SFG2042

Draft Report

Environmental Health, Safety and Quality
Environmental and Social Office

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Contents

ACRONYMS

AfDB	African Development Bank
ANRS	Amhara National Regional State
ARCCH	Authority for Research and Conservation of Cultural Heritage
Birr	Ethiopian Local Currency
EBRD	European Bank for Reconstruction and Development
EEP	Ethiopian Electric Power
EHS & Q	Environmental Health Safety and Quality
EMP	Environmental Management Plan
EPE	Environmental Policy of Ethiopia
EPTLP	Electric Power Transmission Line Project
ESIA	Environmental and Social Impact Assessment
FDRE	Federal Democratic Republic of Ethiopia
EDHS	Ethiopia Demographic and Health Survey
HVTL	High Voltage Transmission Line
IPM	Internal Performance Monitoring
Km	Kilo Meter
kV	Kilo Volt
MEFCC	Ministry of Environment, Forest and Climate Change
MoFEC	Ministry of Finance and Economic Cooperation
MCH	Mother and Child Health
MoWIE	Ministry of Water, Irrigation and Electricity
MW	Mega Watt
PIU	Project Implementation Unit
PTLP	Power Transmission Line Project
TOR	Terms of Referenced
TPLS	Traction Power and Lighting Substation
WB	World Bank
ZOI	Zone of Influence

EXECUTIVE SUMMARY

Ethiopia is a large and diverse country, located in the Horn of Africa and is a land-locked country with an area of 1.1 million km^2—about the size of Bolivia. Its bio-physical environment includes a variety of contrasting ecosystems, with significant differences in climate, soil properties, vegetation types, and agricultural potential, biodiversity and water resources. Ethiopia is a country of many nations, nationalities and peoples, with a total population of 91.7 million (2012)[1]. Only 17 percent of the population lives in urban centers, the great majority of them in Addis Ababa. At a current annual growth rate of 2.6 percent, Ethiopia's population is estimated to reach 130 million by 2025, and is projected by the UN to be among the world's top ten, by 2050. Ethiopia is vulnerable to terms of trade shocks from international food and fuel prices, and to large domestic weather-related shocks as the 2011/12 East Africa drought demonstrated.

Ethiopia has experienced strong economic growth over the past decade. Economic growth averaged 10.7 percent per year in 2003/04 to 2011/12 compared to the regional average of 5.0 percent. Growth reflected a mix of factors, including agricultural modernization, the development of new export sectors, strong global commodity demand, and government-led development investments. In spite of its strong economic growth, Ethiopia is one of the world's poorest countries, but has made substantial progress on social and human development over the past decade. The country's per capita income of US$370 per is substantially lower than the regional average of US$1,257 and among the ten lowest worldwide[2]. Ethiopia is ranked 173 out of 187 countries in the Human Development Index (HDI) of the United Nations Development Program (UNDP). However, high economic growth has helped reduce poverty, in both urban and rural areas. Since 2005, 2.5 million people have been lifted out of poverty, and the share of the population below the poverty line has fallen from 38.7 percent in 2004/05 to 29.6 percent in 2010/11 (using a national poverty line close to US$1.25 per day). However, because of high population growth the absolute number of poor (about 25 million) has remained unchanged over the past fifteen years. Ethiopia is among the countries that have made the fastest progress on the Millennium Development Goals (MDGs) and HDI ranking over the past decade. It is on track to achieve the MDGs related to gender parity in education, child mortality, HIV/AIDS, and malaria. Good progress has been achieved in universal primary education, although the MDG target may not be met. The reduction of maternal mortality remains a key challenge.

GoE is currently implementing its ambitious Growth and Transformation Plan (GTP2), which sets a long-term goal of becoming a middle-income country by 2023, with growth rates of at least 11.2 percent per annum during the plan period. To achieve the GTP goals and objectives, GoE has prioritized key sectors such as Energy, industry and agriculture, as drivers of sustained economic growth and job creation. To sustain its GDP growth at double digits and create new jobs, energy is critical, as appropriately acknowledge in the GTP2. However, for now the access to electric power supply in Ethiopia is about 46%, and the per capita energy consumption is 43.53 kWh. Therefore, GoE has given great emphasis on national energy policy and equitable development of the energy sector in parallel with other social and economic developments. Specific policy lines include the attainment of self-sufficiency through the development of indigenous resources with minimum environmental

[1] Source: United Nations. According to the Central Statistics Office, the population figure is 82.6 million.
[2] Gross National Income, World Bank Atlas Method.

impact and equitable distribution of electricity in all the FDRE government`s administrative setups (nine national regional states plus two administrative councils). The policy envisages the development of hydro, geothermal, natural gas, coal, wind and solar energy resources based on their techno-economic viability, social and environmental acceptability.

In line with the aforementioned policy of the GoE, EEP has defined its long term strategies so as to support the endeavors of the GoE in promoting social and economic progress in all parts of the country. These strategies are generally focused on; developing hydropower resources, increasing the current low level electricity access within short period of time, expanding EEP's market to neighboring countries and beyond, through active participation in regional and bilateral power trade initiatives, intensifying electric usage within already electrified towns and improving EEP's service delivery capabilities through implementing reforms. As part of that effort, EEP has planned to supply electric power at four targeted LOT sites in Ethiopia, in Amhara, SNNPR and Oromia National Regional States.

This report outlines the Environmental and Social Impact Assessment (ESIA) report of four targeted sites of the Electric Power Transmission Line Project (EPTLP) in Ethiopia.

A Grid Interconnection Load Forecast Feasibility Study was conducted and the findings proposed the following sites:

Metu-Masha 230 KV EPTLP (Lot-I) with in SNNPR and Oromia National Regional States

- Construction of a new substation at Masha town, which will take about 9ha of land (300 X 300 meters); construction of a 230 kV double circuit transmission line from Metu (existing substation) town to Masha town in the newly selected substation site, which covers about an estimated total length of 65.1km, and; construction of access road towards erection of each tower pad site. This demands an estimated total length of 3.3km or 0.33ha of land.

Finchaa-Shambu 230 KV EPTLP (Lot-II), in Oromia National Regional State

- Construction of a new substation at Shambu town, which will take about 9 ha (300 X 300 meters) of land area; construction of a 230 kV double circuit transmission line from Finchaa (existing substation) town to Shambu town in the newly selected substation site, which covers about an estimated total length of 41.6 km. It will also involve construction of access road towards erection of each tower pad site. This demands an estimated total length of 2.1 or 0.21ha of land.

BahirDar-Dangila132 KV EPTLP (Lot-III), in Amhara National Regional State

- Construction of a new substation at Dangila town, which will take about 9ha (300 X 300 meters) land; construction of a 132 kV double circuit transmission line from Bahir-Dar (existing substation) to Dangila town in a newly selected substation site, which covers about an estimated total length of 67.5km. It also involves construction of access road towards erection of each tower pad site. This demands an estimated total length of 3.4km or 0.34 ha of land.

Azezo-Chiliga 132KV EPTLP (Lot-IV), in Amhara National Regional State

- Construction of new substation at Chiliga town, which will take about 9ha (300 X 300 meters) land; construction of a 132kV single circuit transmission line from Azezo (existing substation) town to Chiliga town in a newly selected substation site, which covers about an estimated total length of 42.3km. It will also involve construction of access road towards erection of each tower pad site. This demands an estimated total length of 2.12km or 0.21 ha of land.

The main objectives of the present ESIA are:

- To identify and predict potentially probable significant impacts (both positive & negative) that are most likely to occur from the construction, operation and maintenance phases of the proposed projects.
- To propose possible enhancement measures for benefits and appropriate mitigation measures to minimize or reduce the adverse impacts.
- Prepare management and monitoring plans to mitigate the effects of the projects.
- Establish the need for a full or abbreviated Resettlement Action Plan (RAP).

Project Description and Justification: The following table presents detailed information on the proposed project and respective targeted project sites.

Project Name	LOT I-Metu-Masha 230 kV EPTLP	LOT – II: 230 kV Finchaa-Shambu EPTLP	LOT III-Bahir Dar-Dangila 132 kV EPTLP	LOT IV-Azezo-Chilga 230 kV EPTLP
Implementing Agency	Ethiopian Electric Power (EEP)	Ethiopian Electric Power (EEP)	Ethiopian Electric Power (EEP)	Ethiopian Electric Power (EEP)
Financier	World Bank (WB)	World Bank (WB)	World Bank (WB)	World Bank (WB)
Location	Within SNNPR and Oromia NRS, about 625 km distance from Addis Ababa	Oromia NRS (Horo-Guduru Zone), 338km distance from AA	Amhara NRS, at about 568 km from Addis Ababa.	Amhara NRS, at about 774 km from Addis Ababa.
Selected Voltage Level[3]	230 kV	230 kV	132 kV	230 kV
Selected Conductor Type[4]	A twin conductor of 2X180.7 mm^2 ASH	A twin conductor of 2X180.7 mm^2 ASH	A twin conductor of 2X180.7 mm^2 ASH	A twin conductor of 2X180.7 mm^2 ASH
Proposed Route Option and estimated length	R1= 65.1 km R2= 66 km R3= 66 km	R1= 41.6km R2= = 41.7km R3=41.8km	The only route option, (R1=67.5)	R1= 42.3km
Preferred Route Option[5]	R1=65.1 km	R1= 41.6km	R1=67.5 km	R1=42.3 km
Major Project Components	▪ Construction of a new substation at Masha Town-[16ha (400x400 meters) of land] ▪ Transmission Line ▪ Construction of Access Roads	▪ Construction of a new substation at Shambu Town-[16ha (400x400 meters) of land] ▪ Transmission *Line* ▪ Construction *of Access Roads*	▪ Construction of a new substation at Dangila Town-[16ha (400x400 meters) of land] ▪ Transmission *Line* ▪ Construction *of Access Roads*	▪ Construction of a new substation at Chilga Town-[16ha (400x400 meters) of land] ▪ Transmission *Line* ▪ Construction *of Access Roads*
Estimated Area Coverage of Substation	16 ha (400 X 400 meters).	16 ha (400 X 400 meters).	16 ha (400 X 400 meters).	16 ha (400 X 400 meters).
Estimated Length of Access road	3.3 km with 5m wide		3.4 km with 5 m wide	

[3] As per the analysis of the load forecast feasibility study, EPTLP; considering existing and future power demands and distance between delivery and receiving ends.

4 Considering future load growth trends, present value of initial and future investment and running cost of the line including cost of losses and risk

5 Based on analysis of design considerations, economic, environmental, social and financial feasibility

Project Cost	USD 33,433,402.55	USD 27,983,806.69	USD 31,157,000	USD 51,471,000
Estimated Job Opportunity to be Created (Temporary, during construction)	200-250 People	128-160 People	203-254 People	130-162 People
Project Status	New	New	New	New
Project Justification	The prime purpose of this power transmission project is to meet the electric power demand of the population nearby and surrounding areas of the proposed project sites. It will also contribute indirectly in meeting the demands of increasing electric services in Ethiopia. Moreover, it will facilitate the desired economic and social progress in the country.			
Tentative Date of Commencement	Sep-16	Sep-16 (planned to be completed in 2 years)	Sep-16 (planned to be completed in 2 years)	Sep-16 (planned to be completed in 2 years)

Policies, Development Strategy, Legal, Institutional and Administrative Frameworks: All relevant and applicable national laws, polices and regulatory frameworks that have due relevance to Environmental and Social Impact Assessment, including the federal and regional proclamations, national policies, relevant regulation, the ENREP project description and the World Bank Operational Policy Frameworks have been carefully reviewed and analyzed.

Analysis of project route alternatives: Analysis of alternative route options study findings at four Lots targeted sites of each 4 EPTLPs reveals the followings:

	Proposed Route Option and estimated length	**Preferred Route Option, based on analysis of design considerations, economic, environmental, social and financial feasibility**
At LOT I-Metu-Masha 230 kV EPTLP	▪ R1= 65.1 km ▪ R2= 66 km ▪ R3= 66 km	✓ R1=65.1 km
At LOT – II: 230 kV Finchaa-Shambu EPTLP	▪ R1= 41.6km ▪ R2= = 41.7km ▪ R3=41.8km	✓ R1= 41.6km
At LOT III-Bahir Dar-Dangila 132 kV EPTLP	▪ The only route option- (R1=67.5)	✓ R1=67.5 km
At LOT IV-Azezo-Chilga 230 kV EPTLP	▪ R1= 42.3km	✓ R1=42.3 km

Public Consultations and Disclosure

The proposed Electric Power Transmission Line Projects will be implemented at four LOTs. A field visit and survey activities on public consultation and disclosure planning has been carried out from November1–20, 2015. During field visit, the National/Ethiopian and World Bank Group Operational Policy and legal framework requirements in the context of the project have been used. During the study period, the ESIA Team used key interview method to consult with selected stakeholders at Federal, Regional and Zonal levels; and focus group discussions (FGDs) were used at the Woreda and Kebele levels for stakeholders' engagement.

Summary of Consultation

At **Woreda level** all members of the Woreda FGD participants have prior awareness about the project and expressed positive attitude towards the implementation of the proposed project in the targeted sites. FGD participants have agreed that they will provide all information and support required for the success of the proposed project. They also reached a consensus on the process to be used in land acquisition process for construction camps and other associated sites, and how land for land replacement will be effected for any affected persons, if any. Moreover, community members declared to respect the ROW and prevent people from building any new houses, fences, etc, in the designated ROW set back, since whoever builds a house or any structure in ROW will not be paid any compensation (after the cut-off date).

The project affected persons also recommended the following plan of actions:

- The project contractors, consultants, workers and project owner who come to the project area should respect the community culture
- The project should facilitate temporary job opportunities for the local unemployed, and should encourage project contractor to give priority to the community members, particularly unemployed during construction period.
- The influx of labor to the construction areas and potential social interactions with the local communities may result in the spread of communicable diseases in the area. Hence, the project contractor should provide health awareness program in collaboration with the woreda health offices prior to and during the implementation of the proposed projects to overcome the problem.
- For the projects affected private and public properties, census and payment of compensation should be done in accordance to Proclamation No 455/2005 and regulation No 135/2007 before the start of the project construction.
- During the construction period, the project through its contractors should provide medical and insurances services for anticipated accidents/ injuries etc.

Final, anticipated environmental and social impacts of the project will be both positive and negative impacts. These include, improved electric power supply at targeted sites and nearby environs, local employment and income generation during construction period, improvements in various social services giving facilities, reduce portage burden from women, appropriate technology transfer and economic growth and development. Conversely, predicted potential negative/adverse impacts that likely to be occurred on bio-physical and socio-economic environment could also include impact on air and water quality, noise and vibration impacts, impacts on existing land use, soil and water resources, impacts on biodiversity, impacts on private and public properties as well as public and occupational health and safety impacts.

In regard to potential affected land area (permanently and temporarily) by the projects, a total of about 861.6 ha of land would be affected temporarily, for the formation of ROWs, 6.77 ha of land would be permanently affected for erection of tower pads and 36 ha of land would also be affected due to the construction of new substations in the project proposed localities. Besides, a total of about 5.53 ha of land would be temporarily affected for the construction of access roads in the project sites.

Conclusions and Recommendations

Based on analysis of the present ESIA study findings, it is concluded that the construction and operation of the proposed projects benefits far outweigh the adverse impacts. In terms of biophysical and socio-economic impacts, there are no severe impacts that cannot be mitigated, using the agreed safeguards instruments discussed in this report and or would prevent the construction of the projects.

CHAPTER ONE

1. INTRODUCTION

The Federal Democratic Republic of Ethiopia is a country located in the Eastern horn of Africa, with a total surface area of about 1.1 million square kilometres. Currently, it borders South Sudan and Sudan in the west, Sudan and Eritrea in the north, Djibouti and Somalia in the east, and Kenya in the South (CSA, 2009; EDHS, 2012). Administratively, the country is divided into nine regional states and two city administrative councils. In addition, it is further divided into Special Zones /zones, Special Woredas/Woredas (districts) and kebeles (Rural/Urban Dwellers Association) at lowest level of administrative organizations.

