land under various uses, huge excavation works, several tunnels (in total over 10km long), numerous cross drainage structures (culverts, bridges and viaducts), deep cut and high fill sections, use of huge quantities of construction materials, etc. Thus, all these activities are very likely to cause significant environmental and social impacts, which will require particular attention and mitigation measures. Therefore, the proposed railway project will require implementation of corresponding mitigation or compensation measures in order to minimize the adverse impacts to acceptable levels and ensure the environmental and social acceptability of the project.

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Table 7.1: Description of the ERC Route Sections Proposed for Realignment and their Environmental Impacts

No.	Station		Length (km)	Description of the ERC Alignment	Description of Proposed Realignment	Comments in terms of Environmental Impacts
	From	To				
1	1+200	4+300	3.10	Centreline runs through Mille river-course and on its fragile banks.	Centreline shifted to LHS to avoid the river-course.	The realignment is highly recommended since the ERC alignment/centreline is environmentally not acceptable.
2	7+600	8+000	0.40	Centreline directly cut through the centre of an important Nursery Site containing conservation worthy indigenous trees.	Centreline shifted to LHS to avoid the Nursery Site.	The realignment is highly appreciated since it protects the Nursery Site, which is a big and an essential site for raising a variety of seedlings for forestry development, species needed for SWC, fodder plants, horticulture or fruit trees and grass strips. Also, it contains several conservation worthy indigenous tree species.
3	8+100	14+800	6.70	Centreline runs through Mille river-course and on its fragile banks.	Centreline shifted to LHS to avoid the river-course.	The realignment is highly needed as the ERC alignment is environmentally not acceptable.
4	15+500	20+000	4.50	Centreline runs through Mille river-course and on its fragile riverbank.	Centreline shifted to RHS to avoid passing through the river-course.	The realignment is highly recommended since the ERC centreline is environmentally not acceptable.
5	22+000	23+000	1.00	Centreline runs on the left bank of Mille R., which could be susceptible to riverbank erosion, slope failures and flooding effects.	Centreline shifted to LHS to avoid possible riverbank erosion, slope failures and flooding effects.	The realignment is recommended as it reduces potential environmental impacts like increased sedimentation, riverbank erosion, slope failures, water pollution etc.

No.	Station		Length (km)	Description of the ERC Alignment	Description of Proposed Realignment	Comments in terms of Environmental Impacts
	From	To				
6	24+200	25+600	1.40	Centreline travels through a stream course and its banks.	Centreline shifted to LHS to avoid passing through a stream-course.	The realignment is appreciated as locating the rail line along a river course is not acceptable.
7	33+100	23+900	0.80	Centreline travels through Gelana river course and its fragile banks.	Centreline shifted to LHS to avoid passing through the river-course and along fragile riverbanks	As above.
8	36+100	53+460	17.36	This section crosses a highly dissected undulating and mountainous terrain that will require huge earthworks and numerous drainage structures.	Realigned to LHS to avoid the dissected terrain and to minimize the extent of earthworks & number of drainage structures, and to achieve better grade.	The realignment is highly recommended as it will avoid the environmental damages of the railway construction through such sensitive environment – prone to erosion, slope instability, disfiguring of landscape quality, heavy siltation or sedimentation in downstream, etc.
9	54+000	74+000	20.00	Traverses difficult terrain, crosses so many river-courses, passes through centre of Hara town & causes damages to a lot of properties and high safety risks.	Realigned to RHS to locate best tunnel route across the mountainous sections, to minimize the number & span of drainage structures, to minimize destruction to properties and safety risks.	The realignment is recommended as it will reduce environmental damages related to construction of the railway in mountainous terrain that requires huge earthworks at deep cut sections & along long tunnels, due to more number of drainage structures with longer span, possibly more slope instability and disfiguring of landscape quality, more significant damages of

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No.	Station		Length (km)	Description of the ERC Alignment	Description of Proposed Realignment	Comments in terms of Environmental Impacts
	From	To				
						properties (housing units & public utilities), disruption of existing roads & obstruction of pedestrian and vehicular movements, more safety risks, etc.
10	78+600	79+400	0.80	Centreline travels along a stream course and its banks.	Centreline shifted to LHS to avoid passing through a stream-course and to reduce the stretch on riverbanks.	The realignment avoids locating the rail line along a stream-course and reduces the stretch on riverbanks. Yet, there is a stretch (~400m long) that runs close to the left bank of the stream.

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8. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

8.1 Environmental Management Plan

The potential negative environmental impacts associated with the implementation and its subsequent operation of the proposed railroad project have been identified and described in Chapter 6. In addition, appropriate mitigation measures that would be adopted to prevent, reduce or offset the potential adverse impacts are proposed in the same section. Furthermore, Environmental Management Plan (EMP) is needed to ensure that the mitigation measures recommended in this EIA study will actually be complied with when the project is approved for implementation. Therefore, this section provides an EMP that comprises the mitigation and monitoring measures to be applied during the following phases of the project together with responsibilities for their implementation and time framework. The proposed EMP is provided in Table 8-1 below.

The following sections provide a brief description of the main environmental management activities during the subsequent phases of the project. In addition, a comprehensive EMP is presented in Table 8-1 below. The EMP indicates:

- main environmental and social impacts, and their key mitigation measures,
- recommended time framework for implementation of the mitigation measures,
- organizations/ parties responsible for implementation of the mitigation measures,
- organizations/ parties responsible for monitoring of the proper implementation of the mitigation plan, and
- where necessary, cost estimate of the mitigation plan

8.1.1 Detailed Designing Phase

During the detailed design phase, the Design Consultant, i.e. AEC, should incorporate environmental mitigation measures and enhancement measures into the engineering design and bidding documents so that environmental mitigation and enhancement measures will be part of the contractual agreement. For the various details of the engineering designs corresponding drawings, specifications and pay/ bill items have to be prepared as part of the tender documents for the works contract. To ensure the proper implementation of environmental mitigation measures, sufficiently detailed environmental 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. The Project Proponent, i.e. the Ethiopian Railways Corporation (ERC), should monitor whether the mitigation measures recommended in this EIA document are properly considered in the design and tender documents and ultimately provide approval for implementation.

8.1.2 Pre-Construction Phase

Before Contractor mobilization and commencement of construction works, environmental management activities should focus on:

- Ensuring that the tender and construction contract documents contain appropriate clauses to allow control of impacts arising from construction activities,
- preparation of clarification of tenderers' queries, if any, in relation to environmental requirements of the tender documents, and forwarding the same to all purchasers of the tender documents; and

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- Examination, request for clarification, evaluation and comparison of the environmental-relevant sections of the tenders.
- Ensuring the proper implementation of land acquisition procedures and implementation of the necessary resettlement/ compensation measures,
- Ensuring that environmentalist inputs are considered among the Contractor's personnel.

8.1.3 Construction Phase

Most of the project environmental management activities will be carried out during the construction phase, since it is at this period that most impacts will occur. The Construction Contractor will be fully responsible for implementing all the environmental mitigation measures included in the EMP (Table 8.1 below), design and technical specifications. On the other hand, the Construction Supervision Consultant (CSC) will be responsible for monitoring impacts and the proper implementation of mitigation measures at the right time. The CSC shall be fully responsible for ensuring that all the construction works will be carried out as per the recommendations of this EIA, and the specifications and drawings provided in the contractual documents, that the environmental impacts will be taken into consideration, and that good workmanship will be followed. The CSC should also be empowered to deal with infringements at the time and on the spot.

In order to discharge the responsibility of overseeing the EMP, the Supervision Consultant should have a qualified and experienced Environmental Specialist. He/ She will have executive responsibility for ensuring that all site environmental management and monitoring aspects are dealt, promptly and properly. He/ She, in collaboration with the Resident Engineer (RE), will be responsible for establishing procedures and mechanisms for effective environmental management and monitoring and will ensure that these are fully incorporated 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 actions are taken.

The Environmentalist should also be responsible for reviewing and commenting on environmental management aspects of work plans prepared by the Construction Contractor during the mobilization period, as well as in developing Site Environmental Management Procedures etc., in collaboration with the RE and other supervision team members. The Environmental Expert will also provide advice and assistance to the RE and other Engineers of the CSC as and when required, on all aspects of environmental management.

The Environmentalist should prepare and submit environmental performance progress reports to the RE that ultimately will be submitted to ERC, Federal Environmental Protection Authority (EPA) and to other relevant organizations like the Regional Environmental Protection Authority and project-financing agency as it deems.

8.1.4 Commissioning Phase

During the commissioning phase, the Construction Contractor should clean up the project environment. All the salvages and waste materials from the construction process should be cleaned, demolished or dumped in appropriate and authorized places. Quarry sites, borrow areas, and access roads should be rehabilitated and replanted. Temporary campsites should be removed and the compacted materials should be removed and reinstated so that the land continues giving services which were discontinued due to the project. The CSC esp. the Environmental Inspector should follow up the proper implementation of these activities and check that the works as built meets all significant environmental requirements before the project is officially accepted. The Client

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should hold some amount of payment tagged to clean up until the Construction Supervision Consultant assures that the works have been done properly.