The country's estimated population for the year 2015 was 90,076,012 persons with an annual growth rate of 2.6% (CSA, Statistical Abstract, 2014). Based on results of the 2007 National Population and Housing Census carried out by CSA, out of the total population about 50.2% were males and 49.8% females. In terms of residency, the projected figures for the urban areas are 19.2%, while that of the rural population is about 80.8% (CSA, Statistical Abstract; 2014). The population has increased steadily over the last decades from 42.6 million in 1984 to 53.5 million in 1994, 73.8 million in 2007, 84,320,987 in 2012, 87,952,991 in 2014 and 90,076,012 by 2015 (EDHS, 2011: MOFEC, 2011, CSA, Statistical Abstract 2014). The number of observed overall urban and rural dependency ratios for the country is 10:2. However, this appears to be 65 for the urban and 110 for the rural.

Based on data sources obtained from results of the 2014 Ethiopia Mini Demographic and Health Survey, the observed average house hold size for overall urban and rural areas is about 4.7 persons, which is slightly lower than the average 5 persons per household reported in 2005 of EDHS. The figure for urban areas is 3.6 compared with 5 persons in rural areas. About one fourth (23%) of Ethiopian households are headed by women (Ethiopia Mini Demographic and Health Survey 2014), and this compares with the figure in 2005. Concerning educational attainment, there has been a marked improvement for women. The proportion of females with no education has declined over the years. Moreover, in other areas of health indicators also an improvement has been observed, particularly in the area of Maternal and Child Health (MCH). Further, Ethiopia has experienced strong economic growth over the past decade. Economic growth averaged 10.7 percent per year in 2003/04 to 2011/12 compared to the regional average of 5.0 percent. Growth reflected a mix of factors, including agricultural modernization, the development of new export sectors, strong global commodity demand, and government-led development investments. Private consumption and public investment have driven demand side growth, with the latter assuming an increasingly important role in recent years. On the supply side, growth was driven by an expansion of the services and agricultural sectors, while the role of the industrial sector was relatively modest. Recently, annual growth rates have declined slightly, but still remain at high single-digit levels. Growth in the export of goods has also moderated in recent years and a decline was observed in 2012/13 for the first time since 2008/09. There have been bouts of high inflation in recent years and, while inflation is currently much lower, keeping it down remains a major objective for monetary policy. It should be noted that attainment of the country's socioeconomic development goals depends on the expansion of infrastructure, with particular reference to availability of electric power supply. Access to electric power supply in Ethiopia is about 46%, and the annual per capita energy consumption is 43.53 kWh.

In terms of residency, educational attainment is much higher among the urban population than rural. In urban areas, 27% of female and 15% of males have no education, compared with 53% of female and 41% of males in rural areas (see Results of the 2014 Ethiopia Mini Demographic and Health Survey). With regard to prevalence trend in the areas of HIV/AIDS pandemic and other reproductive health diseases, there seems to be a slight decrease compared to the previous years. Moreover, in other areas of health indicators also an improvement has been observed. In that instance, among others improvement in the area of Maternal and Child Health can be taken as the case in a point.

In view of the above, since 2011, the overall economic performance, analysis of the national accounts statistics in Ethiopia indicates the following results:

The Ethiopian economy has registered positive economic performance of 11.7, 12.6, 11.6 and 11.4 percent (MOFED, 2014). Therefore, it should be noted that attainment of the country socioeconomic development depends upon infrastructures, with particular references to availability of electric power supply. In the above connection, the access to electric power supply in Ethiopia is about 46%, and the per capita energy consumption is 43.53 kWh.

Hence, by recognizing the importance's of the said infrastructure for socio-economic development of Ethiopia, the FDRE government has given great emphasis in the aforementioned area of development endeavour. In view of that, the national energy policy of the country emphasizes the need for equitable development of the energy sector in parallel with other social and economic developments. Specific policy lines include the attainment of self-sufficiency through the development of indigenous resources with minimum environmental impact and equitable distribution of electricity in over all the FDRE government`s administrative setups (nine national regional states plus two administrative councils). The policy envisages the development of hydro, geothermal, natural gas, coal, wind and solar energy resources based on their techno-economic viability, social and environmental acceptability.

In line with the aforementioned policy of FDRE government, EEP has defined its long term strategies so as to support the endeavors of the Federal Government of Ethiopia in promoting social and economic progress in all parts of the country. These strategies are generally focused on; fast development of the countries hydropower resources, increasing the current low level electricity access within short period of time, expanding EEP's market to neighboring countries and beyond that, through active participation in regional and bilateral power trade initiatives, intensifying electric usage within already electrified towns and improving EEP's service delivery capabilities through implementing reforms. As part of that effort, EEP has planned to supply electric power at four targeted LOT sites in Ethiopia, based on administrative parts of three national regional states (Amhara, SNNPR and Oromia regions).

Purpose and Focus of the Report

This report is designed to present the analysis of the Environmental and Social Impact Assessment (ESIA) report at four lots targeted sites of Electric Power Transmission Line Project (EPTLP) in Ethiopia.

- LOT-I: 230 kV Metu-Mesha EPTLP to be constructed in SNNPR and Oromia.
- LOT-II: 230 kV Finchaa-Shambu EPTLP to be constructed in the Oromia region.
- LOT-III: 132 kV Bahir Dar- Dangila EPTLP to be constructed in the Amhara region.
- LOT-IV: 132 kV Azezo-Chiliga EPTLP to be constructed in the Amhara region.

The aforementioned projects are under one package. Accordingly, the present ESIA report is prepared as one document by the following EEP-ESIA study team members:

Abebe Abate (Senior Environmentalist/Sociologist and Team leader);
Hailu Gebre (Senior Economist);
Aneley Anteneh (Environmentalist);
Yohannes Almaw (Environmentalist)
Horo Leta (Sociologist)
Tigist Atilabvachew (Environmentalist)
Mohmed Aman (Surveyor)
Andarge Belay (Surveyor)
Mohamod Dagne (Surveyor)

The team prepared the report by conducting field assessment from December 24 - January 17, 2015 at four proposed targeted sites to collect all necessary information for the ESIA report. Based on TOR prepared for the ESIA (please refer Annex-I: TOR for the ESIA).

Project Background and Justification for the ESIA

In view of the overall economic performance, analysis of the national accounts statistics in Ethiopia indicates the following results: The Ethiopian economy has registered positive economic performance of 11.7 %, 12.6%, 11.6% and 11.4% through the respective years (MoFEC, 2014). Therefore, it should be noted that attainment of the country's socioeconomic development goals depends on the expansion of infrastructure, with particular reference to availability of electric power supply. Access to electric power supply in Ethiopia is about 46%, and the annual per capita energy consumption is 43.53 kWh.

Hence, by recognizing the importance's of the infrastructure for socio-economic development of Ethiopia, the FDRE government has given emphasis in the aforementioned area of development endeavour. In view of that, the national energy policy of the country emphasizes the need for equitable development of the energy sector in parallel with other social and economic developments. Specific policy lines include the attainment of self-sufficiency through the development of indigenous resources with minimum environmental impact and equitable distribution of electricity in all the FDRE government`s administrative setups (nine national regional states plus two administrative councils).The policy envisages the development of hydro, geothermal, natural gas, coal, wind and

solar energy resources based on their techno-economic viability, social and environmental acceptability.

The FDRE government EEP has defined its long term strategies so as to support the endeavors of promoting social and economic progress in all parts of the country. These strategies are generally focused on:

- Fast development of the countries hydropower resources
- Increasing the current low level electricity access within short period of time
- Expanding EEP's market to neighboring countries and beyond that, through active participation in regional and bilateral power trade initiatives
- Intensifying electric usage within already electrified towns
- Improving EEP's service delivery capabilities through implementing reforms.

As part of that effort, EEP has planned to supply electric power at four sites in three national regional states (Amhara, SNNPR and Oromia regions). Accordingly, a Grid Interconnection Load Forecast Feasibility Study has been carried out which proposed the following sites:

Metu-Masha 230 KV EPTLP (Lot-I)

- Construction of a new substation at Masha town, which will take about 9ha of land (300 X 300 meters); construction of a 230 kV double circuit transmission line from Metu (existing substation) town to Masha town in newly selected substation site, which covers about an estimated total length of 65.1km, and; construction of access road towards erection of each tower pad site. This demands an estimated total length of 3.3km or 0.33ha of land.

Finchaa-Shambu 230 KV EPTLP (Lot-II)

- Construction of a new substation at Shambu town, which will take about 9 ha (300 X 300 meters) of land area; construction of a 230 kV double circuit transmission line from Finchaa (existing substation) town to Shambu town in newly selected substation site, which covers about an estimated total length of 41.6 km. It will also involve construction of access road towards erection of each tower pad site. This demands an estimated total length of 2.1 or 0.21ha of land.

BahirDar-Dangila132 KV EPTLP (Lot-III)

- Construction of a new substation at Dangila town, which will take about 9ha (300 X 300 meters) land; construction of a 132 kV double circuit transmission line from Bahir-Dar (existing substation) town to Dangila town in a newly selected substation site, which covers about an estimated total length of 67.5km. It also involves construction of access road towards erection of each tower pad site. This demands an estimated total length of 3.4km or 0.34 ha of land.

- Construction of new substation at Chiliga town, which will take about 9ha (300 X 300 meters) land; construction of a 132kV single circuit transmission line from Azezo (existing substation) town to Chiliga town in a newly selected substation site, which covers about an estimated total length of 42.3km. It will also involve construction of access road towards erection of each tower pad site. This demands an estimated total length of 2.12km or 0.21 ha of land.

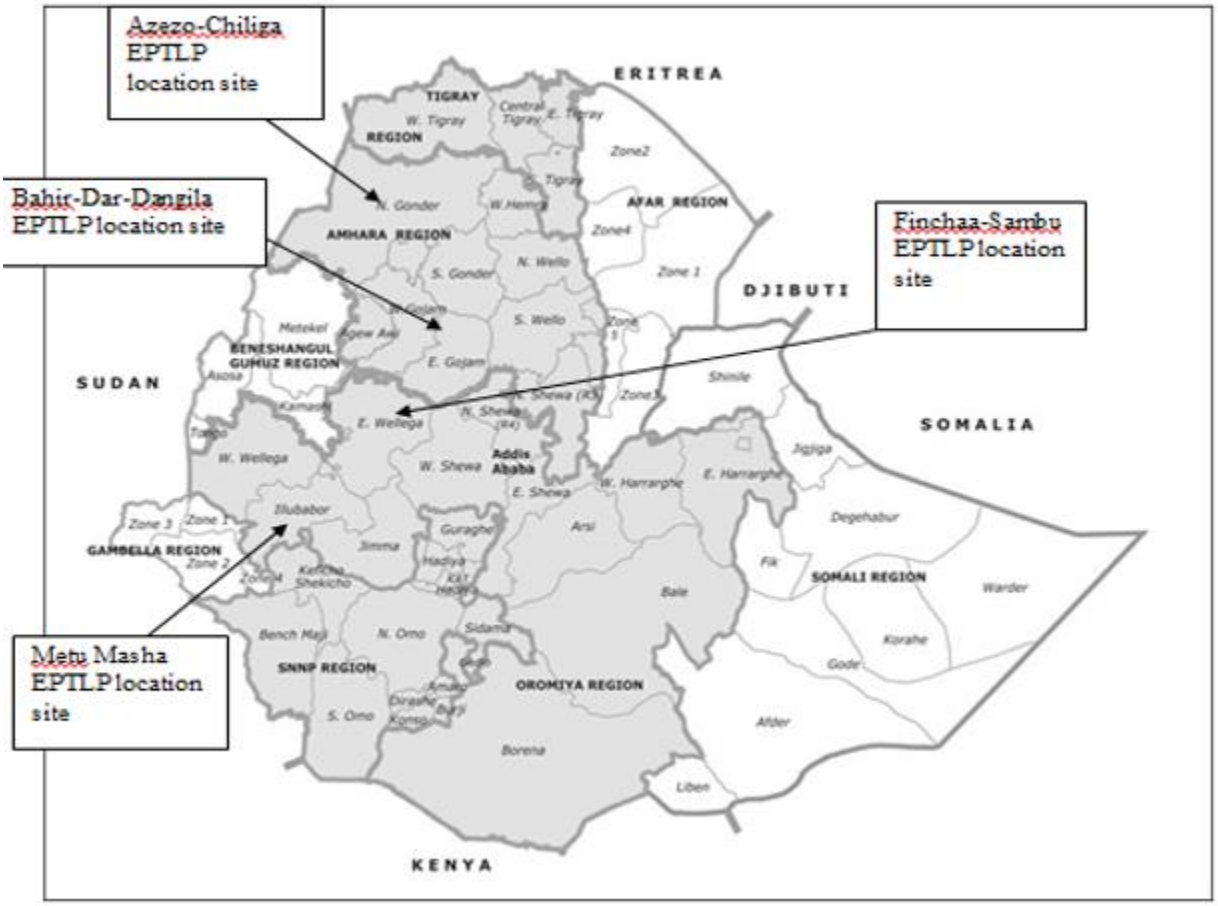

Figure-1.1: Indicative locational map of EPTLPs at four targeted sites.

Experience from doing development projects in Ethiopia have shown that when construction works are involved like electric power transmission lines and new or upgrading or/and rehabilitations of substations will involve the following environmental and social effects:

- Land acquisition and involuntary resettlement
- Loss of biodiversity
- Modification of the landscape
- Changes to existing production system

- Health and safety problems, etc.

Thus, as per request of the analysis of feasibility study findings and TOR prepared for the projects ESIA there are need to undertake the field assessment and prepare the ESIA report in one package for all the ETLP, which are located under four lots targeted sites.

Objective and Scope of the ESIA

The main objectives of the present ESIA are:

- To identify and predict potentially probable significant impacts (both positive and negative) that are most likely to occur from the construction, operation and maintenance phases of the proposed projects.
- To propose possible enhancement measures for benefits and appropriate mitigation measures to minimize or reduce the adverse impacts.
- Prepare management and monitoring plans to mitigate the effects of the projects.
- Establish the need for a full or abbreviated Resettlement Action Plan (RAP).

Methodology

1.1.1. Data Sources

The available information for the present ESIA report was collected from primary and secondary sources having qualitative and quantitative nature.

1.1.2. Techniques of Data Collection

Techniques of data collection are selected based on their applicability to a particular situation. Accordingly, the following major data collection techniques were employed during the ESIA study period, which is entertained in the following sections of this report.

1.1.2.1.Study Project Targeted Briefings

The ESIA Team has contacted the primary and secondary stakeholders at each of the four sites and provided stakeholders awareness creation information about the project objectives, potential impacts both positive and negative, possible enhancement measures for benefits and mitigation measures to reduce or minimize the adverse impacts (if possible) or to compensate if avoidance is not possible.

1.1.2.2.Reconnaissance Survey

Reconnaissance survey was conducted along the transmission line corridor of the route alignments at each selected sites. The main purpose of the survey was to have an insight about:

- The layout of transmission line route alignment
- Ongoing activities along zone of influences
- The existing socio-economic and bio-physical environment

- Administrative set-up within which the project falls
- Geographic boundary of the project's areas
- Project affected people (PAPs) and their immovable properties

1.1.2.3.Observation

Simple and direct observation of activities along zone of influences of proposed projects, categories of potentially affected groups and their immovable properties, the existing environmental and socio-economic potential impacts of proposed projects were directly observed and recorded.

1.1.2.4.Interview

Purposively, selected concerned stakeholders including administrative and sector development office heads, other selected experts from sector development office in the fields of environmental and socio-economic professions, some categories of project affected individuals, community elders and religious leaders, youth and women, traders, students, teachers, farmers and some other community members at project affected areas were directly interviewed, and in some circumstances interviewed by telephone, This was done in order to assess major attitudes and opinions about the proposed projects.

1.1.2.5.Designed Questionnaire

A set of well formulated bio-physical and socio-economic base line survey questionnaires were designed and distributed for distinct sector development offices at each study project affected people at woreda level to complement the primary data.

1.1.2.6.Focus Group Discussions (FGD)

During and at the end of the field visits, FGD were carried out on key environmental and socio-economic issues, such as on existing socio economic and bio-physical environments, analysis and selection of best alternative route options, potential project affected people and their immovable properties including the name of targeted proposed projects site, impacts of the projects, etc. with integrated groups members consisting of, selected administrative officials, representatives of sector development offices, community elders and religious leaders, and vulnerable groups at the selected sites along the study route line and at project affected woreda level was undertaken.