8.1.5 Post-Construction/Operation Phase

Important activities that are required before the railway becomes operational and during the operation period include:

- provision of awareness creation lessons for the local communities in villages, town and schools along the railroad concerning safety issues including about use of pedestrian/ animal crossing structures, prohibited sections of the railway or prohibited actions like crossing across the risky sections of the railway,
- provision of appropriate safety facilities/signs at appropriate locations or intervals,
- Checking that all the recommended/designed pedestrian crossings are properly implemented and proved that they are appropriate and effective for the intended users/ people and/or animals, and
- Routine and periodic monitoring of the proper functioning of pedestrian crossings and safety facilities, any failures and maintenance requirements, any severance of economic or social activities, effects on land use, and environmental issues like drainage, erosion, siltation, slope stability etc.

Table 8.1 presents detailed environmental management measures to be taken with regard to the control of the potential environmental and social impacts, which might arise during the pre-construction, construction and operational phases of the project. It also indicates who will be responsible for taking the necessary management actions and allocation of costs.

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Table 8.1: Detailed Environmental Management Plan

S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
I	**Detailed Design Phase**						
1	Inclusion of environmental clauses in the contract document	Not applic-able (NA)	• Ensure that detail engineering design incorporates features to minimize adverse environmental impacts • Ensure that construction contract document contains appropriate clauses to allow control of environmental impacts of project activities.	During engineeri ng design	Design Consultant	ERC	Part of the design consultancy cost
2	Compliance of the EIA report with Government and financer's safeguard policies & EIA guidelines	NA	• Ensuring that government and funding agency requirements relating to EIA are complied with	As above	As above	As above	As above
3	Consideration and incorporation of EIA recommendations into the design	NA	• Design team thoroughly understand the recommendations made in the EIA study and incorporate necessary improvements in the final engineering design and tender document	As above	As above	ERC through evaluation team or panel of experts	As above

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
4	Loss of land under various uses and impacts on land use	High	• Design viaducts for the sections that require excessively high embankment fill and tunnels for the sections that require very deep cut. • Design retaining walls for the sections that require high embankment fill thereby to reduce width of RoW and loss of land under agricultural or other uses. • Design appropriate pedestrian/ animal crossings to allow easy and safe movements of pedestrians and animals across the railway for agricultural and other activities. • Design culverts and side-drains in such a way that they will not release runoff or flood water onto agricultural lands.	As above	As above	As above	As above
5	Impacts on soil and drainage systems	Moder ate to High	• Design effective drainage structures such as paved side-ditches, diversion drains, check dams, culverts and sufficient turnouts to reduce the concentration of water flows, erosion and scouring along or downstream of the railway. • Avoid designing of culverts and side-drains in such a way that they would release runoff or flood water onto slopes vulnerable to erosion, for unavoidable cases, provide erosion/scour protection structures.	During engineeri ng design	Design Consultant	ERC	Part of the design consultancy cost

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
6	Impacts on landscape quality and slope stability	Moderat e to High	• Design viaducts for the sections that require extremely high embankment fill and tunnels for the sections that requires very deep cut to reduce damaging of landscape quality and possible slope instability problem, excessive use of borrows and natural aggregates, and generation of spoil materials from the deep cut and high fill sections. • Design retaining structures like retaining walls and gabions for the sections vulnerable to slope instability problem.	As above	As above	As above	As above
7	Disruption of existing roads/tracks and creation of obstruction to human, animals and vehicular traffic	High	• Design appropriate under or over passage crossing structures at the existing roads and tracks and at additional locations to allow easy/free and safe movements of people and animals across the railway. • Design viaducts for the sections that require high embankment fill and tunnels for the sections that require deep cut to allow free and safe human and animal movements under the viaducts and over the tunnels.	As above	As above	As above	As above
II	**Pre-Construction Phase**						
1	Loss of land under various uses and impacts on land use	High	• Payment of fair cash compensation for loss of farmlands and grazing areas according to relevant government laws and regulations.	During preparation for construction	ERC through Compensatio n Committee (CC)	Woreda Administratio n & EPLAUO	To be included in RAP

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
2	Impacts on cultural heritage sites		• If safeguarding the potentially affected mosques and cemeteries around km 62 – 63 was not possible, consulting with the local community and religious leaders and relocating the properties at safe places.	Prior to start of construction works	ERC with CC & Woreda Culture & Tourism Off.	Woreda Culture & Tourism Office	As above
III	**Construction Phase**						
1	Loss of land under various uses and impacts on land use	High	• Construct viaducts for the sections that require excessively high embankment fill and tunnels for the sections that require very deep cut. • Build retaining walls for the sections that require high embankment fill thereby to reduce width of RoW and loss of land under agricultural or other uses. • Construct appropriate pedestrian/ animal crossings that will allow easy and safe movements of pedestrians and animals across the railway. • Construct culverts and side-drains in such a way that they will not release runoff or flood water onto agricultural lands. • Avoid side-tipping of excavation/spoil materials onto adjacent agricultural lands and grazing areas. • Restore campsites, materials processing plants sites, borrow areas and access roads to productive state.	During construction	Construction Contractor	Resident Engineer (RE) & Environmentalist Inspector (EI) of the CSC	Part of the Construction Contractor's contract

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S. No	Environmental/ Social issue/ impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
2	Impacts on soils (soil erosion, compaction & pollution)	Moder ate to High	• Execute potentially impacting activities like land clearing, excavation in soil and earthmoving works during the dry season thereby reducing soil erosion and soil compaction. • Limit land acquisition and construction works to the imperative area necessary for the project. • Construct effective drainage structures like paved side-ditches, diversion drains, check dams, culverts and sufficient turnouts to reduce the concentration of water flows, erosion and scouring along or downstream of the railway. • Reduce the time surface remains bare after completion of works and implement grassing or planting of vegetation immediately following the completion of the works. • Avoid construction of culverts and side-drains in such a way that they would release runoff or flood water onto slopes vulnerable to erosion, for unavoidable cases, provide erosion/scour protection structures.	During construction	Construction Contractor	RE & EI	Costs of physical erosion control structures to be included in the engineering cost estimate; others will be part of the Contractor's contract
			• Plant appropriate plant species (grasses, shrubs and/or trees) on erosion-prone slopes such as cut and fill slopes and other disturbed or exposed surfaces. • Prevent contamination of the soil by oil, fuel, used oil, etc. through regular maintenance and serving of vehicles & equipment, proper storage of hazardous substances and proper disposal of used oils.	During construction & after completion construction works	Construction Contractor	RE & EI	2,677,500.00 for grassing of embankment slopes, cut slopes etc.

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
3	Disfiguring of landscape/ impacts on landscape quality and slope stability	Moderat e to High	• Build viaducts for the sections that require extremely high embankment fill and tunnels for the sections that require very deep cut to reduce damaging of landscape quality and possible slope instability problem, etc. • Construct retaining structures like retaining walls and gabions for the sections vulnerable to slope instability problem to reinforce the resisting forces.	Throughout construction phase & upon completion works	Construction Contractor	RE & EI	To be included in the engineering cost estimate.
			• Properly compact embankment slopes, and spread the fill slopes and cut slopes with topsoil and establish grasses by seeding or planting grass strips of appropriate species.	As above	Construction Contractor	RE & EI	Part of the Contractor's contract plus given under item 2 above
			• Avoid disposal of surplus materials excavated from deep cut sections, tunnels etc. on down-slope or in adjacent areas by reusing it in the construction of embankment or in restoration of borrow and quarry sites, or by depositing it at approved dumping sites and by landscaping and establishing appropriate vegetation. • Preserve and use excess or unsuitable excavation materials for back-filling of borrow sites and quarries. • Restore borrow sites and quarries to the extent possible. • Control surface water infiltration by providing adequate side-, interceptor- & diversion- drains, and culverts.	Throughout construction phase & upon completion construction works	As above	As above	Part of the Contractor's contract, and 2,000,000.0 0 for reinstateme nt of borrow and quarry sites

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
4	Impacts on water resources (increased sedimentation, channel modification and water pollution risks)	Moder ate to High	• Construct culverts and pipes that have adequate openings to pass the design flood to minimize flooding, scouring or erosion downstream of the structures. • Execute the potentially impacting construction works during the dry season when river flows are minimal or non-existent. • Avoid disposal of surplus excavation materials on river banks or in river courses by depositing it only at approved disposal sites. • Proper handling of hazardous substances (oils, fuel, used oil etc.) to avoid water pollution by spillages. • Avoid leakages from vehicles and construction equipment by regular and effective maintenance. • Locate site facilities (camps, fuel storage etc.) at sufficient distance (min. 2km) from water bodies or community water supply sources. • Provide satisfactory disposal of solid and liquid wastes generated by construction camps. • Avoid disposal of used oils in the field, by strictly controlling waste disposal process through use of only approved waste disposal and recycling techniques.	Throughout construction phase	Construction Contractor	RE & EI	Part of the Contractor's contract
5	Impacts on community water supply sources like damaging of existing sources, competition for	Moder ate	• Avoid withdrawal of water for the project requirements from water sources used by the local communities unless its adequacy is approved by w. water offices local authorities.	Throughout construction phase	Construction Contractor	RE, EI, and Woreda Water Offices	The cost of water supply for the project

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
	project requirements and contamination by hazardous substances & wastewater from camps		• Develop alternative water sources for any existing water supply sources affected by the project activities. • Other measures given above (item no. 4, bullets 4 – 8).				requirements is part of the construction cost
6	Impacts on irrigation water conveyance structures	Low	• Replace the irrigation canals affected by the project activities by appropriate structures as soon as possible in order to let an uninterrupted flow of irrigation water.	During construction	Construction Contractor	RE, EI, W. Water Res. Office	To be included in engineering cost estimate
7	Air and noise Pollution	High	• Limit traffic speeds and apply water regularly on dusty roads. • Use modern and well-maintained equipment (with mufflers). • Regular maintenance of diesel powered machinery, vehicles and emission intensive plants to reduce excessive exhaust emissions. • Locate the aggregate production plants and concrete mixing plants at a min. distance of 2km from any sensitive receptors (residential areas, religious places, health units, schools, drinking water supply sources etc.). • Comply to health and safety standards pertaining to noise and emissions. • Implement well-designed traffic management plan that considers traffic safety and working hours for materials transport. • Carry out noisy construction activities during normal working hours.	Throughout construction phase	Construction Contractor	CSC/RE	Part of the Contractor's contract/ obligations

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
			• Inform local people in advance when there will be blasting or unusual unavoidable noises. • Avoid burning of materials such as tiers, plastic, rubber products or other materials that create heavy smock or nuisance odour. • Avoiding disposing of any volatile chemicals to the air.				
8	Impacts on natural vegetation and flora including damaging of part of Faji PF, loss of remnant indigenous trees and patches of bushes and shrubs	Mode-rate	• Limit land take and land clearing/earthworks to the area absolutely necessary for the project. • Avoid locating/selecting quarries, borrow pits, access roads, construction camps and materials processing plants in areas, which have significant vegetation or trees cover. • Avoid disposal of spoil/excess excavation materials on down-slope or in adjacent areas where it will affect vegetation/trees. • Create awareness for construction workforce, not to cut trees for any purpose without prior approval of Environmental Supervisor and Woreda Environmental Protection & Land Administration Office/Forestry Department of ARDO.	Throughout construction phase and following completion of works	Construction Contractor	RE & EI	Part of Contractor's contract
			• Implement replanting of appropriate tree species at areas affected due to temporary activities (campsites, materials processing sites, access roads, borrow sites etc.), along the railway and at other places to be	During and after completion of	Construction Contractor	EI & Woreda EPLAO/ Forestry Dept of	2,000,000.00

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
			recommended by the concerned local office(s) or environmental/natural resources conservation experts; plant at least 200,000 seedlings and manage until it establishes well.	construction works		ARDO of affected woredas	
9	Impacts on wildlife habitats and fauna	Low	• Apply good site practices incorporating appropriate mitigation measures that reduce nuisance noise levels. • Post appropriate signs and apply speed limits for the sections passing through important wildlife areas especially in the Fajl PF by setting speed limits to safe levels. • Strictly forbid hunting and trapping of wild animals by the project workers, and animal killings. • Strictly prohibit unnecessary destruction of habitats, cutting of trees or vegetation found outside the area absolutely needed for the project. • Increase the awareness of drivers and equipment operators towards wildlife conservation and encourage them to avoid or minimise animal fatalities. • Implement restoration of affected areas through artificial landscaping and replanting of trees.	Throughout construction period	Construction Contractor	RE & EI	Part of Contractor's contract and 10,000 for installing warning signs in important wildlife areas.
10	Impacts on cultural heritage sites	Moder ate	• Design & construct a tunnel for the section km 61.30 - 64.00 where mosques, cemeteries, villages and existing access road will be affected.	During engineering design & construction	Design Consultant & Contractor	ERC & CSC/RE	Part of engineering cost estimate

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
			• At sections nearby religious sites, avoid activities producing excessive noise levels during the time when spiritual programs are underway. • In the event of accidental discovery of any archaeological remains or properties of cultural value, immediately halt works and notify the Resident Engineer and protect and keep same intact until the relevant authority takes delivery thereof.	Throughout construction phase	Construction Contractor	RE & EI	Part of Contractor's obligations
11	Disruption of existing roads/tracks and creation of obstruction to human, animals and vehicular traffic	High	• Construct appropriate under or over passage crossing structures at the existing roads and tracks and at additional locations to allow easy/free and safe movements of people and animals, but some of which will also be for motorized traffic. • Construct viaducts for the sections that require high embankment fill and tunnels for the sections that require deep cut to allow free and safe human and animal movements under the viaducts and over the tunnels. • For the bridges and viaducts over major rivers or at elevated stretches, provide appropriate facility for the passage alongside each river or deep crossing points for pedestrians and animals beneath the railway. • Fence the highly risky sections of the railway like the deep cut sections, deep borrow & quarry sites for safety reasons.	Before start of construction & construction	Construction Contractor	RE & EI	To be included in engineering cost estimate & part of Contractor's obligations

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
			• Provide appropriate information about the locations of risky areas like construction sites, borrow pits and quarries, materials storage and processing sites, and access routes to potentially affected local communities prior to the beginning of any works. • Strictly prohibit risky areas for safety reasons, e.g. deep cut and high fill sections, rock-blasting sites, borrow pits and quarries, and materials storage and processing places.				
12	Safety issues related to operation of construction vehicles and equipment, blasting activities , and operation of quarries and borrow pits	Moder ate to High	• Provide necessary information such as speed limits, direction, hazard locations, sensitive sites (e.g. schools, villages, animal crossing paths etc.) by putting appropriate signals and hazard markings. • Provide awareness trainings for drivers and equipment operators in traffic safety measures. • During access routes selection, avoid sensitive sites like villages, prime livestock grazing areas, schools etc. to the extent possible. • Assign traffic regulators or traffic police to control traffic flows at critical sections or periods where/when traffic safety is a serious issue, • Establish speed limits and control construction vehicles and discipline for the drivers, and • Provide appropriate information on the location of risky areas to potentially affected local communities and prohibit such areas for safety reasons, examples of such areas - working sites esp. the deep cut and high fill sections, borrow pits and quarries, rock blasting sites, and materials storage and processing places.	During preparation for construction and throughout construction period	Construction Contractor	RE & EI	Part of Contractor's obligations

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
13	Impacts of construction camps and immigrant workers	Moder ate to High	• Proper siting and management of camps, and restoration of the sites to meld with the surrounding environment as soon as the construction works are completed, • Keep appropriation of land for camps to the absolute minimum and effect suitable compensation for the affected land owners, • Proper reinstatement of access roads to campsites by removing the pavement materials, ripping and spreading, • Proper disposal of solid and liquid wastes generated by the camps and facilities and maintenance of the environmental sanitation of the campsites in good condition, • Maintenance of proper management and discipline in the camps, • Avoid sitting camps and other facilities at ecologically or socially sensitive areas, e.g. in or nearby Faji Forest, at areas containing important indigenous trees, near rivers, streams and lake, near settlements, villages or religious sites, in prime agricultural lands, etc. • Avoid overloading of existing facilities like potable water supply and health care by developing independent water sources for camp requirements, establishing onsite clinic for the project workers, and provide garbage disposal facilities at campsites.	During site establishment, throughout construction period & when use of the campsites is ceased	Construction Contractor	RE, EI & Local Authorities	Part of the Contractor's obligations

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
14	HIV/AIDS prevention	High	• Provide health education mainly focusing on the HIV transmission and prevention. • Avoid discrimination in work places due to HIV/AIDS and provide counseling service. • Provide free counseling and distribute condoms & leaflets to workforce and vulnerable group of nearby communities.	Throughout construction period	NGO involved in such activities in colleboratio n with the WHOs	Social Expert of the CSC in collabo-ration with Woreda Health Offices (WHOs)	1,500,000 Birr (for subcontracti ng the activities)
15	Occupational health and safety issues	High	• Store any explosives and chemicals in a safe place and make notification during blasting activities • Distribute goggles, helmets and other masks for the workers who directly involved in construction works such as excavations, use of explosives, stone crashing and other similer activities, • Minimize dust emission by watering the road during construction, • Provide first-aid and clinics in the work places and main construction camps, • Put visible and appropriate warning signs on the road during road construction including speed limits, • Provide education to personnel of the contractor about safety procedures and emergency response plans associated with their task.	Throughout construction period	Construction contractor	Sociologist of the CSC in collaboration with Woreda Health Offices and Traffic Police	Part of the Contractor's obligations

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
16	Uncertainties in impact assessment regarding Contractor's campsites, construction materials sources and spoil disposal areas, their extent and the actual methods of operation	Moder ate	• Prepare detailed Site Environmental Plans (SEPs) prior to commencement of any site development, and execute all works at the sites in accordance with the plans. The SEPs should address all matters relevant to environmental protection and the minimization of impacts.	During preparation for construction	Construction Contractor	RE & EI	Part of the Contractor's obligations
			• Identify potential environmental issues when the sites are selected and propose mitigation measures.	As above & during construction	Environmen talist of the Contractor	EI	As above
IV	**Commissioning Phase**						
1	Impacts from salvages, wastes, unused construction materials, un-reinstated quarries borrow areas and access roads, and spoil disposal sites	High	• Rehabilitate quarry, borrow areas and access roads, and drain if any water is impounded	Before termi-nation of contract period	Construction Contractor	RE & EI	Part of the Contractor's obligations
			• Clean all the salvages and waste materials from the construction process and campsites and damp in an appropriate and authorized places • Remove all the temporary camps and restore the site to productive state so that the land continues giving services, which were discontinued due to the project. • Check that the work as built meets all significant environmental requirements before the project is officially accepted.	Before termination of contract period	As above	RE, EI & Woreda LAEPO	As above