1.1.2.7.Public Consultation

During study period, at major towns and rural villages along ROW of proposed projects targeted sites community meetings were conducted. It was carried out at particularly cluster types of rural village settlement sites. Accordingly, information related to the study projects characteristics, setting, envisaged impacts etc. were disseminated to community members including directly affected groups. Moreover, community member's awareness, major attitudes and opinions towards proposed projects were assessed and recorded.

1.1.2.8.Review of Related Literatures

Secondary sources of information on environmental and social policies, proclamations, regulations, directives, studies on vulnerable groups, World Bank operational policies, national and regional government land acquisitions, compensation payment related laws were reviewed. The relevant literature to the projects were systematically reviewed to enrich the primary data sources.

1.1.2.9.Supporting Materials and Equipment

During the study period pictures were taken of the selected sites, affected people and their properties, participants in FGD, interviews and discussion with some individuals/groups (i.e. professionals, project area authorities, religious leaders, community elders, youth, women, community members, etc.). Moreover, topographic maps were used to identify the location of study sites. On top of that, GPS has been used to record readings of geographic positions by taking coordinate points (locations and elevations) of particular places, objects, etc., which were relevant and served as valuable input for the present ESIA report.

1.1.3. Methods of Data Analysis

Simple statistical method of Preliminary Analysis has been used. Accordingly, the collected environmental and socio-economic data were presented in the form of charts, figures and tables, to have insight into the study project, this helps to come up with some inferences.

Limitation of the Study:

The present ESIA report has been prepared successfully by application of the best practices of similar electric power transmission line and substation projects, in accordance with the requirements set out in national and international safeguard frameworks, including the World Bank's Safeguard Operational Policies.

Organization of the Report

The report is organized into 11 sections**.**

- ✓ The first section deals with an introduction, while the second section presents the study projects description and justification; section three outlined and described major national and international policy, legal, institutional and administrative frameworks; the fourth section presents analysis of alternatives; section five presented descriptions of the EPTLP environment at the four selected sites. In section six, Public Consultation and Disclosure activities were presented; section seven dealt with potential environmental and socio-economic impacts, and enhancement/mitigation measures; section eight offers the Environmental and Social Management; section nine deals with Environmental and Social Monitoring Plans. In section ten, the ESIA cost is presented and finally, section eleven presents conclusion and recommendations.

On top of these, references and lists of relevant annexes are enclosed under Appendix herewith.

CHAPTER TWO PROJECT DESCRIPTION AND JUSTIFICATIONS				
The following table presents detailed information on the proposed project and respective targeted project sites.				
Project Name	**LOT I-Metu-Masha 230 kV EPTLP**	**LOT – II: 230 kV Finchaa-Shambu EPTLP**	**LOT III-Bahir Dar- Dangila 132 kV EPTLP**	**LOT IV-Azezo-Chilga 230 kV EPTLP**
Implementing Agency	Ethiopian Electric Power (EEP)	Ethiopian Electric Power (EEP)	Ethiopian Electric Power (EEP)	Ethiopian Electric Power (EEP)
Financier	World Bank (WB)	World Bank (WB)	World Bank (WB)	World Bank (WB)
Location[6]	Within SNNPR and Oromia NRS, about 625 km distance from Addis Ababa; along the Addis Ababa–Gore-Metu asphalt road and Metu-Masha gravel road.	Oromia NRS (Horo-Guduru Zone), 338km distance from AA; at the start/controlling Point is along Addis Ababa-Ambo–Gedo towns asphalt road (188km) and from Gedo – Finchaa –Shambu towns gravel road (152km). While, 313 km distance away at its second side of controlling point/end of the project is along Addis Ababa-Ambo-Gedo - Bako towns asphalt road (253km) and Bako-Shambu towns gravel road 60km).	Amhara NRS, at about 568 km from Addis Ababa. At its second side of controlling Point (terminal point of the project), which is along Addiss Ababa-Debere-Markos-Dangila-Bahir Dar towns asphalt road. While, 485- km distance away at its first side of controlling point (starting point of the project) along Addis Ababa – Debere-Markos –Dangila towns asphalt road.	Amhara NRS, at about 774 km from Addis Ababa. At its first side of controlling Point (the start of the project), which is along Addiss Ababa—Debere-Markos-Azezo towns asphalt road. While, 816 km distance away at its second side of controlling point (terminal point of the project) along Addis Ababa Ababa-Debere -Markos-Azezo-Chiliga towns asphalt
Selected Voltage Level[7]	230 kV	230 kV	132 kV	230 kV
Selected Conductor Type[8]	A twin conductor of 2X180.7 mm^2 ASH	A twin conductor of 2X180.7 mm^2 ASH	A twin conductor of 2X180.7 mm^2 ASH	A twin conductor of 2X180.7 mm^2 ASH
Proposed Route Option and estimated length	R1= 65.1 km R2= 66 km R3= 66 km	R1= 41.6km R2= = 41.7km R3=41.8km	The only route option-(R1=67.5)	R1= 42.3km
Preferred Route Option[9]	R1=65.1 km	R1= 41.6km	R1=67.5 km	R1=42.3 km

[6] Coordinates and map of LOT-I to LOT-IV are attached in Annex 1.

[7] As per the analysis of the load forecast feasibility study, EPTLP; considering existing and future power demands and distance between delivery and receiving ends.

8 Considering future load growth trends, present value of initial and future investment and running cost of the line including cost of losses and risk

9 Based on analysis of design considerations, economic, environmental, social and financial feasibility

Major Project Components	*Construction of a new substation at Masha Town-[16ha (400x400 meters) of land]* ▪ 2x 230 kV incoming line bay Double bus bar); ▪ 2x132 kV incoming line bay (Double bus bar); ▪ 2x230 kV transformer bay (Double bus bar); ▪ 2x132 kV transformer bay (Double bus bar); ▪ 2x230/132 kV, 125 MVA transformer; ▪ 132/33 kv, 2025/25 MVA transformer; and ▪ 33 kV indoor and outdoor equipment (Five feeder)	*Construction of a new substation at Shambu Town-[16ha (400x400 meters) of land]* ▪ 2x 230 kV incoming line bay (Double bus bar) ▪ 2x132 kV incoming line bay (Double bus bar) ▪ 2x230 kV transformer bay (Double bus bar) ▪ 2x132 kV transformer bay (Double bus bar) ▪ 2x230/132 kV, 125 MVA transformer ▪ 132/33 kV, 2025/25 MVA transformer ▪ 33 kV indoor and outdoor equipment (Five feeder)	*Construction of a new substation at Dangila Town-[16ha (400x400 meters) of land]* ▪ 2x 132 kV incoming line bay(Double bus bar) ▪ 2x132 kV incoming line bay (Double bus bar) ▪ 2x132kV transformer bay (Double bus bar) ▪ 2x132 kV transformer bay (Double bus bar) ▪ 2x230/132 kv, 125 MVA transformer ▪ 132/33 kv, 2025/25 MVA transformer ▪ 33 kv indoor and outdoor equipment(Five feeder)	*Construction of a new substation at Chilga Town-[16ha (400x400 meters) of land]* ▪ 2x 132 kV incoming line bay(Double bus bar) ▪ 2x132 kV incoming line bay (Double bus bar) ▪ 2x132 kV transformer bay (Double bus bar) ▪ 2x132 kV transformer bay (Double bus bar) ▪ 2x230/132 kv, 125 MVA transformer ▪ 132/33 kv, 2025/25 MVA transformer ▪ 33 kv indoor and outdoor equipment(Five feeder)
	Transmission Line ▪ Construction of 230 kV double circuit transmission line from the existing substation at Metu town to the proposed new substation at Masha town, a distance of about 130 km. ▪ Construction of a double circuit tower, two shield wires and one of the shield wires should be with optical fiber core ground wire (OPGW) serving as shield for the line from lighting strikes, as well as, data communication between the substation and the load dispatch	*Transmission Line* ▪ Construction of 230 kV single circuit transmission line from the existing sub-station at Finchaa town to the newly selected sub-station at Shambu town, which covers about 41.6km. ▪ Double circuit tower, two shield wires and one of the shield wires should be with optical fiber core round wire (OPGW) serving as shield of the line from lighting strikes, as well as, data communication between the substation and the load dispatch center (LDC). ▪ Three phases double circuit twin conductor of 2 X 180.7 mm2 ASH, single optical fiber cable shield wire on self-supported	*Transmission Line* ▪ Construction of 132 kV single circuit transmission line from Bahir –Dar town existing substation to Dangila town newly selected substation, which covers about 66km. ▪ Single circuit tower, two shield wires and one of the shield wires should be with Optical fibers core Ground Wire (OPGW) serving as shield of the line from lighting strikes, as well as, data communication between the substation and the load dispatch center (LDC). ▪ Three phases single circuit twin Conductor of 2 X 180.7 mm2 ASH, single optical fiber cable shield wire on self-supported	*Transmission Line* ▪ Construction of 132 kv single circuit transmission line from Azezo town existing substation to chiliga town newly selected substation, which covers about 42.3km. ▪ Single circuit tower, two shield wires and one of the shield wires should be with Optical fibers core Ground Wire (OPGW) serving as shielded of the line from lighting strikes, as well as, data communication between the substation and the load dispatch center (LDC). ▪ Three phases double circuit twin Conductor of 2 X 180.7 mm2 ASH, single optical fiber cable shield wire on self-supported tapered configuration vertical formation galvanized steel towers. Their average span is 310 meters erection of towers.

	center (LDC). ▪ Installation of three-phase double circuit twin conductor of 2 X 180.7 mm^2 ASH, single optical fiber cable shield wire on self-supported tapered configuration vertical formation galvanized steel towers. Their average span is 310 meters. ▪ Erection of about 210 towers.	tapered configuration vertical formation galvanized steel towers. Their average span is 310 meters. ▪ Erection of about 134 towers.	tapered configuration vertical formation galvanized steel towers. Their average span is 310 meters ▪ Erection of about 212 towers.	
	Construction of Access Roads ▪ Towards transmission line towers, estimated total length is about 3.3km at 5m width	*Construction of Access Roads* ▪ Towards transmission line towers, estimated length of 2.08 km at 5m width	*Construction of Access Roads* ▪ Towards transmission line towers, estimated total length is about 3.3 km at 5m width	*Construction of Access Roads* ▪ Towards transmission line towers, estimated total length is about 2.1 km at 5m width
Estimated Area Coverage of Substation	16 ha (400 X 400 meters).	16 ha (400 X 400 meters).	16 ha (400 X 400 meters).	16 ha (400 X 400 meters).
Estimated Length of Access road	3.3 km with 5m wide		3.4 km with 5 m wide	
Project Cost	USD 33,433,402.55	USD 27,983,806.69	USD 31,157,000	USD 51,471,000
Estimated Job Opportunity to be Created (Temporary, during construction)	200-250 People	128-160 People	203-254 People	130-162 People
Project Status	New	New	New	New
Project Justification	The prime purpose of this power transmission project is to meet the electric power demand populations along the proposed corridor. It will also contribute indirectly in meeting the demands of increasing electric services in Ethiopia. Moreover, it will facilitate the desired economic and social progress in the country. Therefore, these will contribute indirectly in meeting the demands of increasing electric services in Ethiopia. Moreover, it facilitates the desired economic and social progress in the country.			

Tentative Date of Commencement	Sep-16	Sep-16 (planned to be completed in 2 years)	Sep-16 (planned to be completed in 2 years)	Sep-16 (planned to be completed in 2 years)

CHAPTER THREE

2.Policies, Development Strategy, Legal, Institutional and Administrative Frameworks National Requirements

2.1.1. Institutional and Administrative Frameworks

2.1.1.1.The Federal Democratic Republic of Ethiopia (FDRE)

The FDRE comprises of the Federal State and Nine Regional State members. The power and duties of the Federal, Regional, and Local Governments have been defined by proclamation number 32 of 1992, 41 of 1993 and 4 of 1995 constitution. The government structure takes from the centre to the region and localities. Under these proclamation, duties and responsibilities of Regional State includes planning, directing and developing social and economic programs, as well as, the administration of natural resources of their respective regions. The basic administrative units in each regional government are zones, woredas and kebele administrative units at the lowest level. Further, based on their authority and responsibility the Regional Governments have established Sectoral Bureaus, Commissions and Authorities.

2.1.1.2.SNNPR and Oromia National Regional States

The SNNPR and Oromia regions are two of the 9 Regional State members, under the Constitution of the Republic of Ethiopia Organizational Structure of Administration. Regional States were established in 1994, under the new Constitution of Ethiopia. The Regions are structured into zones, woredas and kebeles (Urban and Rural) at the lowest level. For each of the two Regions, there is a Regional Council which is the supreme political and administrative entity of the respective region. The two Regions have established sectoral bureaus, commissions and authorities, based on their authorities and responsibilities issued by the FDRE constitution.

2.1.1.3.Ministry of Environment, Forest and Climate Change (MEFCC)

On 29th July 2013, the responsibilities and obligations of the Environmental Protection Authority (EPA) has been transferred to the newly established Ministry of Environment and Forest by Proclamation No. 803/2013 and renamed as Ministry of Environment, Forest and Climate Change in 2015. The Ministry has the following powers and duties:

- Coordinate measures to ensure that the environment objectives provided under the constitution and the basic principles set out in the environmental policy of Ethiopia are realized.
- Establish a system for environmental impact assessment of public and private projects, as well as social and economic development policies, strategies, laws and programs.
- Prepare a mechanism that promotes social, economic and environmental justice and channel the major part of any benefit derived thereof to the affected communities to reduce emissions of greenhouse gases that would otherwise have resulted from deforestation and forest degradation.
- coordinate actions on soliciting the resources required for building a climate resilient green economy in all sectors and at all governance levels as well as provide capacity building support and advisory services.

- Establish a system for the evaluation of the environmental impact assessment of investment projects submitted by their respective proponents by the concerned sectorial licensing organ or the concerned regional organ prior to granting a permission for their implementation in accordance with the Environmental impact Assessment Proclamation.
- Take part in the negotiations of international environmental agreements and, as appropriate, initiate a process of their ratification.
- Establish an environmental information system that promotes efficiency in environmental data collection, management and use.
- Promote and provide non formal environmental education program and cooperate with competent organs with a view to integrating environmental concerns in the regular educational curricula.

2.1.1.4. Ministry of Water, Irrigation and Electricity (MoWIE)

The Ministry of Water, Irrigation and Energy is the regulatory body for the energy sector, inter alia. Based on the delegation from Ministry of Environment and Forestry, the whole draft ESIA document will be submitted to the Ministry for reviewing purpose and then they will give their comments and recommendations and finally given approval /certify the implementation of the project and monitoring the performance of the development project will also be undertaken by the Ministry.

2.1.1.5.Ethiopian Electric Power (EEP)

Prior to 2013, the energy sector of Ethiopia has been overseen and supervised by the Ethiopian Electric Power Corporation (EEPCo). EEPCO was a national electricity utility established as public enterprises by regulation No. 18/1997 of the council of ministers. According to the aforementioned regulation, EEPCo was responsible for the generation, transmission, distribution and sales of electricity nationwide. Moreover, to carry out any other activities that would enable it to achieve its stated objectives. The said corporation is executing agency for all energy sector projects. As an implementing agency, EEPCO had responsibility to carry out its development activities in the manner that to protect the environment.

But in 2013, the corporation has been restructured into two institutions. Namely, the Ethiopian Electric Power (EEP) and Ethiopian Electric Utility (EEU) aiming at facilitation of the sector`s efficiency and effectiveness. Based on public enterprises Proclamation and Regulations (Proclamation No. 25/1992 and the Regulation Nos. 302/2013 and 303/2013) issued by council of minister. In the above connection, particularly the primary purposes of EEP re-establishment are to:

- Undertake feasibility studies, design and survey of electricity generation, transmission and substation; to contract out such activities to consultants as required;
- Undertake electricity generation, transmission and substation construction and upgrading; to contract out such activities to contractors as required;
- Handle electricity generation ,transmission ,operation and maintenance activities;
- Lease electricity transmission lines as required;
- Sell bulk electric power;

- Sell and pledge bonds and to negotiate and sign agreements with local and international finance sources ,in line with directives and policy guidelines issued by the ministry of finance and economic Cooperation (MOFEC) and
- Undertake any other related activities necessary for attainment of its purposes.