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S. No	Environmental/ Social Issue/ Impact	Significance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
2	Safety risks along deep cut sections	Moderate to High	• Fence the highly risky sections of the railway like the deep cut sections and deep borrow and quarry sites that could not be rehabilitated.	Before taking the railway into operation	Construction Contractor	RE & EI	To be included in engineering cost estimate
			• Provide awareness education about safety issues for local communities at villages and schools along the railway.	As above	ERC, Local Traffic Police	Woreda LAEPOs	20,000.00
V	**Operation Phase**						
1	Siltation of drainage structures (culverts & pipes) and embankments	High	• Follow up of the risk/rate of siltation in culverts, side drains, diversion drains etc. and implement de-silting program.	Once per year after rainy season	ERC	Woreda LAEPOs	Part of the operation and maintenance cost
			• Implement catchment rehabilitation measures through soil and water conservation practices in the catchments that have high sediment yields.	As proposed by WARDO/ WNRDCO	WARDO/ WNRDCO	ERC & WLAEPO	1,000,000
2	Railroad and traffic safety issues/accident risks related to operation of trains on the railroad	Moderate	• Monitor the effectiveness of the installed safety measures like pedestrian crossings and nay failures of the structures. • Monitor accident risks/rates. • Provide awareness education about traffic safety issues for local communities.	Quarterly or as necessary	ERC, Local Traffic Police	Woreda Health Offices	Part of the operation cost

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S. No	Environmental/ Social Issue/ Impact	Signifi -cance	Main Mitigation Measures/ Management Activities	Timing of Execution	Executing Body	Supervising Body	Cost Estimate (Birr)
3	Erosion, scour or siltation problems, failure of drainage structures or environmental mitigation structures		• Conduct periodic monitoring of the installed drainage structures and drainage conditions long the railway. • Conduct periodic monitoring of the rate of erosion and siltation problems and implement maintenance of erosion/ silt control structures and de-silting activities as necessary.	Once per year preferably after the main rainy season	ERC	Woreda LAEPOs	Part of the road operation and maintenanc e cost
			Sub-total of Environmental Mitigation and Management Costs[1]				**9,207,500.00**

[1]This cost does not include the RAP cost & the cost of engineering/physical structures that are considered as part of the engineering cost.

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8.2 Environmental Monitoring Plan

It is important to have a well-planned environmental monitoring program for both the implementation as well as operation phases of the project. Environmental monitoring is required to ensure the proper implementation of the proposed environmental mitigation plan. It helps to detect the scale and extent of impacts caused by the project activities over time and to assess whether mitigation actions have been properly and timely implemented and are working effectively. Monitoring of environmental parameters will identify potential problems from the railroad construction and operation activities and will allow for prompt implementation of effective corrective measures.

The environmental monitoring program must cover the following major issues, but may not be limited to:

- land acquisition for the project requirements and rehabilitation measures after completion of works,
- site selection/location of material sources and their operation and hauling condition,
- site selection, establishment and operation of contractor's site facilities,
- handling of productive soils - proper preservation of topsoil cut from the railway alignment, campsites, materials sources etc. and its reuse in reinstatement of campsites, access roads, quarries and borrow sites etc.
- extent of soil/excavation materials exposure to erosion and rate of soil erosion and siltation,
- drainage, water pollution, and impacts on existing irrigation structures,
- impacts on human water supply systems and competition for water,
- spoil or excess excavation materials disposal condition,
- management or disposal of wastes generated from campsites, workshops/garages, used oils etc.,
- impacts on Faji PF and remnant indigenous trees and mitigation measure taken,
- extent of impacts on existing roads and tracks and human and animal mobility,
- traffic and pedestrian safety issues, and
- wastes (generated by workers camps, garages, used oils etc.) management or disposal.

During the construction phase, the results of monitoring should be reported, clearly addressing any specific concerns/issues quarterly to the ERC, Federal EPA/delegated Authority, and Land Administration and Environmental Protection Office of the Woredas/Zones affected by the project. The Environmental Inspector (EI) shall work closely with the Resident Engineer (RE) in order ensure that the construction works are according the contract obligations of environmental protection measures. The RE oversees that the technical specifications are met during construction while the EI monitors internally the implementation of the EMP on site. It is recommended that the EI shall compile the monitoring results concerning environmental mitigation and management activities. The quarterly report may comprise the following issues, but not limited to:

- Results or status on implementation of the environmental management actions by the Contractor in the specific period,
- A description of any environmental accident or developments which could potentially develop into a non-conformance event by the Contractor,
- A description of exceptional conditions on site whether they be meteorological, personnel related, machinery related, or otherwise stipulated,
- Minutes of meetings, if any, with stakeholders on any outstanding issues related to the railway construction works, and
- Proposed solutions for any outstanding/unforeseen issues/impacts detected during the monitoring.

After evaluating the monitoring results and the proposed solutions for unforeseen issues, EPA and Woreda/Zone LAEPOs may approve the proposed solutions or may propose other appropriate solutions. After obtaining the feedback from ERC, EPA and/or the Woreda/Zone LAEPO, the RE & EI will enforce the Contractor or other responsible body to implement the recommended solutions.

External monitoring can be carried out by representative experts from each Woreda/Zone LAEPO, Health Office and Woreda Administration Office. Such monitoring can also be carried out intermittently by the project financing agency, if any.

During the operation period, the institutions or bodies assigned for monitoring should report the results to ERC as per the monitoring requirements together with proposed solutions for any outstanding issues. Then, ERC reports to EPA, and the ERC/ EPA may approve the solutions proposed by the monitoring organizations or propose other suitable solutions. The proposed environmental monitoring plan (EMP) is provided in Table 8.2 below.

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Table 8.2: Environmental Monitoring plan

Ser. No	Environmental/ Social issues	Indicators/Parameters to be Measured/ Monitored	Location/Project Component	Frequency/Timing of Monitoring	Responsible body	Cost Estimate in Birr
I	**Preparation for Construction Phase**					
1	Inclusion of environmental mitigation measures in the contract documents	Check whether mitigation and enhancement measures are properly included in the contract documents	At ERC head office	Once during the document evaluation	ERC	Part of the routine activities of the ERC
2	Displacement of people and loss of properties	Number of complaints from the affected people	Hara town, villages and other settlements along the rail line	Once before the start of the construction work	A team comprises of representatives from each Woreda LAEPO	25,000 (daily allowance for Woreda experts & transport cost)
II	**Construction phase**					
1	Loss of land and impacts on use due to land take for the railway RoW, access roads, quarries and borrow sites, campsites, etc.	Area of productive land affected and number of households lost their land	Along the project alignment and access roads, at campsites, quarry and borrow sites etc.	Once per year	A team of two experts from Woreda LAEPO	50,000 (daily allowance experts & transport cost)
2	Soil erosion	Area exposed to erosion and incidence of erosion	Cut and fill slopes, areas exposed due to land clearing/ excavations in soils, and access roadsides,	Twice per year	EI of the CSC and Representative from each Woreda LAEPOs	The transport & EI expenses will be covered as part of the construction supervision cost; 20,000.00 for per diem LAEPO's expert.
3	Slope stability & river bank erosion	• Areas/sections vulnerable to slope failures, • Riverbanks vulnerable to erosion or slope failures	Cut and fill slopes, river crossing points of the railway & riverbanks close to the railway route	Twice per year	As above	Can be done at the same time with the above activities without additional cost

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Ser. No	Environmental/ Social issues	Indicators/Parameters to be Measured/ Monitored	Location/Project Component	Frequency/Timing of Monitoring	Responsible body	Cost Estimate in Birr
4	Disposal of construction spoils	• Number of spoil disposal sites properly located and managed, • Number of unauthorized spoil disposal sites	Sites used for disposal of spoil materials generated by the railway project	Twice per year	As above	As above
5	Loss of forestland/ natural vegetation and indigenous trees	• Area of forestland/natural vegetation esp. affected, • Number of indigenous trees fallen, • Number of tree seedlings raised, planted and number survived or well established	• Faji PF (km 29.40 – 31.35) & other sections indicated in sect. 6.4.1, • Esp. around km 45 – 54 & km 58 – 64. • Along the railway & at areas proposed for tree planting	Twice per year	As above	As above
6	Impacts on water quality by construction activities and disposal of wastes from campsites and construction areas	Water quality parameters such as EC, pH, TDS, Turbidity, oil, grease, petrol and diesel leakages	Major rivers (like Mille, Gelana, Chireti & Alawuha), Hara Beni Lake (~km 67) and wells along the project route	Once before construction, 2 times per year during construction and once after the completion of construction	Water quality expert from Zonal Water Department	200,000 [7] (cost of water samples analysis, per diem for 3 experts & transport cost).