2.1.1.6. EEP Environmental and Social Office

This Office is one of the functional areas of EEP to address the major environmental and social issues in the power sector development. The team works to make the power generation and transmission construction environmentally and socially sound and sustainable. It works in line with the environmental proclamations, policies and international conventions enforcing EEP to comply.

The major task of the Environment and Social Office is to conduct periodic monitoring in power projects and operational activities of EEP, Environmental and Social impact Assessment (ESIA) and Resettlement Action Plan (RAP). The team ensures whether or not the EEP power projects are complying with the approved environmental and social management plan and undertaking the appropriate mitigation measures accordingly. The team will be providing technical support and regular monitoring of identified potential risks and agreed solutions according to the WB social safeguard policy.

2.1.1.7.Regional Environmental Agencies

Provisions for establishing or designating Regional Environmental Agencies are also included under Proclamation No. 295/2002. In both the regional states, such agencies were established. The Regional Environmental Agencies are directly accountable to their respective Regional Councils and the Regional Presidents.

2.1.1.8.World Bank (WB) Financed Project Management Office

EEP has established a new project office to coordinate the electric power transmission line and substation projects located at four lot sites in Ethiopia. The project office is located within the main building of EEP office in Addis Ababa.

2.1.2. Policy Frameworks

2.1.2.1.Environmental Policy of Ethiopia

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

The policy seeks to ensure the empowerment and participation of the people and their organizations at all levels in environmental management activities, and to raise public awareness and promote

understanding of the essential linkage between the environment and development. In addition, the EPE has outlined its guiding principles. Sectoral and cross-sectoral environmental policies will be checked against these principles to ensure consistency.

Environmental Impact Assessment (EIA) policies are included in the cross-sectoral environmental policies. The EIA policies emphasize the early recognition of environmental issues in project planning, public participation, mitigation and environmental management and capacity building at all levels of administration. The policy established the Ministry of Environment and Forest (MEF) as the body to harmonize Sectoral Development Plans and 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.

Land Policy and Tenure

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

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.

Art. 40.3 Of the Constitution states those 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 purposed project 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.

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, economic, and social rights of women by creating an appropriate structure in government offices and 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 program 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.

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.

Sector Policy for HIV/AIDS Prevention and Control in the Work Places

EEP has prepared a sectoral policy for HIV/AIDS in the workplaces of EEP. In the policy, EEP 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 company. Therefore, EEP:

- Commits itself to create a supportive and nondiscriminatory 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 (STIs),
- Commits itself to offering support, counseling and education services to infected and affected employees;
- Commits itself to establish and maintain an employee assistance program, and
- Insures sustainable resources for the prevention and control of HIV/AIDS

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.

Wildlife Policy:

The Ministry of Agriculture 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.

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 preventive 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-sectorial 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 neighboring 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.

EEP Resettlement Policy Framework

EEP Resettlement Policy Framework clarifies the principles of environmental and social impact mitigation in the process of addressing impacts induced by proposed projects. The Policy Framework stresses that project affected persons (PAPs) should be consulted and compensated for adverse impacts caused by the proposed project.

Water Resource Policy

The ministry of water resource 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 institutionalize environment conservation and protection requirement as integral parts of water resources planning and project development.

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.

Energy Policy

Energy is critical for economic development. Its importance stems from the fact that energy is a basic input in all productive activities, including the household sector. Energy is a necessary input to meet basic survival needs. In order to properly address the energy problem in the country from all aspects, it is necessary to formulate a comprehensive national energy policy which ensure least-cost development consistent with the country's energy resource endowment and socio- economic policies. The general objectives of the energy policy are:

- To ensure a reliable supply of energy at the right time and at affordable prices, particularly to support the country's agricultural and industrial development strategies adopted by the government.
- To ensure and encourage a gradual shift from traditional energy sources use to modern energy sources.
- To stream-line and remove bottlenecks encountered in the development and utilization of energy resources and to give priority to the development of indigenous energy resources with a goal toward attaining self-sufficiency.
- To set general guidelines and strategies for the development and supply of energy resources;
- To increase energy utilization efficiency and reduce energy wastage; and,
- To ensure that the development and utilization of energy is benign to the environment.

Growth and Transformation Plan II (GTP II)

The second 5 year GTP is the development plan of strategy that has been framed for the period 2015/16-2020/21.

During the plan period, the GTP encompasses qualitative and quantitative targets set in the development performance areas of all economic and social sectors among others(energy, water, mining, agriculture, irrigation, transport, telecommunication, education &health, construction and urban development, trade and industry) and cross-cutting sectors that includes: Gender and Children Affairs, HIV and AIDS Control Programs, Social Welfare, Population Development, Labour Affairs, Culture and Tourism, Science and Technology Development, Environment and Climate Change.

Climate Resilient Green Economy Strategy of Ethiopia

Ethiopia aims to achieve middle-income status by 2025 while developing a green economy. Following the conventional development path would, among other adverse effects, result in a sharp increase in GHG emissions and unsustainable use of natural resources. To avoid such negative effects, the government has developed a strategy to build a green economy.

Accordingly, the Climate-Resilient Green Economy (CRGE) initiative follows a sect oral approach and has so far identified and prioritized more than 60 initiatives, which could help the country achieve its development goals while limiting 2030 GHG emissions to around today's 150 Mt CO2e – around 250 Mt CO2e less than estimated under a conventional development path. The green economy plan is based on four pillars:

1. Improving crop and livestock production practices for higher food security and farmer income while reducing emissions
2. Protecting and re-establishing forests for their economic and ecosystem services, including as carbon stocks
3. Expanding electricity generation from renewable sources of energy for domestic and regional markets
4. Leapfrogging to modern and energy-efficient technologies in transport, industrial sectors, and buildings.

The initiatives offer positive returns on investments, thus directly promoting economic growth and creating additional jobs with high value-added. Implementing the initiatives would also offer important co-benefits. For example, it would improve public health, through better air and water quality, and would promote rural economic development by increasing soil fertility and food security.

3.1.4. Environmental Legislation, Guidelines and Proclamation

Environmental Impact Assessment Guidelines

MEFCC Environmental Impact Assessment Guideline

The MEFCC has issued a Guideline Document for EIAs. 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 EIA system as set out by the MEFCC 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 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 may therefore, require full EIA.

Schedule2: 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.

Schedule3: 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 study project has been undertaken using the MEFCC EIA guidelines. The project categorization schedule-1 is equivalent to category A, schedule-2 as category B and schedule-3 as category C. There is no substantive difference in the alignment of GoE schedules and World Bank categorization.

Therefore, the proposed electric power transmission line projects which are located here below at lot four sites fall under category A.

- LOT-I: 230 kV Metu-Mesha EPTLP to be constructed in SNNPR and Oromia.
- LOT-II: 230 kV Finchaa-Shambu EPTLP to be constructed in the Oromia region.
- LOT-III: 132 kV Bahir Dar- Dangila EPTLP to be constructed in the Amhara region.
- LOT-IV: 132 kV Azezo-Chiliga EPTLP to be constructed in the Amhara region.

EEP's Environmental Guideline for the Power Sector

The EEP's Environmental and Social Expert Group has prepared Environmental Guideline, which specifies the requirements and procedures to conduct an ESIA for energy sector projects.

Proclamations

Environmental Protection Institutions Establishment Proclamation No. 295/2002

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

This Proclamation re-established the MEFCC 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.

Environmental Impact Assessment Proclamation No-299/2005

The main objective of this Proclamation is to make EIA 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 EIAs, and determines the duties of different parties concerning EIAs.

The general provisions of the Proclamation include:

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

To affect this Proclamation, the MEFCC issued an EIA Guideline document, which provides details of the EIA process and its requirements.

Environmental Pollution Control Proclamation No.300/2002

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 MOEPF, 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.

The Rural Land Administration and Land Use ProclamationNo.456/2005

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.

Proclamation on Expropriation of Landholdings for Public Purposes and Payment of Compensation No. 455/2005

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

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

the land. Accordingly, the compensation for the Wolekyite power transmission line project affected people should be effected according to this proclamation.

Research and Conservation of Cultural Heritage Proclamation No. 209/2000

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 borne 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 energy, 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, Electric Power Transmission Line Projects which are located at the four lots targeted sites, the construction contractor should immediately report it to the nearest responsible office and protect and keep it intact until responsible body handles it.

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. The Environmental Protection Authority transitioned in 2013 as Ministry of Environment, Forest and Climate Change. The rationale for the review of these conventions is to show the alignment of national laws and policies with these conventions. These Conventions and Protocols are as follows:

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.

Kyoto Protocol to the UN 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.

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.

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.

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.

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.

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.

Legal Frameworks for Public Consultation and Participation (PCP)

The FDRE constitution has many articles that deal with public consultation and participation. Among those, the following are taken in to consideration in the context of the project. Article 43(2) acknowledges the right of the people participation and consultation with respect to polices and projects that affects them. Article 92, guarantees the right of the people to full consultation and the expression of view in the planning and implementation of environmental policies and project that affects them.

3.2. The World Bank's (WB`s) Environmental and Social Safeguard Policies

3.2.1.1. Operational Policy (OP) 4.01: Environmental Assessment (EA)

The core requirement of this OP is that screening should be done as early as possible for potential impacts and select appropriate instrument to assess, minimize and mitigate potentially adverse impacts. An Environmental Assessment ensure that appropriate levels of environmental and social impact assessments are carried out as part of project design. It is worth noting that OP 4.01 applies to all components of a project with financing from the World Bank, including co-financed components by the Borrower or by other funding agencies.

This overarching safeguard governs the process of determining a project's environmental and social Category and the resulting environmental and social assessment requirements. Environmental and social assessment includes the project's area of influence, a comprehensive scoping of the project's components, consideration of alternatives, and assessment of cumulative impacts, where relevant.

The WB's category of the projects comprises the followings;

Category A: Bank operations likely to cause significant environmental and social impacts

Category A projects are likely to induce significant and/or irreversible adverse environmental and/or social impacts, or to significantly affect environmental or social components that the Bank or the borrowing country considers sensitive. Some program based operations or other regional and sector program me loans that have significant adverse environmental or social risks and are deemed to be Category A. In some cases, projects are included in Category A because of their potential cumulative impacts or the potential impacts of associated facilities. Any project requiring a full Resettlement Action Plan (RAP) under the provisions of the Bank's policy on involuntary resettlement is also deemed to be Category A.

Category A program based operations or regional and sector loans require a strategic environmental and social assessment (SESA), and Category A investment projects require an environmental and social impact assessment (ESIA), both leading to the preparation of an ESMP. For a project requiring a full RAP, the ESIA includes, and—if there are no other issues requiring assessment—may be limited to, the social assessment needed to prepare the full RAP.

Category B: Bank operations likely to cause less adverse environmental and social impacts than Category A

Category A projects are likely to have detrimental site-specific environmental and/or social impacts that are less adverse than those of Category A projects. Likely impacts are few in number, site-specific, largely reversible, and readily minimized by applying appropriate management and mitigation measures or incorporating internationally recognized design criteria and standards. Most program based operations and regional or sector program loans designed to finance a set of subprojects approved and implemented by the borrower or client are included in this category unless the nature, scale or sensitivity of the intended pipeline of subprojects involves either a high level of environmental and social risk or no such risk.

Category B projects require an appropriate level of environmental and social assessment (SESA for program operations, investment plans, and some corporate loans, or ESIA for investment projects) tailored to the expected environmental and social risk so that the borrower can prepare and implement an adequate ESMP (for an investment project) or ESMF (for a program operation), to manage the environmental and social risks of subprojects in compliance with the Bank's safeguards.

Category C: Bank operations with negligible adverse environmental and social risks

Category C projects do not directly or indirectly affect the environment adversely and are unlikely to induce adverse social impacts. They do not require an environmental and social assessment. Beyond categorization, no action is required. Nonetheless, to design a Category C project properly, it may be necessary to carry out gender analyses, institutional analyses, or other studies on specific, critical social considerations to anticipate and manage unintended impacts on the affected communities.

Category FI: Bank operations involving lending to financial intermediaries

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

3.2.1.2 Operational Policy (OP) 4.11: Physical Cultural Resources

The policy requires the project to avoid or mitigate adverse impacts of development on physical cultural resources. In that instance, the Policy bases itself on investigating and inventorying any chance findings and cultural resources potentially affected. It includes mitigation measures when there are adverse impacts on physical cultural resources.

The Borrower assesses the project's potential impacts on physical cultural resources as an integral component of the Environmental and Social Impact Assessment (ESIA).

The physical cultural resources component of the ESIA provides for (a) an assessment of physical cultural resources likely to be affected by the project, (b) documentation of the characteristics and significance of the these resources, and (c) an assessment of the nature and extent of potential direct and indirect impacts on these resources.

Where the ESIA predicts adverse impacts on physical cultural resources, the cultural resources component of the ESIA includes a management plan which includes: (a) actions to mitigate adverse impacts, (b) provisions for the treatment of physical cultural resources discovered during project implementation and operation (hereafter referred to as "chance finds"), (c) any necessary measures for

strengthening institutional capacity to implement the management plan, and (d) a monitoring system to track progress of these activities.

The management of cultural property should be undertaken in conjunction and consultation with appropriate agencies including NGOs and academic institutions.

The Bank avoids projects that will significantly damage non-replicable cultural property, and will assist only those projects that are sited or designed so as to prevent such damage.

3.2.1.3 Operational Policy (OP) 4.12: Involuntary Resettlement

The policy aims to avoid or minimize involuntary resettlement where feasible by exploring all viable alternative project designs. Its key economic objective is to assist displaced persons in improving their former living standards, income earning capacity and production levels, or at least in restoring them. The Operational Policy promotes the participation of displaced people in resettlement planning and implementation. It also promotes for provision of assistance to affected people regardless of the legality of land tenure.

The policy covers not only physical relocation, but any loss of land or other assets resulting in: (i) relocation or loss of shelter; (ii) loss of assets or access to assets; and (iii) loss of income sources or means of livelihood, whether or not the affected people must move to another location.

The impetus of this Policy is that development projects should not cause the impoverishment of the people who are within the area of influence of the projects. In cases where resettlement of people is inevitable, proper resettlement action plan should be undertaken to at least restore or improve, as stated above, their standard of life prior to the projects.

Concerning public consultation, resettles, as well as the host communities should be consulted for the successful implementation of the resettlement process. The views of the consulted resettles and the host communities should be incorporated into the Resettlement Action Plan (RAP) including the list of their choices.

3.2.1.4 Operational Policy (OP) 4.04: Natural Habitat

Natural Habitats OP/BP 4.04: This policy is triggered by any project (sub-project) with the potential to cause significant conversion (loss) or degradation of natural habitats (protected or unprotected ecologically valuable habitats), either directly through construction or indirectly through human activities induced by the project. The natural habitats are land and/or water areas where the biological communities are formed largely by native plant and animal species, and human activities have not essentially modified the primary ecological functions. Natural habitats have important biological, social, economic, and existence value. The policy was triggered because sub-projects in EPTLP may have some adverse impacts on wetlands, protected areas, conservation sites, and critical ecosystems.

3.2.2. WB`s Requirements on Public Consultation and Disclosure Plans

It is the requirement of the Bank that people residing in the project area have the Right to be informed of the proposed development project(s) in their respective areas. Therefore, prior to project appraisal, the summary of the study of projects along with other relevant information should be disclosed at the Bank's as well as project area (local) level.

The Disclosure Policy requires that Category B Environmental Assessment reports should be self-standing document and thus disclosure is a pre-requisite for appraisal of the project. These effects can lead to the improvement of the infrastructure related to agriculture, commerce and the activation of the regional economy.

WB's requirement regarding the public consultation and disclosure plans reveals public consultation and disclosures of information are continuous processes at all stage of project phases. It will be conducted at each project phases of planning, construction and operation in culturally appropriate way.

The borrower or client is responsible for conducting and providing evidence of meaningful consultation (i.e., consultation that is free, prior and informed) with communities likely to be affected by environmental and social impacts, and with local stakeholders, and also for ensuring broad community support, especially for Category A projects and for projects affecting indigenous peoples. Consultation is undertaken with reference to the updated ESIA Guidance Notes on consultation, participation and broad community support, which also provide guidance on affected communities' involvement in the process of project planning, implementation and monitoring.

Consultation is based on stakeholder analysis and is preceded by disclosure of adequate project information and environmental and social information to ensure that participants are fully informed. It begins at an early stage during project preparation and continues as needed. It is conducted in a timely manner in the context of key project preparation steps, in an appropriate language, and in an accessible place. The results of the consultation are adequately reflected in the project design and in the project documentation.

For Category A projects, the affected communities are given the opportunity to participate in key stages of project design and implementation. Therefore, stakeholders should be consulted to obtain their input into the preparation of the draft terms of reference of the environmental and social assessment, the draft SESA or ESIA report and summary, and the draft ESMP. For Category B projects, the affected communities and stakeholders are consulted about the draft environmental and social assessment report and the draft ESMP. Consultation should be conducted with the objective of ensuring that the project—especially a Category A project—has broad community support, and that affected people endorse the proposed mitigation and management measures.

When the borrower or client has identified vulnerable communities that would potentially be affected by the project, the borrower/client engages in meaningful informed consultation and participation with the vulnerable communities, beginning as early as possible in the project cycle before the project is submitted for Board consideration and continuing throughout the project cycle. The borrower or client demonstrates that consulted individuals or groups can effectively represent the affected groups.

Environmental and social assessment documents are made public at relevant stages of the project cycle through EEP's website in country and disclosed on the WB Infoshop website. Borrowers also disclose assessment documents in appropriate national and local settings under the direct responsibility and supervision of relevant national/local authorities.

Disclosure commences early in project preparation to allow the public, beyond the mandatory consultation process, to genuinely participate in project design and implementation. This enables communities in project areas to voice their concerns and aspirations and reap true benefits from project related developments.

- In most cases, the disclosure of key environmental and social assessment documents in the ISTS begins with the terms of reference for SESA/ESIA for Category A and 2 projects and encompasses all relevant documents, including SESA/ ESIA summaries, ESMPs, financial intermediaries' ESMSs, and Resettlement Action Plans.

- For Category A public sector projects, final and cleared versions of key environmental and social assessment documents (SESA/ESIA, ESMP and Resettlement Action Plan summaries) are disclosed at least 120 days before Board consideration, and final versions of Category A private sector projects are disclosed at least 60 days before Board consideration.

Most corporate loans involve implementation of various subprojects and thus can be treated like financial intermediary category investments.

- For Category B public and private sector projects, a summary of the ESMP is made available to the public in the borrowing country, on the Bank's website and through other appropriate channels of information for at least 30 days before Board consideration.
- For Category FI projects involving financial intermediaries or corporate loans, the financial intermediary ensures that the subprojects that require ESIAs undergo the same information disclosure process as other private sector Category A projects funded by the Bank. Financial intermediaries are required to notify the responsible sector department in the Bank if a subproject is deemed to be Category A, and this information is passed on to the relevant Compliance and Safeguards function of the Bank.
- In projects in which a full RAP is required, it is released as a supplementary document to the ESIA Summary. For any project involving the resettlement of fewer than 200 persons, an ARAP, together with the ESIA or EMSP, is disclosed by the borrower in the borrowing country and by the Bank in the Public Information Centre and field offices, and is posted on the Bank Group's website for public review and comment.

CHAPTER FOUR

3.Analysis of Alternatives

Project Alternatives

The projects versus no project/ "do nothing option" were demonstrated for the EPTLPs at the four selected sites. The details are provided below:

Option -I: Do - Nothing Option

From the environmental and social points of view, this option is preferable, because it avoids creation of adverse impacts associated with the projects. Thus, the projects funds could be shifted to another viable project that can bring another development benefits to the people

To conclude, the "do nothing option" is the least preferred option, because it holds back the country's economic development in every corner.

Option –II: Project Implementation

In terms of socio-economic advantage the projects implementation is preferable and paramount important option to be selected with objectives to fulfill the Ethiopian development strategy of the second 5 years GTP.

Comparison of Route Alternatives

Some simple criteria were selected to compare the three route alternatives. Impacts due to construction and operation that are applicable more or less equally to the three alignment options were not used as these would cancel each other. For example, the impacts due to migrant workers, impacts of the contractor's camp, road safety issues, and occupational health issues are the same regardless of the alignment option.

In this case, in the context of socio-economic criteria, the length of road was considered important as travel time for workers has a bearing on productivity, as well as travel costs. The length of new road construction is also important as this is proportional to environmental degradation such as deforestation and erosion, which have socio-economic implications. Many of the local communities harvest and depend on natural resources either for sustenance or to supplement their incomes. Erosion and soil loss due to new road construction could lead to reduced agricultural productivity along the route alignment. One may expect ribbon development to occur along these new sections, and consequently there will be a change in land use due to the settlement process and population growth along the new routes, and the attendant pressures on fuel wood and other resources.

Physical connectivity between the villages/settlements and main trading centres through construction of roads due to the project was considered very important by the local communities because of its potential for opening up new areas.

Relocation of people due to the acquisition of land, which also necessitates compensation and resettlement, was a major concern of the stakeholders. Where new road alignments will be constructed, settlements, houses and other assets can be easily avoided through maneuvering the road alignment. Construction along the existing alignment will therefore be the cause of any relocation that may be necessary.

Route Alternatives

Analysis of alternative route options study findings at four Lots targeted sites of each 4 EPTLPs reveals the followings:

I. At lot- I Site: Metu-Masha 230 kV Power Transmission Line Project

Analysis of routing study findings for the project indicates the results indicated below. Three alternative route options with an estimated length in km have been identified and recorded. These are:

- R1 (65.1km)
- R2 (66km)
- R3 (66km)

Among the aforementioned route option, R1 has been selected, as the best option, in terms of design, minimal environmental, economic, social and financial impacts. On the basis of the feasibility study and suggested design features, the preferred route is option RI because it is the shortest distance, farther away to cities and with fewest PAPs.

II. At lot- ii site: for Finchaa- Shambu 230 kV Power Transmission Line Project

Analysis of routing study findings for the project indicates three alternative route options with an estimated length in km have been identified and recorded. These are:

- R1 (41.6 km)
- R2 (41.7km)
- R3 (41.8km)

Among the aforementioned route option, R1 has been selected, as the best option, in terms of design, environmental, economic, social and financial impacts. On the basis of the feasibility study and suggested design features, the preferred route is option R1 because it is the shortest distance, farther away to cities and with fewest PAPs.

III. At Lot- III Site: For Bahir-Dar-Dangila 132KV Power Transmission Line Project

Analysis of routing study findings for the said project indicates the following Results:

The only route option that has been preferred and selected is Route Option one (R1); an estimated length of the said route in km is 67.5km. The only route option is the route alignment along the existing road .so that it facilitates ease of construction and maintenance. On the basis of the feasibility study

and suggested design features, option RI is the shortest distance, farther away to cities and with fewest PAPs.

The only option during the feasibility routing study has been selected in terms of design, environmental, social and economic advantage,

IV. At Lot- IV Site: For Azezo-Chiliga 132KV Power Transmission Line Project

Analysis of routing study findings for the said project indicates the following Results:

The only route option that has been preferred and selected is Route Option one (R1); an estimated length of the said route in km is 42.3km. The only route option is the route alignment along the existing road so that it facilitates ease of construction and maintenance. On the basis of the feasibility study and suggested design features, the preferred route is option RI because it is the shortest distance, farther away to cities and with fewest PAPs.

CHAPTER FIVE

5. BASELINE CONDITIONS

The 230 kV Metu-Masha EPTLP

5.1.1. Physical Environment

5.1.1.1. Topography

The general topographic nature of the site for the transmission line project is supposed to comprises mainly of flat, rolling to flat with some gentle slopes mixed with hilly landscape structures of terrain types.

5.1.1.2. Climate

The project covers overall a total length of 65.1km and entirely situated within agro -climatic zone of tropical region (500 to 2084masl), the average annual temperature ranges from 20-30^{0}c and rainfall is between 401-800 mm. The rainy season extends from May to September. The small rain falls between February and April and heavy rain is from July to September. The month of November, December and January are generally dry with ground frost at night.

5.1.1.3. Soil

The soil type along the project area is predominantly characterized by Latosols. Latosols are very shallow and have somewhat limited agricultural potential. The other soil types currently existing in the tropical region of the project site are Cambisols and Calcisols. These soil types have relatively good physical and chemical properties for agricultural productions.

5.1.1.4. Mineral Resources

Based on data sources obtained from project targeted areas, major minerals existing along Zone of Influences (ZOIs) are iron ores deposit.

5.1.1.5. Water Sources

The main sources of water supplies both for human and livestock population are rivers, shallow and hand dug unprotected and protected wells in the rural sites while, in the urban areas these are pure water supplies from protected wells and by piped lines.

Based on data sources obtained from project affected sites of water resource development sector offices, as well as, community interviews and discussions that have been carried out along ZOIs, no conflict in water usage currently exist in the general project area.

5.1.1.6. Land Use and Cover Characteristics

The major land use and land cover characteristic types in the project area are: Cultivated and Cultivable, Grazing, Forest, Bare Land, others (settlement, infrastructures, etc.)

5.1.2. Biological Environment

5.1.2.1. Flora

In general, the vegetation coverage of project area is high. The area is characterized by densely populated species diversity.

The project area is in the tropical agro-climatic zone. The dominant tree species currently existing are Acacia, Erythrina, Cordia, Ficus, Eucalyptus, and Albizia.

Acacia and Ficus trees

Eucalyptus trees

5.1.2.2. Fauna

The diversity of wild animals in the study areas as a whole is low because of the decline of their natural habitat. However, according to the information from the Woreda agriculture office, some common wild animals currently existing in the area are:

Hyena (Crocuta crocuta);
Monkey (Cereopithecus aethiops);
Duiker (Sylvi capra species);
Wild cats (Felis lybica (Lepus sp) ;
Dormouse (Graphinu parvus);
Abyssinian hare (Lapwabissinicus)
Dik dik (Madaquq guentheri).
Lion
Leopard

5.1.2.3. Protected/Reserved Areas, Sanctuaries

During the study period, sites of ecological importance, like designated wild life parks; reserved or protected areas; sanctuaries etc along the project route in all participating woredas were assessed, and accordingly, there are no such records of protected/reserve areas and sanctuaries identified.

5.1.3. Socio-Economic Environment

5.1.3.1 Location and Administrative Organization

The proposed transmission line project is located in the south-western part of Ethiopia namely in the SNNPR and Oromia regions. The SNNPR and Oromia regions are two of the nine regional state members of FDRE government established under the 1995 Constitution. The regions are structured into Special Zones/Zones, Special Woredas/Woredas and kebeles.

The duties and responsibilities of the regional states include planning, oversight and development and protection of natural resources of the region. The supreme political and administrative entity of the region is the regional council. Further, based on authority and responsibility, the regional governments have established sector bureaus, commissions and authorities.

Zone administration does not have councils, but report to the regional council. Members of zone administration are elected from the regional executive committees. The committee coordinates and controls activities in the Woredas, and enforces the proclamations policies, regulations and decisions of the regional council. Moreover, it prepares proposal for socio-economic developments of the respective zone. It is accountable to the regional executive committees. Organizational structure of zone administration constitutes representatives from all sector development bureaus under respective zones.

The Woreda council administration consists of representatives from the kebeles who are elected by the people, members of the Woreda council. The Woreda council is accountable to the people of the Woreda, the zone executive committees, and through the latter regional executive committees. The Woreda administration is mandated to enforce laws, policies, regulation and directives issued by the regional state. Moreover, it is responsible for administration of sector development offices establishment under their respective Woredas. Last but not least, the Woredas' duties are to prepare social and economic development plans for decision and implementation. The organizational structure of the Woreda consists of all representatives of sector development offices.

The Kebele administrative assembly or "Shengo" consists of the executive committee together with the judicial, security, social and economic development bodies. Members of the Kebele assembly are elected by the people, and so the assembly is accountable to the people, the Woreda council and the Woreda executive committee. The Kebele assemblies are required to implement plans and directives issued by the Woreda council and higher bodies.

The specified government structure is suitable for efficient realization of the project. Because since the decentralization, Woredas are empowered to plan implement projects, which are planned to enhance the socio-economic status of their population and the structure is suitable for the promotion of community participation in development activities.

Administratively, the proposed project overlap two administrative zones and three Woredas. Accordingly, lists of the aforementioned administrative set-ups traversed by envisaged project against number of kebeles along Zone of Influences (ZOIs) are outlined and presented in the table **5.1** here below.

Table 5.1: Lists of administrative set-ups affected by the envisaged project

S\No	**Region**	**Zones**	**Woredas**	**Number of Kebeles covered by the project**		
				Rural	Urban	Total
1	Oromia	IIubabor	Metu	3	2	5
			Didu	2	-	2
			Alle	1	-	1
SUB-TOTAL-1	**1**	**1**	**3**	**6**	**2**	**8**
2	SNNPR	Shaka	Masha	3	2	5
SUB-TOTAL-2	**1**	**1**	**1**	**3**	**2**	**5**
Total (subtotal 1+2)	**1**	**2**	**4**	**9**	**4**	**13**

Sources: General project affected Woredas. (Provide year)

5.1.3.2. Demographic Characteristics and Trends

Population and Household Size

According to the CSA 2013 population projection, the total projected population of the targeted woredas in 2015/16 is 1,699,969 out of which 52% (852,860) are males while, the remaining 49.8% (847,145) are females. In terms of residence, about 60% or 1,015,962 (511,502 males and 504, 460 females) are living in the rural site sites, the remaining 40% or 684,043 (341,358 males and 342,685 females) resides in urban areas. The population figures in percentage for urban is greater than the national average (19.4 %), while, the rural is less than the national average (80.6%). Projected population by sex against residence site for 2015 are outlined and presented in the table below.

Woreda	Total Population projection (2015/16)[10]								
	Total (Urban-Rural)			Urban			Rural		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Debre Markos	51076	52187	103263	51076	52187	103263	-	-	-
Bahir Dar	172979	172631	345610	148786	149008	297794	24193	23623	47816
Dangila	98792	96451	195243	22852	21810	44662	75940	74641	150581
Chilga	132648	131073	263721	16005	18213	34218	116643	112860	229503
Bako	79051	80811	159826	17938	17221	35159	61113	63590	124703
Ambo	37571	36549	74120	37571	36549	74120	-	-	-
Shambu	11831	11239	23070	11831	11239	23070	-	-	-
Mesha	26140	27337	53477	6594	7119	13713	19546	20218	39764
Metu Zuria	36765	36946	73711				36765	36946	73711
Dido	19,936	20,079	40,015	827	884	1,711	19,109	19,195	38,304
Ale	41,030	41,627	82,657	6,892	7,033	13,925	34,138	34,594	68,732
Abey Chamo (Fincha)	33,263	31,409	64,672	7,774	7,458	15,232	25,489	23,951	49,440
Gondar Zuria (Azezo)	111,778	108,806	220,584	13212	13964	27176	98566	94842	193408
Total Project Site	852860	847145	1699969	341358	342685	684043	511502	504460	1015962

Source: Central Statistical Agency; 2013.

Table 5.2: Projected population projection in the proposed EPTLP sites 2015/16

10 Central Statistical Agency. 2013. Population Projection of Ethiopia for All Regions at Wereda Level from 2014-2017. Addis Ababa.