[7] It is assumed for10 water samples at a time; once before start of construction, 4 years construction period & 2 times/year, once after completion of works; cost of analysis at 500 Birr per sample; 5 days for one sampling period; Per diem rate at 200 Birr/day/expert, i.e. total of 3000 Birr for 3 experts per sampling period, and transport cost (car rent & fuel) = 11,0000.

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Ser. No	Environmental/ Social issues	Indicators/Parameters to be Measured/ Monitored	Location/Project Component	Frequency/Timing of Monitoring	Responsible body	Cost Estimate in Birr
7	Safety issues related to operation of construction vehicles and equipment, blasting activities , and operation of quarries and borrow pits	• Number of work places furnished with safety facilities, site traffic management plan etc. • Number of accidents occurred, life lost, properties affected, their causes etc.	Active construction sites along the rail line, access roads, quarry & borrow sites, materials processing & storage sites	Every three months (quarterly)	EI and two policemen from each project affected Woreda	Transport cost & EI's expenses will be covered as part of the Construction Supervision cost; 40,000.00 for daily allowance for the policemen
8	Health condition of the people in the project area and status of HIV/AIDS	Overall health and sanitation situation of the project area including construction camps	Construction campsites, working areas and nearby towns & villages	Twice per year	Two representatives from each Woreda Health Office	80,000.00 (daily allowance for experts & transport cost)
III	**Construction Completion Phase**					
1	Aesthetic value and landscape	Un-rehabilitated areas and leftovers	Throughout the project area	Once for 5 days before officially termination of construction contract	A team comprising of a representative from each Woreda Administration, Woreda LAEPO, EI of the CSC & a representative from ERC	40,000.00 (daily allowance for experts and transport cost)
2	Pedestrian/animal/ vehicular traffic mobility across the railway	• Number of pedestrian/ animal/vehicular traffic crossings (under passage/over passage) provided and their appropriateness,	At existing roads/ tracks and additional locations recommended in this EIA or by local communities or authorities	As above	Can be done by the above indicated team at the same time	Can be done by the above indicated team without additional cost

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Ser. No	Environmental/ Social issues	Indicators/Parameters to be Measured/ Monitored	Location/Project Component	Frequency/Timing of Monitoring	Responsible body	Cost Estimate in Birr
		• Number of complaints from local communities concerning the crossings or mobility across the railway				
IV	**Operation phase**					
1	Erosion, slope stability & sedimentation/ siltation issues of drainage structures, loss of traffic signals, sight distance issues and roadside weeds	• Surface area, length or number of sites affected by erosion, siltation or slope failures, • Number & type of drainage structures silted up or blocked by siltation or affected by erosion, etc.	• Cut and fill slopes, areas/surfaces that have been exposed or disturbed by the project, • River crossing points, side ditches, diversion drains	Once per year after the main rainy season	Operation and Maintenance Department of ERC	Part of routine works
2	Pedestrian/animal/ vehicular traffic mobility across the railway and traffic safety issues	• Number of crossing structures effectively used for the intended purpose, • Number of crossing structures that require maintenance, de-siliting etc. • Number of accidents occurred, life lost and properties affected	• Stations of pedestrian/ animal/ vehicular crossing structures, • Stretches or spots where people and/or animals may tend to move across the railway.	Once per year	Operation and Maintenance Department of ERC, Woreda Rural Roads Office & Local Traffic Police	Part of routine works
					Sub-Total Cost	**455,000**

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8.3 Environmental Mitigation, Management and Monitoring Cost Estimate

The majority of the environmental mitigation and management measures recommended in the Chapter 6 and Chapter 8 will not entail separate costs since they are engineering features, good engineering practices, or good housekeeping matters, which will be part of the Contractor's construction items. They can be implemented following proper organization/ planning of works and construction methods, which shall be specified in the tender document, technical specifications and construction contract documents.

Several of the mitigation measures specified in this EIA document shall be incorporated in the engineering design and included in the BOQ and contract documents for the Contractor. Others will be included in environmental clauses that will be part of contract documents for the Contractor.

The mitigation measures that may have separate cost items can include the following:

- Bioengineering measures including grassing of cut slopes, embankment slopes, and other erosion prone areas to stabilize slopes, prevent erosion and improve the visual quality of the impacted landscape,
- Planting of trees and shrubs to replace or compensate for trees and other vegetation removed or to reduce erosion, stabilize slopes and/or improve the visual quality of areas impacted by project activities,
- Reinstatement of borrow pits and quarry sites, campsites, materials processing and storage sites,
- Awareness creation programs on safety and public health issues for the local community to minimize accidents related to construction activities, vehicular movements (traffic safety hazards), pedestrian/animal movements across the rail line and risks due to spreading of sexually transmitted diseases, and
- Environmental supervision and monitoring activities.

Indicative cost estimates for the above outlined environmental mitigation measures are given in Table 8-3 below, while the major costs related to physical construction works are referred to be included in the engineering design cost estimates. The costs related compensation of agricultural lands and properties like housing units, fences, public utilities, private plantation trees are considered to be part of the Resettlement Action Plan (RAP) and these costs would be worked out separately. The environmental mitigation, management and monitoring costs are estimated to be around 11.3 Million Birr.

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Table 8-3: Environmental Mitigation, Management and Monitoring Costs Estimate

Item No	Description of Activities	Unit	Quantity (recommended/ estimated)	Unit Cost (Eth. Birr)	Total Amount (Eth. Birr)
1	**Bio-engineering measures**				
1.1	Grassing of cut slopes, embankment slopes, and other erosion prone areas	Ha	15	178,500.00	2,677,500.00
2	**Site restoration and artificial landscaping**				
2.1	Reinstatement of quarry & borrow pits through backfilling, landscaping & establishment of vegetation		Lump sum		2,000,000.00
3	**Biological mitigation and catchment rehabilitation measures**				
3.1	Replanting trees to replace trees removed or as compensation for vegetation lost	No.	200,000	10	2,000,000.00
3.2	Catchment rehabilitation through soil and water conservation practices to reduce erosion and sediment yields	Lump Sum			1,000,000.00
3.3	Installation of warning signs and posters in important wildlife areas to create awareness about wildlife conservation and minimize impacts	Lump Sum			10,000.00
4	**Public health and traffic safety measures**				
4.1	Awareness creation & provision of protectives for prevention of HIV/AIDS, other STDs and safety issues		Lump sum		1,020,000.00
5	**Environmental monitoring**				
5.1	Assigning Environmentalist (part of internal monitoring cost)	Man-month	6	40,000	240,000.00
5.2	External environmental monitoring costs	Lump Sum			455,000.00
	Total				**9,402,500.00**
	Contingency (20%)				1,880,500.00
	Grand Total				**11,283,000.00**

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9. CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

The assessment of potential environmental impacts is based on the project location and the proposed project activities as described in Chapter 2. The assessment acknowledges that the construction and operation of the Hayik – Robit Railway will bring positive as well as negative environmental and social impacts. The key positive environmental effects will be reduction of air pollution and effects on climate that would have been caused by using the road transport in supporting the increasing mobility demands for passengers and freight. The railway project will support the local as well as national socio-economic development by meeting the increasing mobility demands for passengers and freight in much more efficient and economical way compared to the road transport. Other potential socio-economic benefits of the project include creation of job opportunities and income generation for the unemployed people, creation of easy outlet for agricultural products to market centers at lower transportation costs and boosting of trade activities.

Conversely, implementation of the proposed railway project is expected to bring a number of undesirable environmental and social impacts, most of which will occur during the construction phase. Most of the significant potential impacts are related to project location, land acquisition for the rail right-of-way requirement and for construction material sources, the rail construction activities (esp. deep cutting and high embankment filling works), installation of drainage structures, extraction, haulage and processing of construction materials, opening and use of access roads, establishment of construction camps, and disposal of spoil or excess excavation materials. Considering the location and scale of the project, the potential impacts are not unexpected ones, but they need due attention and corresponding mitigation measures.

The potential impacts/issues that will require particular attention and mitigation include loss of agricultural lands, erosion, siltation/sedimentation, slope instability, disfiguring of landscape, disruption of existing roads/tracks and obstruction of pedestrian/animal/vehicular movements, and safety concerns. Other significant issues include air and noise pollution, soil and water contamination by pollutants, loss of natural vegetation and habitats (esp. part of the Faji PF) and remnant indigenous trees, impacts on private and cultural properties (housing units, mosques and cemeteries), and public health concerns esp. spreading of HIV/AIDS. Some of the potential impacts including land take for the RoW, alteration of the landscape and prevention of pedestrian/animal/vehicular movements along deep cut and high embankment fill sections and at quarries and borrow pits, loss of vegetation and safety issues will be long-term or permanent impacts, and these impacts require particular mitigation or compensation measures. Others are temporary/short-term impacts that will mainly occur during the construction phase, but require appropriate environmental or social mitigation measures to reduce them to acceptable levels.

In summary, the impact assessment has identified a number of significant environmental and social issues that need due attention and particular mitigation measures. Nonetheless, the assessment did not identify any severe environmental or social issue that will prevent the proposed railroad project from proceeding to the implementation stage provided the mitigation measures recommended in this EIA document are properly considered. It is expected that all potential negative impacts identified in this EIA study could be mitigated or compensated to reduce severity and significance to lower levels through good engineering design and good construction methods, as well as through implementation of appropriate environmental and social mitigation measures.

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10.2 Recommendations

For all significant impacts/issues identified in this EIA, corresponding mitigation or compensation measures are recommended in Chapter 6 and summarized in Chapter 8 in the form of environmental management plan (EMP). To ensure implementation, the recommended mitigation measures shall be included in the engineering design or in the tender documentation, either as contract and/or special technical specification clauses. In addition, adequate budget shall be allocated for the mitigation and management actions not included in the obligations of the Contractor and the Construction Supervision Consultant, and necessary institutional/specialist arrangement is made for their implementation before the commencement of the construction works. Further, a well-planned monitoring programme should be instituted in order to follow up the proper implementation of the EIA recommendations and their effectiveness, as well as to monitor incidence of any unforeseen issues.

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APPENDICES

Appendix 1: List of Consulted Persons and Organizations

No	Name	Position and Organization	Date
I	**Tehuledere Woreda**		
1	Ato Seid Eshetu	Head, Tehuledere Woreda Administration Office.	22 & 29/ 12/10
2	Ato Demeke Beyene	Plan Preparation and Follow up Expert, Tehuledere Woreda Finance & Economic Development Office.	29/12/2010
3	Ato Yimer Getahun	Community Problems & Needs Assessment Expert, Tehuledere Woreda Agriculture & Rural Devt Office.	29/12/2010
4	Ato Gashaw Mohamed	Agriculture Early Warning Expert, Tehuledere Woreda Agriculture & Rural Devt Office.	29/12/2010
5	Ato Maereg Wondimnew	Water Quality Expert, Tehuledere Woreda Water Resources Development Office.	29/12/2010
6	Ato Endris Kassaw	Head, Tehuledere Woreda Health Office.	29/12/2010
7	Ato Seid Ahmed	Mothers & Youth Reproductive Health Services Officer, Tehuledere Woreda Health Office.	29/12/2010
8	W/ro Tilanesh Hailu	Data Management & Media Expansion Expert, Tehuledere Woreda Government Communication Office.	29/12/2010
II	**Ambassel Woreda**		
9	Ato Zerihun Gizaw	Chief Administrator, Ambassel Woreda Administration.	29/12/2010
10	" Tadesse Abegaz	Representative Chief Administrator, Ambassel Woreda.	22/12/2010
11	" Getachew Yismaw	Head, Ambassel Woreda Health Office.	24/12/2010
12	" Demis Rafissa	Head, Nutrition and Children's Health Services Officer, Ambassel Woreda Health Office.	24/12/2010
13	" Getachew Agonafir	Head, Ambassel Woreda Culture and Tourism Office	24/12/2010
14	" Tiliksew Alebachew	Tourism Service Expert, Ambassel Woreda Culture and Tourism Office	24/12/2010
15	" Gumataw Ali	Head, Ambassel W. Agriculture & Rural Devt Office.	29/12/2010
16	" Berhan Asfaw	Head, Ambassel Woreda Environmental Protection and Land Administration Office.	29/12/2010
17	" Feleke Firew	Head, Ambassel Woreda Water Resources Devt Office.	29/12/2010
18	" Tesfaye Molla	Coordinator, Ambassel Woreda Petty & Small Scale Trade Activities Coordination Office.	29/12/2010
19	" Fantaw Ali	Guard of Mille Nursery Site of Ambassel W. ARDO.	29/12/2010
20	" Nuriye Hussen	Resident of Kebele 05, Ambassel Woreda.	29/12/2010
III	**Habru Woreda**		
21	Ato Ale Belay	Head, Habru Woreda Administration Office	27/12/2010
22	" Habte Tsegaye	Forestry Management & Utilization Expert, Habru Woreda Agriculture & Rural Development Office (ARDO)	22/12/2010
23	" Hagos Habtu	Natural Resource Expert, Habru Woreda ARDO.	22/12/2010
24	" Aman Senay	Soil & Water Conservation Expert, Habru Woreda ARDO.	22/12/2010

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25	" Alemu Abay	Irrigation Infrastructures Management Expert, Habru Woreda ARDO.	24/12/2010
26	" Tekestebirhan Araya	Irrigation Horticulturalist, Habru Woreda ARDO.	24/12/2010
27	W/rt Ajebnesh Tsegay	Agricultural Technology Transfer and Animal Husbandry and Fodder Expert, Habru Woreda ARDO.	27/12/2010
28	Ato Engidaw Adimasu	Drinking Water Supply Process Owner, Habru Woreda Water Resources Office.	24/12/2010
29	" Mohammed Abdu	Water Quality Officer, Habru W. Water Resources Office.	22/12/2010
30	" Akililu Kelemework	Head. Habru Woreda Culture & Tourism Office	24/12/2010
31	" G/Wahid Amdebirhan	Tourism Service Support & Monitoring Officer, Habru Woreda Culture & Tourism Office.	24/12/2010
32	" Tesfaye Biyadiglign	Head, Habru Woreda Health Office.	24/12/2010
33	" Mohammed Hussen	Nutrition and Children's Health Services Officer, Habru Woreda Health Office.	24/12/2010
34	" Haile Dejene	HIV/AIDS & Other Sexually Transmitted Diseases Prevention Officer, Habru Woreda Health Office.	24/12/2010
35	" Fantahun Endris	Resident of Girana Kebele & Guard of Faji State Forest, Habru W.	25/12/2010
36	" Siraj Hashim	Resident of Ulula Kebele (K. 21), Habru Woreda.	26/12/2010
37	" Worku Getachew	Resident of Wera Lalo Kebele (10 Kebele), Habru W.	27/12/2010
38	" Seid Yassen	Resident of Kule Kebele (05 Kebele), Habru Woreda.	27/12/2010
39	" Amare Eshetu	Resident of Wera Lalo Kebele (10 Kebele), Habru Woreda.	27/12/2010
IV	**Guba Lafto Woreda**		
40	W/ro Alemtsehay Tafere	Deputy Head, Gubalafto Woreda EPLAUO	22/12/2010
41	Ato Haddis Halefom	EIA Expert, Gubalafto Woreda EPLAUO	22/12/2010
42	" Berhanu Abay	Environmental Education Expert, Gubalafto W. EPLAUO	22/12/2010
43	" Kifle Yeshitila	Forestry and Agroforestry Expert, Gubalafto W. ARDO	22/12/2010
44	" Fiseha Gugissa	Soil & Water Conservation Expert, Gubalafto W. ARDO.	22/12/2010
45	" Halefom G/Silasse	Animal Resources & Fodder Expert, Gubalafto W. ARDO.	22/12/2010
46	" Mulata Mengesha	Irrigation Technology Expert, Gubalafto W. ARDO.	23/12/2010
47	W/rt Gidey G/Kidan	Water Harvesting Expert, Gubalafto Woreda ARDO.	23/12/2010
48	W/ro Alemtsehay	Crop Production Expert, Gubalafto Woreda ARDO.	23/12/2010
49	Ato Moges Haile	GIS & Remote Sensing Expert, Gubalafto W. ARDO.	22/12/2010
50	" Zeru G/Mikael	Mothers & Youth Officer, Gubalafto W. Health Office.	22/12/2010
51	" Abera Semahu	Children & Nutrition Officer, Gubalafto W. Health Office.	22/12/2010
52	" Esubalew Teka	HIV/AIDS & Other STDs Officer, Health Care Core Process, Gubalafto W. Health Office.	28/12/2010
53	W/ro Roman Mengiste	Head, Gubalafto Woreda Culture & Tourism Office.	28/12/2010
54	Ato Sisay Mengesha	Chairman, Hara Town Kebele Adm., Gubalafto Woreda.	26/12/2010

55	" Yesouf Ahmed	Manager, Hara Town Kebele Administration Office	26/12/2010
56	" Mohammed Ali	Resident of Sibil Kay Kebele, Guba Lafto Woreda.	26/12/2010
57	" Mengesha Molla	Resident of Doro Gibir Kebele, Guba Lafto Woreda.	28/12/2010
V	**Raya Kobo Woreda**		
58	Ato Kbrom Berhe	Natural Resources Development, Conservation & Utilization (NRDCU) Core Process Owner, Raya Kobo ARDO.	23/12/2010
59	" Bokru Meresa	Land Use Expert, NRDCU Core Process, Raya Kobo ARDO.	23/12/2010
60	" Belay Fantahun	Crop Production Expert, Extension Services Core Process, Raya Kobo ARDO.	23/12/2010
61	" Ashagire Kubi	EIA Expert, Environmental Protection Sustainability Ensuring (EPSE) Core Process, Raya Kobo W. EPLAUO.	23/12/2010
62	" AragawYimam	Environmental Education Expert, EPSE Core Process, Raya Kobo Woreda EPLAUO.	23/12/2010
63	" Demeke Abate	Music Expert, Raya Kobo W. Culture & Tourism Office	23/12/2010
64	" Zeynu Seid	Coordinator, Raya Kobo Woreda HIV/AIDS Prevention and Control Office.	23/12/2010
65	" Meseret Mengesha	Plan Preparation, Monitoring & Evaluation Officer, Raya Kobo Woreda Health Office.	23/12/2010