S/No	Project area	Land area (km^2)	Projected population			Density	% of rural population
			Male	Female	Total		
1	Oromia Region	284,537.8	16,906,992	16,784,999	33,691,991	118.4	85.5
1.1	Illu babor-Zone	15,135.33	768,525	770,658	1,539,183	101.7	88.7
1.1.1	Metu	16.26	20,007	20,314	40,321	2,479.8	-
1.1.2	Alle woreda	830	38,930	39,443	78,373	94.4	83.8
1.1.3	Didu woreda	735.33	19,477	19,602	39,079	53.1	95.8
Subtotal-1 (3 Woredas)		1,582	78,414	79,359	157,773	99.7	65.4
2	SNNPR	105,887.2	8,843,999	8,993,006	17,837,005	168	84.8
2.1	Sheka Zone	2,387.54	124,772	123,102	247,874	104	75.0
2.1	Masha Wereda	736.73	24,758	25,860	50,618	69	75.7
Sub Total 2: Mash woreda		737	24,758	25,860	50,618	68.7	75.7
3	4 (combined Woredas)	2,319	103,172	105,219	208,391	89.9	84.2
4	ZOIs	2,084.3	55,762	55,540	111,302	53.4	83

Sources: Central Statistical Abstract (CSA), 2014 and the general project 4 for woredas (2015)

Population Densities

The population and population densities of the general project area and ZOIs are outlined and presented in the table 5.2 above. Accordingly, the population densities for the general project area and ZOIs are 89.9 and 53.4 person per square kilometre respectively.

5.1.3.3 Ethnic Composition and Religion

Based on the 2007 National Population and Housing Census results, interview and Focus Group Discussion carried out in the field sites, as well as, by field observation, major ethnic groups, language and religious facility services were identified and recorded in general project affected areas and ZOIs Accordingly, analysis of the survey result reveals majority of population constitutes Shekecho ethnic group. The remaining belong to the Keficho, Oromo, Amhara, and Gurage. Concerning religious facility services, the largest percentage of population is Ethiopian Tewahedo Orthodox Christian. Following that are other Christian religions such as Protestants, Muslims and traditional religions.

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

5.1.3.4 Settlement Patterns and Housing Characteristics

Generally speaking, with respect to rural areas, the settlement pattern is of highly scattered type, while it is of a clustered pattern in urban sites. Overall, 99% of housing types in the urban areas are made of corrugated iron roofing, while in rural areas they are entirely tukuls, i.e., almost 85%.

5.1.3.5. Livelihood

Agriculture

Analysis of existing major sectors of the economy for livelihoods is a paramount important during project and programs development period. To this end, the 230kV Metu-Masha electric power transmission project is no exception. Accordingly, during the study period the existing major economic practices for the livelihoods of the people living in the general project affected area were assessed. Hence, major sectors of economic activities are based on crop production and cattle rearing.

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

The major annual crops produced in the area are cereals such as, teff, sorghum and maize. The major perennial crops types identified in the project area and recorded during field assessment period are mango, lemon, orange, papaya, sugarcane, hops and chats.

Table 5.4: Major crops with share of cultivated land against average yield per hectare 2014/15

Type of crops	Share of the cultivated land (%)				Average yield in (quintals/ha)				Price per quintal in Birr			
	Metu	Alle	Dido	Masha	Metu	Alle	Dido	Masha	Metu	Alle	Dido	Masha
Teff	10	7	4	7	13	15.38	15	15.38	1400	1400	1400	1400
Maize	20	23	25	23	12.71	15	16	15	550	550	550	550
Sorghum	21	21	23	21	21.05	13	13.5	13	600	600	600	600
Orange	3	5	5	5	97	110	110	110	2000	2000	2000	2000
Papaya	8	13	16	13	227	244	253	244	1000	1000	1000	1000
Lemon	3	4	4	4	107	110	110	110	2000	2000	2000	2000
Banana	2	6	8	6	203	205	206	205	1600	1600	1600	1600
Mango	2.5	3.4	3.8	3.4	54	57	57	57	2500	2500	2500	2500
Hops	1.5	2.7	4.1	2.7	31	34	35	34	1300	1300	1300	1300
Sugarcane	1	1.03	1.5	1.03	504	506	508	506	1000	1000	1000	1000

Source: Project Affected Woredas Agriculture Office (2015)

Crop production is at subsistence level in the region in general and in the project area in particular. This is mainly due to the traditional farming system that is mainly based on hoe cultivation system. Besides, there is no adequate modern input to improve production by those farmers who are engaged in crop farming. Farming practices in the general project areas are still traditional. Machinery, fertilizers and pesticides are usually not available. Farmers practice sedentary food crop production

using oxen for ploughing. Shifting cultivation is common practice in area. It is an old land use practice which involves clearing of the forest and burning the thrash before crop farming. After some years of cropping the land is left fallow in order to restore the fertility of soil.

As data sources obtained from the agriculture sector offices in the affected project areas reveals, the average land holding size per household is about 0.5 ha. Along with efforts exerted to improve crop production, attention has been provided to the development of livestock rearing to complement the need for food security in the Oromiya region which is part of the general project affected areas.

Livestock

Livestock rearing is the dominant economic practice for means of subsistence in the affected general project area of Oromia Region.

The challenges of animal health hazard existing in the general project area are trypanasomiasis, internal and external parasitism. Besides, limitation in animal health institutions, skilled manpower and scarcity of veterinary treatment service contribute to the impediment of animal production in the general project area.

Based on data sources obtained from four woredas within the project, the most commonly owned types of livestock with proportion of holders owning them against average held size per household in the general project area are presented in the table 5.5 here below.

Table 5.5: Types of livestock against average held size per house hold in general project area (2015)

Type	Average held size per house hold in %
Cattle all types	5-4
Sheep	5.6
Goat	7-10
Camel	3-2
Donkey	2-3
Mule	1-2
Poultry	5-7
Beehives	Na

Source: Project affected in four Woreda Agriculture Offices (2015)

Cattles in the project area are used primarily for dairy and meat production, as well as, farm traction. Camels are used commonly as pack animals and to provide milk. Mules and donkeys are most frequently used for transportation. Poultry and their produce are useful for households' income sources and expenditure.

Off- Farm Activities

Off farm market based economic activities are other forms of livelihood, in the general project affected areas along ZOIs. Most income generation schemes that communities are currently engaged in are traditional, uniform and meant mostly to meet daily needs. Some of the activities widely undertaken include traditional informal salt mining, sell of fuel wood, gathering wild honey, etc.

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

5.1.3.6. Household Income and Expenditure

According to data obtained from the Finance and Economic Development Office within the general project areas, the household income level is low in the project area. Accordingly, the figures for low, middle and high levels in Ethiopian Birr are <150, 500-1500, and >1500. Cash income sources are mainly from sales of agricultural products (Sales of crops, livestock and their produces), which are the source of more than 80% of the cash income of relatively rich households along ZOIs. Sales of honey, fuel woods, trees, as well as, petty- trading activities complement incomes in both SNNR and Oromia Regions.

5.1.3.7. Physical Infrastructures and Social Services

Poverty is one of the major challenges of countries in the continent of Africa including Ethiopia. The development of education, health, pure water supply and sanitation, transportation and communication networks, waste disposal management and recreational services are important investment sectors for the attainment of social development in a given country or region. Cognizant of this fact, the Federal Government of Ethiopia has made various development efforts for scaling up social service development facilities in different regions of the country. Accordingly, the following physical infrastructures and social services facilities have been assessed during the study period. The details are outlined and discussed in following subsections.

5.1.3.7.1. Education Service

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

Number of schools

The total number of schools at different levels in general project affected Woreda and ZOIs are outlined and presented in the table below.

Table 5.6: Distribution of Educational Institutions in the General Project Affected Woredas (2015)

School Type	Grade	Woredas								ZOIs
		Metu	**Alle**	**Dido**	**Masha**				**Total**	
Primary	1-8		18	12	8	1	1	1	41	6
Secondary	9-10		1	1	1	-	-	-	3	-
Preparatory	11-12		1	1	1	-	-	-	3	-
TEVT			1	1	1	-	-	-	3	-
Total			21	15	11	1	1	1	50	6

Source: Woreda Education Offices of the 4 Project Woredas (2015)

As revealed in table 5.6 here above, the existing total number of schools in the project Woredas are 50. Out of these schools, 41 are primaries, 3 secondary, 3 preparatory and 3 TEVT schools. The figures for ZOIs are 6. All school types existing are primary.

According to information obtained from Woreda Education Offices, the existing numbers of educational institutions are adequate for school age population existing in area. Moreover, it was reported that the promotion of education is critically stranded due to lack of teaching aids and other vital educational materials essentially needed for education.

Although the budget allocation has been increased in the country during the post-reform period for the education sector, the budget allocated to education has been small in the project Woredas based on information sources obtained from six affected Woreda Education Offices. Number of teachers with qualification at different school levels in the Project Woredas and ZOIs 2015 are outlined and presented bellow in the table 5.8

As can be observed currently, the total number of 533 (381 male + 152 female) teachers with different qualification are existing in the Project Woredas, while the figure for ZOIs is 144 (126 male+18female). To this end, the data sources obtained from the Education Offices of the Project Woredas indicates that the numbers & quality of teachers in terms of training and motivation has been low. Though, efforts are being made to improve the situations.

Enrollment Rates

According to the information obtained from Education Offices in the six project affected Woredas, student enrolment rate is less than the overall school age population though considerable progress has been observed in the elapsed few years. Both gross and net enrolment ratio of girls is lower than boys

in all types of school levels. Looking at the data in terms of residence, it is higher in the rural sites compared to urban, which of course is the case for the county in general.

Based on data sources obtained through interviews and discussions with individuals and groups in the community, the cause of the aforementioned problems are:

- In the society the burden of various household tasks (food preparation, housekeeping, care of children etc.) are put on the shoulder of the female members.
- Females are exposed to distinct sorts of socio economic and cultural discriminations compared to males.
- The societies do not encourage the females to go to school and participate in the development programs as compared to the male counterparts.
- Low public awareness creations on gender and related issues.

Student Dropout Rate

The data sources obtained from the Education Offices of the Project affected indicates that student dropout rate is lower at primary level (1-8) than secondary level. In terms of sex, females' dropout rate is higher than males. The major two reasons cited in both primary and secondary schools were health and economic reasons.

Proximity to School

According to the statistical measurement of the CSA Welfare and Monitoring Survey 2004, for almost all households in the country (95%) there is at least one primary school available within a distance of less than 10 kilometres. Only 6% of rural households and 0.1% of urban households are 10 or more kilometres away from the nearest primary school.

Accordingly, distribution among the project woredas and & ZOIs have also indicated that all school levels are available in a distance of less than 10 kilometres. This is based on data sources obtained from project affected woredas education offices and field observation

Accessibility

95% of the people can have an access to primary and other levels of attain ding education in the project area. But in some rural sites absence of the said services in the area currently has indirect impact on quality of education by making hindrances to attract teachers to the area as well as direct impacts on teaching - learning process.

Upgrading the education system is seen by both the Federal and Regional governments as a crucial component of its poverty reduction strategy through higher primary enrolment, increased participation by girls, new schools and upgrading the existing ones, training of teachers and better access to basic education. The regional government perceives better access as a critical precondition for achieving these goals. So that, the envisaged power transmission project will have significant contribution for promoting education in general project area.

5.1.3.7.2. Health Service

Health has great importance to country like Ethiopia to bring about meaningful development and growth. What are perhaps become more challenging are the means and strategies to be adopted in order to provide and full fill better health services to citizens. Farmers, whether educated ornot, cannot engage themselves in production unless they are healthy. If, in the absence of choice, they are made to struggle to earn a living despite high morbidity, their productivity will be low and results in terms of output will not be satisfactory. Hence, ensuring the health of farmers is as a key element in the overall objective of enhancing the productive capacity of the agricultural labour force.

The national health policy adopted in this respect is envisaged to establish a health delivery system that places emphasis on disease prevention and primary health care. While it is obvious that medical services (curative care) are also necessary, this cannot be the main health service option under the objective conditions in the country. Disease prevention helps to ensure the health of a person without large expenditures on medicine, medical equipment and medical expertise. On the basis of this a number of activities carried out in the project area of which construction of health posts, training and deployment of health extension workers have been the main undertakings.

Accordingly, the project area regional bureaus have made various efforts for the developments of education in the regions, to this end, general project Woredas and ZOIs are no exception. In view of the above, performances of health services have been assessed during the study period; the case in point are outlined and discussed here below.

Health Coverage

Based on data sources obtained from six general project Woredas and ZOIs, health office, the basic health service coverage in the general project area has now reached 90% (2015).

Number of Physical Health Services

Providing access to health services has been one of the major intervention areas, which has received attention from the government. Similar to the education sector relentless efforts made and a number of activities have been carried out to create access to health services for the population of the project area. According to the Project affected six Woreda Health Office reports, the number and types of physical health services currently existing in general project Woreda and ZOIs are presented in the table 5.9here below.

Table 5.9: Number of physical health services in general project woredas and ZOIs

Physical health services	Owner	Woredas								ZOIs
		Metu	Alle	Dido	Mashsa				Total	
Health Centre	GO	-	2	3	1	-	-	-	6	-
Health Clinic	GO	-	1	3	1	2	-	1	8	1
Health post	GO	-	25	12	14	7	9	5		7
pharmacies	GO	-	11	12	11	1	1	1	37	-
Rural drug Vender	PRIVATE	-	25	8	4	2	2	3	44	16
Total	GO+Private	-	64	38	31	12	12	10	95	24

Source: project affected Woreda Health Offices (2015)

As shown in table 5.9 above, total number of health institution currently existing in general project woreda and ZOIs are 95 and 24, respectively.

Health Professionals

Building of health service alone cannot ensure the provision of adequate and efficient health services provisions. The health service has to be manned with health professionals at the required number pursuance to the standard set on the National Health Policy. The numbers of health professionals in general project area are outlined and presented in the table 5.10 here below.

5.1.3.7.3. Water Supply

The Project area is endowed with water supply sources from seasonal rivers and unprotected wells. According to data obtained from project affected Woreda water supply offices, the total clean water supply coverage has reached currently 90 %. The urban and rural disparity indicates that 85 % and 70.6%, respectively. The majority of the rural and urban population have access to water for drinking from protected well and piped lines. Hence,

5.1.3.7.4. Transportation and Communication Services

Transport and communication services are fundamental factors in determining development endeavours being undertaken in a given locality. Since they provide services to other sectors of the economy, it would be impossible to conceive of social and economic development in the absences of adequate transport and communication infrastructure and services. Based on that facts, the existing aforementioned services have been assessed during the study period. Details are presented here below.

Roads

Improved infrastructure, especially road transport would greatly assist the development and utilization of resources and promotes investment in the area. Such investment and development activities generally bring significant economic and social benefits both at local and national level. To this end, the general project area is no exception. Accordingly, the network of the aforementioned area is predominantly connected by asphalt road along the proposed transmission route line

Mode of Transport and communication services

The major means of transportation in the project area are public bus, which serves urbanand rural sites. Besides to that taxi services in the urban sites. While, in the rural mules and donkeys are used for the said services. Regarding communication services, there are a digital telephone and mobile service in general project woredas and along ZOIs.

5.1.3.7.5. Banks and Other Financial Institutions

The availability of access to financial resources and institutions is the key to the expansion of rural demand for goods and services, promoting credit and savings, accelerating rural investment and accumulation of capital. In this regard, The major financial institutions, which can contribute significantly to rural and agricultural development are micro-credit and saving institution, commercial and development banks, as, well as, cooperatives can be taken as a cases in a points. Accordingly, the aforementioned institutions only exist in general project urban sites along ZOIs.

5.1.3.8. Gender Issue

In the general project affected area, women participation compared to men in overall development endeavors are less, even though improvements have been made since the past a few years ago. Based on data sources obtained from project Woredas. The burden of the work in the family is on the shoulder of the women. They are responsible for food preparation, care of the children etc. in the family. The women are also the principal collector of the fire woods and fetching of water.

The main harmful practices affecting the women in the general project area are: circumcision, abduction, traditional birth attendants, based on information sources obtained from Woreda health offices, interview and discussion with women along ZOIs.

5.1.3.9. Vulnerable Groups

During field visit and study period along the route alignment a few number of vulnerable groups, like female-headed households, the poor's, the elderly persons etc. whom needs special care were observed along ZOIs. But at this stage of the project it is not possible to know the exact numbers of vulnerable groups. Therefore, during the resettlement action plan of the preparation stage the aforementioned groups will be identified.

5.1.3.10. Historical, Cultural and Archeological Sites.

As it is well known, Ethiopia is endowed with various sorts of historical, cultural as well as natural tourist attractions. In case of this project site there are no any historical or cultural and archaeological sites.

Finchaa-Shambo 230 kV Power Transmission Line Project

5.2.1. Physical Environment

5.2.1.1 Topography

The general topographic nature of the transmission line project supposed to cross comprises mainly of flat, rolling to flat with some gentle slopes mixed with hilly landscape structures of terrain types.