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Appendix 2: Bird Species found in the Project Area

	Common Name	Scientific Name		Common Name	Scientific Name
1	Helmented Guinea-fowl	*Numida meleagris*	34	Woolly-necked Stork	*Ciconia episcopus*
2	Erckel's Francolin	*Ptemistis erckelli*	35	Marabou Stork	*Leptoptilos crunmeniferus*
3	Speckled Pigeon	*Columba guinea*	36	Yellow-billed Kite	*Milvus aegyptius*
4	White-collared Pigeon	*Columba albitorques*	37	Rufous-crowned Roller	*Coracias naevius*
5	Bruce's Green Pigeon	*Treron waalia*	38	Little Swift	*Apus affinis*
6	Blue-spotted Wood Dove	*Turtar afer*	39	Speckled Mousebird	*Colius striatus*
7	Laughing Dove	*Streptopelia senegalensis*	40	Woodland Kingfish	*Halcyon senegalensis*
8	Ring-necked Dove	*Streptopelia capicola*	41	Striped Kingfish	*Halcyon chelicuti*
9	Red-eyed Dove	*Streptopelia semitorquata*	42	Blue-napped Mousebird	*Urocolius macrourus*
10	African Mourning Dove	*Streptopelia decipiens*	43	Northern Carmine Bee-eater	*Merops nubicus*
11	African Fish-Eagle	*Heliaeetus Nocifer*	44	Little Bee-eater	*Merops pusillus*
12	Black-chested Snake Eagle	*Circaetus pectoralis*	45	Blue breasted Bee-eater	*Merops lafresnayii*
13	Great Cormorant	*Phalacrocorax carbo*	46	Abyssinian Roller	*Coracias abbyssinicus*
14	Long-tailed Cormorant	*P. africanus*	47	Black-billed Wooded-hoopoe	*Phoeniculus somaliensis*
15	Little Bittern	*Ixobrychus minutus*	48	Eurasian Hoopoe	*Upupa epopis*
16	Tawny Eagle	*Aquila rapax*	49	Red-billed Hornbill	*Tockus eythrorhynchus*
17	Long-crested Eagle	*Lophaetus occipitalis*	50	African Grey Hornbill	*Tockus nasutus*
18	African Darter	*Anhinga rufa*	51	Abyssinian Ground- hornbill	*Bucorvus abbyssinicus*
19	Cattle Egret	*Bubulcus ibis*	52	Red-fronted Tinkerbird	*Pogoniulus pusillus*
20	Little Egret	*Egretta garzetta*	53	Black-billed Barbet	Lybius guifsobalito
21	Great Egret	*Egretta alba*	54	Nubican Woodpecker	*Campethera nubica*
22	Yellow-billed Egret	*E. intermedia*	55	Cardinal Woodpecker	*Dendropicus fuscescens*
23	Squacco Heron	*Ardeola ralloides*	56	Red-rumped Swallow	*Cecropsis daurica*
24	Striated Heron	*Butorides striata*	57	Lesser striped Swallow	*Cecropsis abyssinica*
25	Purple Heron	*Ardea purpurea*	58	Jacana	*Actophilornis africanus*
26	Grey Heron	*Ardea cinerea*	59	Common Bulbul	*Pycnonotus barbatus*
27	Black-headed Heron	*A. melanocephala*	60	Abyssinian Black Wheatear	*Oenanthe lugubris*
28	Black-crowned Night Heron	*Nycticorax nycticorax*	61	Mocking Cliff Chat	*Thamnolaea cinamomeiventris*
29	Hamerkop	*Scopus umbretta*	62	Grey-backed Camaroptera	*Camaroptera brachyura*

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30	Sacred ibis	*Threskiornis aethiopicus*	63	African Paradise Flycatcher	*Terpsiphone viridis*
31	Egyptian Goose	*Alopochen aegyptiaca*	64	Scarlet-chested Sunbird	*Chalcomitra senegalensis*
32	Yellow-bill Stork	*Mycteria ibis*	65	Common Fiscal	*Lanius collaris*
33	White Stork	*Ciconia ciconia*	66	Ethiopian Boubou	*Laniarius aethiopicus*

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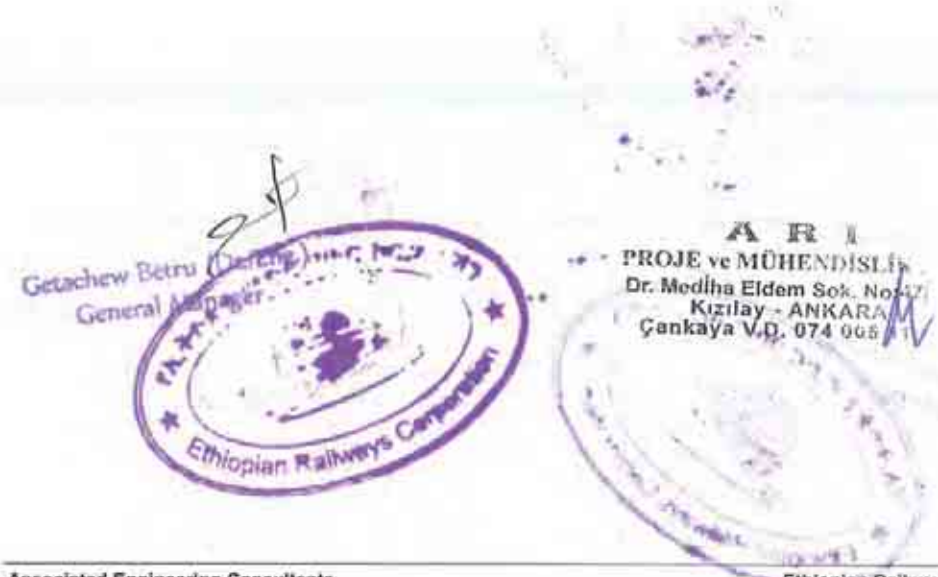
Appendix 2: Contd.

	Common Name	Scientific Name		Common Name	Scientific Name
67	Black-crowned Tchagra	*Tchagra senegalus*	83	Red-billed Fire-finch	*Lagonosticta senegala*
68	Fork-tailed Drongo	*Dicrurus assimilis*	84	Striolated Bunting	*Emberiza steriolata*
69	Red-billed Oxpecker	*Buphagus erythrorhynchus*	85	Red-cheeked Cordon-bleu	*Uraeginthus bengalus*
70	Greater Blue-eared Starling	*Lamprotornis chalybaeus*	86	Swainson's Sparrow	*Passer swainsonii*
71	Superb Starling	*Lamprotornis* superbus	87	Northern Red Bishop	*Euplectes franciscanus*
72	Wattled Starling	*Creatophora cinerea*	88	Pin-tailed Whydah	*Vidua macroura*
73	Spur-winged Plover	*Vanellus spinosus*	89	Dark Chanting Goshawk	*Melierax metabates*
74	Red-billed Quelea	*Quelea quelea*	90	Gabar Goshawk	*Micronissus gabar*
75	Egyptian Vulture	Neophron percnopterus	91	Bateleur	*Terathopius ecaudatus*
76	Hooded Vulture	Necrosyrtes monachus	92	Lanner Falcon	*Falco biarmicus*
77	White-backed Vulture	Gyps africanus	93	Pied Crow	Corvus albus
78	Ruppell's Vulture	Gyps rueppellii	94	Fan-tailed Raven	Corvus rhipidurus
79	Namaqua	Oena capensis	95	Thick-billed Raven	Corvus crassirostris
80	Yellow-bellied Waxbill	*Coccopygia quartinia*	96	White-browed Coucal	Centropus superciliolus
81	Village Weaver	*Ploceus cucullatus*	97	Village Indigobird	*Vidua chalybeata*
82	Little Weaver	*Ploceus luteolus*			

Source: Identification by the Consultant and N. Redman, T. Stevenson and J. Fanshawe (2009).



Appendix 3: Area of Land Requirement for the Railway Right-of-Way (RoW)

	Section		Length (km)	Average RoW (m)	Area (Ha)		Section		Length (km)	Average RoW (m)	Area (Ha)
	From	To					From	To			
I	Deep Cut Sections					II	High Fill Sections				
1	0.00	0.44	0.44	75	3.66	1	0.44	2.14	1.70	54	9.18
2	2.14	2.82	0.68	44	3.11	2	2.96	3.71	0.75	42	3.24
3	4.50	4.80	0.30	30	0.95	3	3.84	4.12	0.28	31	1.01
4	5.30	5.92	0.62	31	2.07	4	5.94	6.36	0.42	25	1.06
5	6.38	9.18	2.80	51	14.56	5	9.20	9.94	0.74	45	3.60
6	10.48	13.14	2.66	34	9.11	6	13.14	13.24	0.10	45	0.55
7	15.68	15.84	0.16	49	0.88	7	13.54	15.24	1.70	41	7.32
8	15.98	16.58	0.60	121	7.49	8	16.70	18.90	2.20	55	12.38
9	18.90	19.20	0.30	33	1.07	9	21.92	23.26	1.34	68	9.47
10	19.40	21.44	2.04	56	11.79	10	24.62	25.90	1.28	39	5.03
11	23.54	23.94	0.40	268	11.27	11	36.48	36.74	0.26	79	2.20
12	24.10	24.60	0.50	55	3.19	12	37.26	37.49	0.23	79	2.06
13	25.90	27.36	1.46	46	6.78	13	38.46	38.70	0.24	40	1.04
14	32.60	36.48	3.88	66	25.38	14	39.98	40.56	0.58	36	2.18
15	36.74	37.26	0.52	72	4.03	15	40.75	41.02	0.27	38	1.15
16	37.49	38.46	0.97	72	7.50	16	44.29	45.20	0.91	25	2.34
17	38.70	39.14	0.44	20	0.93	17	48.13	49.04	0.91	50	4.73
18	40.56	40.74	0.18	28	0.56	18	52.80	53.44	0.64	84	5.53
19	41.03	42.17	1.14	41	4.83	19	58.30	59.46	1.16	64	7.71
20	49.70	52.80	3.10	70	22.20	20	60.40	61.20	0.80	50	4.14
21	63.00	66.90	3.90	66	26.03	21	70.78	70.96	0.18	27	0.53
22	68.70	69.88	1.18	82	10.15	22	71.90	72.32	0.42	28	1.23
23	70.34	70.80	0.46	46	2.22	23	72.58	74.90	2.32	45	10.90
24	70.96	71.90	0.94	36	3.63	24	75.28	79.92	4.64	47	22.17
25	79.92	80.18	0.26	75.5	2.11	25	80.18	81.08	0.90	67	6.18
26	81.08	81.22	0.14	99.4	1.59	26	83.92	84.50	0.58	60	3.87
27	83.78	83.92	0.14	98	1.37		-	-	-	-	-
	Total		30.21		188.46		Total		25.55		130.8
	% (of total project length)		35.75				% (of total project length)		30.24		

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Appendix 3: Area of Land Requirement for the Railway RoW, Contd.

	Section		Length (km)	Average RoW (m)	Area (Ha)
	From	To			
III	Level Sections				
1	2.82	2.96	0.14	20	0.33
2	4.12	4.50	0.38	22	0.79
3	4.80	5.30	0.50	22.4	1.21
4	5.92	5.94	0.02	28.5	0.11
5	6.36	6.38	0.02	27.5	0.11
6	9.18	9.20	0.02	36	0.14
7	9.94	10.48	0.54	26	1.47
8	15.84	15.98	0.14	48	0.67
9	16.58	16.70	0.12	23	0.37
10	19.20	19.40	0.20	45	1.00
11	27.36	32.60	5.24	26	14.11
12	39.14	39.98	0.84	23	1.95
13	42.17	44.29	2.12	26	5.52
14	45.20	48.13	2.93	29	8.61
15	49.04	49.70	0.66	20	1.38
16	66.90	68.70	1.80	21	3.79
	Total		**15.67**		**41.56**
	% (of total project length)		**18.54**		

Summary

	Type	Length (km)	% (of total project length)	Area of RoW	
				Ha	%
1	Deep Cut Sections	30.21	35.75	188.46	50.60
2	High Fill Sections	25.55	30.24	130.80	35.12
3	Level Sections	15.67	18.54	41.56	11.16
4	Tunnel Sections	10.24	12.12	*	
5	Structures	2.83	3.35	11.60	3.11
	Total Project Length	**84.50**	**100**	**372.42**	**99.99**

*Area of RoW for the tunnel sections was not calculated since construction of these sections will not entail land acquisition as they will be located underground.

Appendix 4: List of Stations Recommended for Pedestrian/Vehicular Crossing Structures

	Station	Underpass/ Overpass	Notes
1	1+200	Underpass	Under the Mille river bridge, if technically feasible.
2	3+000	Underpass	This section has high embankment fill.
3	4+000	Underpass	This section has high embankment fill.
4	6+300	Underpass	At existing footpath; this section will be built with high embankment fill.
5	7+700	Overpass	At existing access road connecting a Nursery Site; this section involves deep cut
6	9+800	Underpass	At existing footpaths; this section will be built with high embankment fill.
7	11+200	Overpass	At existing track; these sections will be built through deep cutting.
8	12+300	Overpass	
9	13+700	Underpass	At existing footpath; this section will be built with high embankment fill.
10	15+200	Underpass	Under the Mille river bridge, if technically feasible.
11	16+900	Underpass	At existing footpaths; these sections will be built with high embankment fill.
12	18+400	Underpass	
13	20+300	Underpass	At or near the crossing point of existing track.
14	21+800	Underpass	Under the Mille river bridge.
15	23+200	Underpass	At or near the crossing point of existing tracks.
16	27+350	Underpass	
17	29+35	Underpass	
18	30+800	Underpass	
19	33+300	Overpass	At existing track; construction of this section involves deep cut.
20	34+200	Underpass	Under the bridge over Gelana river.
21	36+600	Underpass	At or near the crossing point of existing track.
22	38+600	Underpass	At or around this station.
23	41+200	Underpass	At existing track; these sections will be constructed with high embankment fill.
24	42+500	Underpass	
25	44+000	Underpass	At or around this station.
26	45+900	Underpass	At or near the crossing point of existing track.
27	~46+600	Underpass	At or around this station.
28	~48+000	Underpass	At or around this station.
29	50+000	Underpass	At crossing point of existing tracks; these sections will be constructed with high embankment fill.
30	58+200	Underpass	
31	60+670	Underpass	At existing track; high embankment fill section
32	~63+300	Overpass	At existing access road linking Sibil Kay Village; this section involves deep cut.
33	64+800	Overpass	At existing track; this section will be in deep cut.
34	~65+600	Overpass	This station will be built with deep cut.
35	66+500	Overpass	At existing Woldiya – Mille main road; this section involves deep cut.

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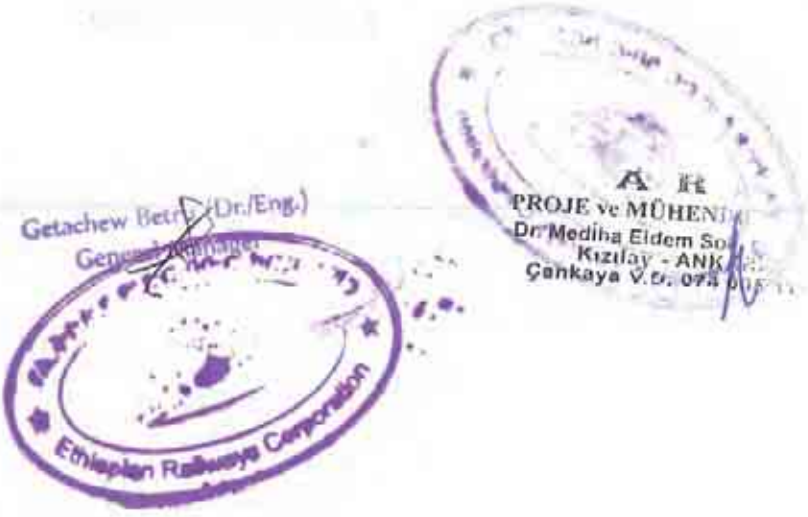
36	67+000	Underpass	At existing access road linking Korke Village and others in east of Hara town.
37	68+500	Underpass	At existing track; this section will be built with high embankment fill.
38	70+000	Overpass	This station will be built with deep cut.
39	71+200	Overpass	At or near the crossing point of existing track.
40	73+000	Underpass	These sections will be built with high embankment fill.
41	77+000	Underpass	
42	81+800	Overpass	At existing track; construction of this section involves deep cut.
43	83+000	Overpass	At existing track; construction of this section involves deep cut.



Appendix 5: Minutes of Public Consultations

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APPENDIX NO. 8: ENVIRONMENTAL APPROVAL CERTIFICATE

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The Federal Democratic Republic of Ethiopia
ENVIRONMENTAL PROTECTION AUTHORITY

ቀን 18 DEC 2012
Date

ቁጥር 11/9-1/348
Ref. No.

Ministry of Transport
Addis Ababa

Subject: Environmental Impact Assessment Reports of Awash-Armeniya-Kemisse-Hayik-Robit Railway Projects

It is to recalled that you have recently sent us the Environmental Impact Assessment Reports of Awash-Armeniya (Lot 10), Armeniya-Kemisse (Lot 11), Kemisse-Hayik (Lot 12), Hayik-Robit (Lot 13) for review and issuance of environmental clearance.

Accordingly, we are currently undertaking the review of the above-mentioned reports in accordance with the Environmental Impact Assessment Proclamation No. 299/2002 and the requirements provided under the relevant technical guidelines and will send very soon our review comments.

This is therefore to let you kn ow that the Environmental Protection Authority will issue the environmental clearance for the implementation of the said railway projects as soon as the Authority receives the corrected and completed reports.

Sincerely,

Environmental Units Programme Directorate Director

Getachew Betru (Dr./Eng.)
General Manager

Ethiopian Railways Corporation
Incoming ... 13466
18/12/12

Cc:
Ethiopian Railways Corporation
Addis Ababa

Deputy Director General
Monitoring and Evaluation Program Directorate
Environmental Protection Authority
Addis Ababa