5.2.1.2. Climate

The project covers overall total length of 50 km and entirely situated within sub-tropical regions.

5.2.1.3. Soil

The soil type along the project area is predominantly characterized by black soil.

5.2.1.4. Mineral Resources

Based on data sources obtained from project targeted areas, major mineral existing along ZOIs are iron deposits.

5.2.1.5. Water Sources

The main sources of water supplies both for human and livestock population are seasonal rivers, shallow and hand dug unprotected and protected wells in the rural areas while in the urban area there is piped water supply. There is no scarcity of water in the project area and there are no conflicts in water usage

5.2.1.6. Land Use and Cover Characteristics

The major land use and land cover characteristic types in the project area are Cultivated, Grazing, scattered bush land, bare land, others (settlement, infrastructures, etc.)

5.2.2. Biological Environment

5.2.2.1. Flora

In general, the vegetation coverage of project area is medium. In the project site, the dominant tree species currently existing is Acacia species, eucalyptus and junipers.

5.2.2.2. Fauna

The diversity of wild animals in the study areas as a whole is low. However, according to the information from the project site Woreda agriculture office, some common wild animals currently existing in the area are reported and recorded.

These are Dormouse (Graphinu parvus); Abyssinian hare (Lapwabissinicus); Dikdik (Madaquq guentheri); Hyena (Crocuta crocuta); Wild cats (Felis lybica (Lepus Sp); Monkey (Cereopithecus aethiops); Duiker (Sylvi Capra species).

Birds

During the field assessment, based on data sources obtained from the project affected areas there is no important bird areas along the route corridor.

5.2.2.3. Protected/reserved areas, sanctuaries

During the study period, sites of ecological importance, like designated wild life park; reserved or protected areas; sanctuaries etc areas at direct ZOIs along the project route were not identified and recorded.

5.2.3. Socio-Economic Environment

5.2.3.1. Location and Administrative Organization

The proposed transmission line project is located in western part of Ethiopia, based on Oromia region. The Oromia region is one of the nine regional state members of FDRE government established by under the 1995 constitution. The region is structured into Zones, Woredas and kebeles. Administratively, the proposed project affected area belongs to parts of three Woredas. Accordingly, lists of the aforementioned administrative set ups traversed by envisaged project against number of kebeles along Zone of Influences (ZOIs) are outlined and presented in the table **5.12** here below

Table 5.12: Lists of administrative setups affected by the envisaged project.

S\No	Region	Zone	woreda	Number of Kebeles crossed by project component		
				rural	urban	**total**
1	Oromia	Horo Gudru		-	1	**1**
2			Shambu	-	1	**2**
3			Horo	3	3	**6**
			Abay Chomen	7	3	**10**
Total				**10**	**7**	**17**

Sources: general project affected 3woredas

5.2.3.2. Demographic Characteristics and Trends

Table 5.13: Projected populations for general project area and ZOIs by sex and place of Residence (2015)

S/No	Project area	Projected population		
		M	**F**	**T**
1	Abay chomen	402942	334587	691871
2	Shambu Tawn woreda	10778	10223	21001
3	Horo-woreda	44636	45360	89996
	Total	458356	390170	802869

Sources: Central Statistical Abstract (CSA), 2014 and the general project 4 woredas (2015)

Based on results of 2007 national populations and housing census of Ethiopia, the total projected population of general project affected areas for 2015 802,869.

5.2.3.3. Ethnic Composition and Religion

Based on 2007 National population and housing census results, interview and Focus Group Discussion carried out in the field sites, as well as, by field observation, major ethnic groups, language and religious facility services were identified and recorded in general project affected areas and ZOIs. Accordingly, analysis of the survey result reveals majority of population constitutes Oromo ethnic groups. The remaining belongs to Amhara and Garage and Tigray.

Concerning religious facility services, the largest percentage of populations are Protestants. Following that, Muslims and Orthodox Christians and the traditional religion. There is no ethnic minorities or tribal people in and around the project area whose traditional life style could be compromised through the development of the proposed projects. Therefore, no indigenous people development plan will be required.

5.2.3.4. Settlement Patterns and Housing Characteristics

Generally speaking, at general project affected rural villages /kebele, the settlement pattern is scattered type, while, in urban site entirely in cluttered patterns. Over all housing types in the urban areas almost 97% corrugated iron roofed, while in rural areas almost 90% tukuls.

5.2.3.5. Livelihood

Agriculture

The major sectors of economic activities are based on crop production and cattle rearing. Crop production is the dominant economic practice for means of subsistence in general project affected areas. Based on data sources obtained from Office of Agriculture, in project affected Woredas, major

crops grown in the area are annual and perennial types. The major annual crops produced in the area are cereals: such as, teff, sorghum and maize. The major perennial crop types identified in the project area and recorded during field assessment period were mango, lemon, orange, papaya, sugarcane, hops and chat.

Off- Farm Activities

Off farm market based economic activities are other forms of livelihood, in the general project affected areas along ZOIs. Most income generation schemes that communities are currently engaged in are traditional, uniform and meant mostly to meet daily needs. Some of the activities widely undertaken include, sell of fuel wood, gathering honey, etc.

5.2.3.7. Physical Infrastructures and Social Services

Poverty is one of the major challenges of countries in the continent of Africa including Ethiopia. The development of education, health, pure water supply and sanitation, transportation and communication networks, waste disposal management and recreational services are important investment sectors for the attainment of social development in a given country or region. Cognizant of this fact, the Federal Government of Ethiopia has made various development efforts for scaling up social service development facilities in different regions of the country. Accordingly, the following physical infrastructures and social facility services have been assessed during the study period. The details are outlined and discussed here below.

5.2.3.7.1. Education Service

The following table summarizes student teachers proportion in proposed targeted Woredas.

I. Abay Chomen Woreda

		Number of Student			Number of Teachers		
No.	**Grade vel**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
1	1 to 4	3788	3872	7660	44	109	153
2	5 to 8	3270	3225	6495	145	94	239
3	9 to 10	1748	1515	3263	86	13	99
4	Preparatory	851	892	1743	32	2	34
5	TVET	0	0	0	0	0	0
6	College	0	0	0	0	0	0
Total		**9657**	**9504**	**19161**	**307**	**218**	**525**

II. Horo Woreda

		Number of Student			Number of Teachers		
No.	**Grade Level**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
1	1 to 4	5,215	5,191	10,406	76	36	112
2	5 to 8	3,771	3,698	7,469	250	174	424
3	9 to 10	1,107	947	2,054	66	6	72
4	Preparatory	280	229	509	22	1	23
5	TVET	0	0	0	0	0	0
6	College	0	0	0	0	0	0
Total		**10,373**	**10,065**	**20,438**	**414**	**217**	**631**

5.2.3.7.2. Health Professionals

Building of health service alone cannot ensure the provision of adequate and efficient health services provisions. The health service has to be manned with health professionals at the required number pursuance to the standard set on the National Health Policy. The numbers of health professionals in general project area are outlined and presented in the table 5.20 here below.

Table 5.16. Numbers of health professionals in the general project area (2015)

Finchaa - Shambu 230 Kv PTLP					
Health Office Profile in Three(3) Woredas of Horo Guduru Wellega Zone					
No.	Type of Health Officer	Number of Health Officer by Woreda			Total
		Abay Chomen	Horo Woreda	Shambu Town	
1	Hew	44	18	12	74
2	Health Officer	10	4	8	22
3	All type Nurses	69	29	19	117
4	Laboratory Technician	18	7	9	34
5	Pharmacist	17	7	18	42
6	Midwives	12	5	13	30
7	Radiologist	1	0	2	3
8	Others	102	42	57	201
	Total	273	112	138	523

Source: Woreda Health Offices 2015

Major Top 10 Diseases in the Area

The ten main cause of morbidity in the general project affected woredas and ZOIs are given in the table. Accordingly, ten top cases of morbidity are specified here under, based on data obtained from project affected Woredas health office (2015).

Table 5.17. The Ten Top Diseases That Affect People In Abay Chomen Woreda By Order of Occurance During 2007

No.	Types of Diseases	Number of Cases Exist/ People Affected	% Out The Ten Top Total
1	Diseases of the Muscular System and Connective Tissue	6728	15.00
2	Acute Upper Respiratory Infections(AURI)	6014	13.41
3	Acute Febrile Illness (API)	5305	11.83
4	Diarrhea (non-Bloody)	4595	10.25
5	Infections of the Skin and Subcutaneous Tissue	4461	9.95
6	Trauma (injury, fracture etc.)	4339	9.68
7	Urinary Tract Infection(UTI)	3980	8.88
8	Helminthiasis	3708	8.27
9	Other or Unspecified Diseases the of Respiratory System	2888	6.44
10	Dyspepsia	2827	6.30
	Total	44845	100

Table 5.18 the top ten diseases affecting People in Horo Woreda by order of Occurrence During 2007

No.	Types of Diseases	Number of Cases Exist/ People Affected	% Out The Ten Top Total
1	Pneumonia	8185	15.47
2	Diarrhea (non-Bloody)	7082	13.38
3	Acute Febrile Illness (API)	6773	12.80
4	Helminthiasis	5210	9.85
5	Trauma (injury, fracture etc.)	5119	9.67
6	Diseases of the Muscular System and Connective Tissue	4987	9.43
7	Acute Upper Respiratory Infections(AURI)	4523	8.55
8	Dyspepsia	4169	7.88
9	Typhoid Fever	3584	6.77
10	Infections of the Skin and Subcutaneous Tissue	3280	6.20
	Total	52912	100

5.2.3.7.3. Water Supply

The main sources of water supplies both for human and livestock population are streams, seasonal rivers, shallow and hand dug unprotected and protected wells.

5.2.3.7.4. Transportation and Communication Services

Transport and communication services are fundamental factors in determining development endeavours being undertaken in a given locality. Since they provide services to other sectors of the

economy, it would be impossible to conceive of social and economic development in the absences of adequate transport and communication infrastructure and services. Based on that facts, the existing aforementioned services have been assessed during the study period.

Roads

Improved infrastructure, especially road transport would greatly assist the development and utilization of resources and promotes investment in the area. Such investment and development activities generally bring significant economic and social benefits both at local and national level. To this end, the general project area is no exception. Accordingly, the network of the aforementioned area is predominantly connected by gravel road along the proposed transmission route line

Mode of Transport and communication services

The major means of transportation in the project area are public bus, which serves urban and rural sites. Besides to that taxi services in the urban sites. While, in the rural mules, camels and donkeys are used for the said services.

Regarding communication services, there are a digital telephone and mobile service in general project woredas and along ZOIs.

5.2.3.7.5. Banks and Other Financial Institutions

The availability of access to financial resources and institutions is the key to the expansion of rural demand for goods and services, promoting credit and savings, accelerating rural investment and accumulation of capital. In this regard, The major financial institutions, which can contribute significantly to rural and agricultural development are micro-credit and saving institution, commercial and development banks, as, well as, cooperatives can be taken as a cases in a points. Accordingly, the aforementioned institutions only exist in general project urban sites along ZOIs.

5.2.3.7.6. Market and Other Commercial Services

Local markets along ZOIs are operating in Saturdays, Tuesdays and Thursdays; on weekly basis. Various services that have been undertaken in the market places exchange and sale of grains, livestock and livestock products and other items (clothes, shoes, agricultural tools, stationery supplies, salt etc).

5.2.3.8. Gender Issue

In the general project affected area, women participation compared to men in overall development endeavors are less, even though improvements have been made since the past a few years ago. Based on data sources obtained from project Woredas, the burden of the work in the family is on the shoulder of the women. They are responsible for food preparation, care of the children etc. in the family. The women are also the principal collector of the fire woods and fetching of water.

The main harmful practices affecting the women in the general project area are: circumcision, abduction, traditional birth attendants, based on information sources obtained from Woreda health offices, interview and discussion with women along ZOIs.

5.2.3.9. Vulnerable Groups

Few numbers of vulnerable groups who need special care (Female-headed households, the poorest of the poor and the elderly etc) were observed during field visit and study period along the route alignment. But at this stage of the project, it is not possible to know the exact numbers of vulnerable groups.

5.2.3.10. Historical Cultural and Archeological Sites

During the field visit and study period, there were no Archaeological, Paleontological, Historical and Cultural Heritage, identified for being affected in the proposed project.

5. 3. Bahir Dar- Dangila 132 K V Power Transmission Line Project

5.3.1. Physical Environment

5.3.1.1 Topography

The general topographic nature of the transmission line project supposed to cross comprises mainly of rolling to flat with some gentle slopes mixed with hilly landscape structures of terrain types.

5.3.1.2. Climate

The project covers overall total length of 67.5km and entirely situated within tropical agro-climatic-zone with an elevation range of 1800-2137masl. In the general project area mean annual temperature ranges in between 18.5^0-20^0c and rain fall 1500- 2000 mm. The rainy season extends from May to September. The small rain falls between February and April and heavy rain is from July to September. The month of November, December and January are generally dry with ground frost at night.

5.3.1.3. Soil

The soil type along the project area is predominantly characterized by Nit sols-fertile soil with shiny appearance. The other soil types currently existing in the project site is Camisoles'- soil which have changes in colures and structure as a result of weathering.

5.3.1.4. Mineral Resources

Based on data sources obtained from project targeted areas, major mineral existing along ZOIs are iron deposits.

5.3.1.5. Water Sources

The main sources of water supplies both for human and livestock population are rivers, hand dug unprotected and protected wells, chlorinated water by piped lines. There is no conflicts in water usage

5.3.1.6. Land Use and Cover Characteristics

The major land use and land cover characters tic types in the project area are farming, grazing, forestry bare land, others (settlement, infrastructures, etc.)

5.3.2. Biological Environment

5.3.2.1. Flora

In general, the vegetation coverage of project area is dense. The major tree species currently existing in the project area are Coridia, Acacia, Albizia and Eucalyptus species. However, the dominant tree species currently existing is Eucalyptus.

Eucalyptus tree

5.3.2.2. Fauna

Based on Information obtained from the project site Woreda agriculture offices, some common wild animals currently existing in the area are reported and recorded. These are, Dikdik (Madaquq guentheri); Hyena (Crocuta crocuta); Wild cats (Felis lybica (Lepus Sp); Monkey (Cereopithecus aethiops); and Duiker (Sylvi Capra species).

5.2.2.3. Protected/reserved areas, sanctuaries

During the study period, sites of ecological importance, like designated wild life park; reserved or protected areas; sanctuaries etc areas at direct ZOIs along the project route were not identified and recorded.

5.2.3. Socio-Economic Environment

5.2.3.1. Location and Administrative Organization

The proposed transmission line project is located in northern part of Ethiopia, based on Amhara national regional state. The Amhara region is one of the nine regional state members of FDRE government established by under the 1995 constitution. Administrative setup of Amhara region is further divided in to Zones, Woredas and at the gross root level Kebeles (urban and rural dwellers associations). All administrative set up units of Amhara national regional state are suitable for efficient realization of the project. Because since the decentralization, woredas are empowered to plan implement projects, which are planned to enhance the socio-economic status of their population and the structure is suitable for the promotion of community participation in development activities.

Administratively, the proposed project affected area belongs to parts of two zones (Awi and West Gojjam) which comprises four woredas. Accordingly, lists of the aforementioned administrative set ups traversed by envisaged project against number of kebeles along Zone of Influences (ZOIs) are outlined and presented in the table **5.12** here below

Table 5.19: Lists of administrative setups affected by the envisaged project.

Region	**zone**	**woreda**	**Number of Kebeles crossed by project component**		
			rural	urban	**total**
Amhara	West Gojjam		-	1	**1**
		Bahirdar Zuria	2	-	**2**
		Mecha	4	-	**4**
		South Achefer	3	-	**3**
	Awi	Dangila	2	-	**2**
			11	1	**12**

Sources: general project affected city administration and four woredas

5.2.3.2. Demographic Characteristics and Trends

Table 5.20 A/ Population and Household Size

S/No	Project area	Land area (km^2)	Projected population			Density	% of Rural population out of the total
			M	F	T		
1	Amara Region	736.73	10025991	9992997	20018988	69	84
1.1	West Gojam	2318.32	1213832	1208464	2422296	90	89
1.1.1	Baher Dar Zuria Woreda	154709	104006	100261	204267	129	100
1.1.2	Mecha Woreda	14004.47	168724	166065	334789	173	90
1.1.3	South Achefer Woreda	1443.37	79280	77586	156866	142	89
	Sub Total	1481.64	352010	343912	695922	226	93
2	Awi Zone	9039.04	571821	571818	1143639	17	84
2.1	Dangla Woreda	11964.05	94707	92502	187209	58	79
2.1	Sub Total	9148.43	94707	92502	187209	125	79
3	Combined	182120.9	446717	436414	883131	89.9	84.2
4	ZOIs		34,397	28,143	62,540	23	55

Sources: Central Statistical Abstract (CSA), 2014 and the general project town and four woredas

Based on results of 2007 national populations and housing census of Ethiopia, the total projected population of general project affected areas 4 woredas for 2015 are 883,131. Out of the total, 51 %(446,717) are males. While, the remaining 49% (436414) are females. In terms of residency, in the general project affected 4 woredas, about 15.8% are living in the urban sites, the remaining 84.2% lives in urban areas.

Ethnic Composition and Religious Facility Services

Based on 2007 National population and housing census results, interview and Focus Group Discussion carried out in the field sites, as well as, by field observation, major ethnic groups, language and religious facility services were identified and recorded in general project affected areas and ZOIs .Accordingly, analysis of the survey result reveals majority of population constitutes Amhara ethnic groups. The remaining belongs to Tigre, Guragie and Oromo's. Concerning religious facility services pre dominantly Orthodox Christian. While there are also other Christian (Protestant) religions. There no ethnic minorities or tribal people in and around the project area whose traditional life style could be compromised through the development of the proposed projects. Therefore, no indigenous people development plan will be required.

5.3.3.3. Settlement Patterns and Housing Characteristics

Generally speaking, at general project affected rural villages /kebele, the settlement pattern is highly scattered type, while, in urban site entirely in cluttered patterns. Over all housing types in the urban areas almost 99% corrugated iron roofed, while in rural areas entirely almost 95% CIS.

5.3.3.4. Economy

5.3.3.4.1. Livelihood

A/ Agriculture

This comprises crop production and livestock rearing.

The major crop types grown in the general project area are cereals; Tef. Wheat, Sorghum and millet. The livestock currently existing in the project area are presented in the table below

Table 5. 21 Types of livestock against average held size per house hold in general project area (2015)

Woredas	Type of livestock						
	Cattle	Sheep	Goat	Donkey	Mule	Horse	Poultry
South Achefer	204747	76300	35970	16570	5218	980	130059
Dangila	114787	37855	23296	12796	1017	248	84047
Mecha	351844	110834	61883	30235	7890	1089	230286
Bahirdar Area	199524	39537	39369	22790	770	56	151944
Total							

Table 5.22 Types of livestock against average held size per house hold in general project area (2015)

Type	Average held size per house hold in %
Cattle all types	5-4
Sheep	5-6
Goat	7-10
Donkey	2-3
Mule	1-2
Poultry	5-7
Beehives	na

Source: Project affected four Woredas Agriculture Offices (2015)

Cattles in the project area are used primarily for dairy and meat production. Camels are used commonly as pack animals and to provide milk. Mules and donkeys are most frequently used for transportation. Poultry and their production are useful for households' income sources and expenditure

B/ Off- Farm Activities

Off farm market based economic activities are other forms of livelihood, in the general project affected areas along ZOIs. Most income generation schemes that communities are currently engaged in are traditional, uniform and meant mostly to meet daily needs. Some of the activities widely undertaken include, sell of fuel wood, honey production, etc.

5.3.3.5. Physical Infrastructures and Social facility Services

Poverty is one of the major challenges of countries in the continent of Africa including Ethiopia. The development of education, health, pure water supply and sanitation, transportation and communication networks, waste disposal management and recreational services are important investment sectors for the attainment of social development in a given country or region. Cognizant of this fact, the Federal Government of Ethiopia has made various development efforts for scaling up social service development facilities in different regions of the country. Accordingly, the following physical infrastructures and social facility services have been assessed during the study period.

Education Service

Number of schools

The total number of schools at different levels in general project affected Woredas are outlined and presented in the table below.

Table 5.23 Distribution of Educational Institutions in general project Affected Woredas

No	Woredas	Type of educational institutions						
		Kinder garten	Primary (1-8)	High (9-10)	Preparatory (11-12)	TVET	College	Educational coverage %
	South Achefer	3	62	2	1			97.5
	Dangla		63	2	2			91
	Mecha	4	102	6	1	1	1	95.04
	Bahir Dar Area		43	3				94.3
	Total							

Source: Four projects affected Woredas Education Offices (2015)

Woredas	Total number of students											
	Kinder garten		Primary 1-8		High school 9-10		Preparatory 11-12		TVET		College	
	M	F	M	F	M	F	M	F	M	F	M	F
South Achefer	149	133	22083	21264	2149	2613	751	665				
Dangla			16606	16039	1624	2071	489	608				
Mecha	79	94	42101	41171	2912	4081	1232	1234	336	779	66	124
Bahirdar			25152	22173	992	1094						
TOTAL												

Source: Four projects affected four Woredas Education Offices (2015)

Number of teachers with Qualification at Different School levels in general Project Woreda are outlined and presented in the table below.

Table 5.24 Number of teachers with Qualification at School levels in general Project Woreda

Woredas	Educational background	Number of teachers		
		Male	Female	Total
South Achefer	Certificate	18	10	28
	Diploma	428	470	898
	degree	174	60	234
	Masters	6	2	8
Dangla	Certificate	6	6	12
	Diploma	455	465	920
	degree	179	53	232
	Masters			
Mecha	Certificate			
	Diploma	854	834	1688
	degree	298	83	381
	Masters	23		23
Bahirdar Area	Certificate	24	44	68
	Diploma	565	458	1021
	degree	61	40	101
	Masters	5	2	7

Source: project affected Woreda Education Offices

5.3.3.5.2. Health Service

Table5.25 Number of physical health institution in general project woredas

Woredas	Health institutions							
	Hospital	Health center	Higher clinic	Medium clinic	Pharmacy	Laboratory	Health post	Drug store
South Achefer	1	8		15		1	18	8
Dangla		6		5			27	
Mecha	1	13		2	1	1	46	13
Bahirdar Area		9					32	10

Source: project affected Woreda Health Offices (2015)

As shown in table 5.25 above, total number of health institution currently existing in general project Woreda and ZOIs are 79 and 4 respectively.

Health Professionals

The numbers of health professionals in general project area are outlined and presented in the table 5.26here below.

Table 5.26 Numbers of health professionals in the general project area (2015)

Woredas	Health experts								
	Doctor	**Health officer**	**Nurse**	**Midwifery**	**Pharmacist**	**Lab technician**	**X-ray technician**	**Environmentalist**	**Health extension**
South Achefer		13	65	21	15	13		4	12
Dangla		14	45	12	13	12			64
Mecha		28	74	31	18	28		5	96
Bahirdar Area		17	48	18	4	19			75

Source: Woreda Health Offices 2015

Major Top 10 Diseases in the Area

The ten main cause of morbidity in the general project affected Woreda are given in the table 5.21. Accordingly, ten top cases of morbidity are specified here under, based on data obtained from project affected Woreda health office (2015).

Table 5.27Top ten cases of morbidity

Woreda	S.no	Types of disease	No. of cases	Cases in %
Bahirdar Area	1	Helimenthiasis	3695	21.69
	2	Acute Febrile illness Na	2740	16.09
	3	Upper respiratory Infection	2058	12.08
	4	Trauma injury Na	1387	8.14
	5	Pneumonia9	1377	8.08
	6	Dyspepsia	1327	7.77
	7	Disease of the musculoskeletal system	1247	7.37
	8	Diarrhea non bloody	1240	7.28
	9	Infection of skin and tissue	1009	5.92
	10	Other unspecified infection & parasitic disease	955	5.61
	7	Diarrhea non bloody	1170	7
	8	AURI	1162	6.9
	9	Trauma injury	624	3.7
	10	Other parasitic infection	594	3.5
Dangila	1	Acute Febrile illness	7196	16.69
	2	Acute upper respiratory Infection	7139	16.56
	3	Helimenthiasis	4901	4.37
	4	Dyspepsia	4532	10.51
	5	pneumonia	4418	10.25
	6	Disease of the musculo-skeletal and connective tissue	4244	9.85
	7	Trauma injury	2893	6.71
	8	Diarrhea non bloody	2707	6.28
	9	Infection of skin and subcutaneous tissue	2585	6.0
	10	Other unspecified infection & parasitic disease	2492	5.78
South achefer	1	Other unspecified infection & parasitic disease	**8021**	32.9
	2	Diarrhea non bloody	3112	12.7
	3	pneumonia	1858	7.6
	4	Acute Febrile illness	1323	7.43
	5	Gastric problem	1812	7.4
	6	Dyspepsia	1614	6.6
	7	Helimenthiasis	1400	5.7

	8	Disease of the musculoskeletal system	1056	4.3
	9	Trauma injury Na Infection of skin and tissue	980	4
	10	Upper respiratory Infection	676	2.7
Mecha	1	pneumonia	17581	18.08
	2	Acute Febrile illness Na	13079	13.45
	3	Acute Upper respiratory Infection	11752	12.09
	4	Helimenthiasis	11346	11.67
	5	Diarrhea non bloody	8819	9.07
	6	Trauma injury	8024	8.25
	7	Other unspecified infection & parasitic disease	7937	8.16
	8	Parasitic disease dyspepsia	7639	7.86
	9	Disease of the musculoskeletal system	5561	5.72
	10	Infection of skin and tissue	5482	5.64

Source project affected woreda health offices (2015)

5.3.3.5.3. Water Supply

The main sources of water supplies both for human and livestock population are seasonal rivers, motorized deep well, shallow and hand dug unprotected and protected wells in all rural areas. While, in the urban areas portable water supply is by pipe line water service

5.2.3.5.4. Transportation and Communication Services

Transport and communication services are fundamental factors in determining development endeavours being undertaken in a given locality. Since they provide services to other sectors of the economy, it would be impossible to conceive of social and economic development in the absences of adequate transport and communication infrastructure and services. Based on that facts, the existing aforementioned services have been assessed during the study period.

Roads

Improved infrastructure, especially road transport would greatly assist the development and utilization of resources and promotes investment in the area. Such investment and development activities generally bring significant economic and social benefits both at local and national level. To this end, the general project area is no exception. Accordingly, the network of the aforementioned area is predominantly connected by asphalt road along the proposed transmission route line.

Mode of Transport and communication services

The major means of transportation in the project area are public bus, which serves urban and rural sites. Besides to that taxi services in the urban sites. Additionally, in the rural mules, and donkeys are

used for the said services. Regarding communication services, there are a digital telephone and mobile service in general project Woredas.

5.2.3.5.5. Banks and Other Financial Institutions

The availability of access to financial resources and institutions is the key to the expansion of rural demand for goods and services, promoting credit and savings, accelerating rural investment and accumulation of capital. In this regard, The major financial institutions, which can contribute significantly to rural and agricultural development are micro-credit and saving institution, commercial and development banks, as, well as, cooperatives can be taken as a cases in a points. Accordingly, the aforementioned institutions only exist in general project urban sites.

5.2.3.6. Gender Issue

In the general project affected area, women participation compared to men in overall development endeavors are less, even though improvements have been made since the past a few years ago. Based on data sources obtained from project Woredas, the burden of the work in the family is on the shoulder of the women. They are responsible for food preparation, care of the children etc. in the family. The women are also the principal collector of the fire woods and fetching of water. The main harmful practices affecting the women in the general project area are: circumcision, abduction, traditional birth attendants, based on information sources obtained from Woreda health offices, interview and discussion with women along project sites.

5.2.3.7. Vulnerable Groups

Few numbers of vulnerable groups who need special care (Female-headed households, the poor's, the elderly persons etc) were observed during field visit and study period along the route alignment. But at this stage of the project it is not possible to know the exact numbers of vulnerable groups.

5.2.3.8. Historical Cultural and Archeological Sites

As it is well known, Ethiopia is endowed with various sorts of historical, cultural as well as natural tourist attractions. Nonetheless, much of these abundant resources are not utilized effectively for promoting tourist industry, due to economic reasons and lack of trained human power in the sector. The region has comparative advantages in tourism for its resources that are needed by international and domestic tourists. On the other hand, the cultural resources and the long life experience of the different ethnic groups of the region is good reasons for cultural oriented tourists to flow in that direction. All the development of potential tourist sites requires sustainable power supply which this project aims to provide as part of the universal rural electrification program.

5.4 Azezo-Chilga 132KV Power Transmission Line Project

5.4.1. Physical Environment

5.4.1.1 Topography

The general topographic nature of the transmission line project supposed to cross comprises mainly of flat, rolling to flat with some gentle slopes mixed with hilly landscape structures of terrain types.

5.41.2. Climate

The project covers overall total length of 42.3km and entirely situated within sub-tropical regions.

5.4.1.3. Soil

The soil type along the project area is predominantly characterized by black soil.

5.4.1.4. Mineral Resources

Based on data sources obtained from project targeted areas, major mineral existing along ZOIs are iron deposits.

5.41.5. Water Sources

The main sources of water supplies both for human and livestock population are seasonal rivers, shallow and hand dug unprotected and protected wells in the rural areas while in the urban area there is piped water supply. There is no scarcity of water in the project area and there are no conflicts in water usage

5.4.3.1.6. Land Use and Cover Characteristics

The major land use and land cover characteristic types in the project area are Cultivated, Grazing, scattered bush land, bare land, others (settlement, infrastructures, etc.)

5.4.2. Biological Environment

5.4.2.1. Flora

In general, the vegetation coverage of project area is medium. In the project site, the dominant tree species currently existing is Acacia species, eucalyptus and junipers.

5.4.2.2. Fauna

The diversity of wild animals in the study areas as a whole is low. However, according to the information from the project site Woreda agriculture office, some common wild animals currently existing in the area are reported and recorded.

These are, Dormouse (Graphinu parvus); Abyssinian hare (Lapwabissinicus); Dikdik (Madaquq guentheri); Hyena (Crocuta crocuta); Wild cats (Felis lybica (Lepus Sp); and Monkey (Cereopithecus aethiops).

5.4.2.3. Protected/reserved areas, sanctuaries

During the study period, sites of ecological importance, like designated wild life park; reserved or protected areas; sanctuaries etc areas at direct ZOIs along the project route were not identified and recorded.

5.4.3. Socio-Economic Environment

5.4.3.1. Location and Administrative Organization

The proposed transmission line project is located in part of Ethiopia part of Ethiopia, based on Amhara region. The Amhara region is one of the nine regional state members of FDRE government established by under the 1995 constitution. The region is structured into Zones, Woredas and kebeles. Azezo - Chilga PTLP is located about 625 km distance away from the Ethiopian capital city/Addis Abeba in the Northern parts of Ethiopia at its first side of controlling point (the start of the project), which is along Adiss Ababa –Bahir Dar – Azezo towns asphalt road. While, 705km distance away at its second side of controlling point (end of the project/ terminal point of the project) along Addis Ababa- Azezo – Gonder - Chilga towns Asphalt road. Administratively, the proposed project affected area belongs to Amhara region.

5.4.3.2. Ethnic Composition and Religio us Facility Services

Based on 2007 National population and housing census results, interview and Focus Group Discussion carried out in the field sites, as well as, by field observation, major ethnic groups, language and religious facility services were identified and recorded in general project affected areas and ZOIs. Accordingly, analysis of the survey result reveals majority of population constitutes Amhara ethnic groups. The remaining belongs to Guragie and Tigray.

Concerning religious facility services, the largest percentage of populations are Orthodox Christians. Following that, Protestants, Muslims and the traditional religion. There is no ethnic minorities or tribal people in and around the project area whose traditional life style could be compromised through the development of the proposed projects. Therefore, no indigenous people development plan will be required.

5.4.3.3 Settlement Patterns and Housing Characteristics

Generally speaking, at general project affected rural villages/kebele, the settlement pattern is scattered type, while, in urban site entirely in cluttered patterns. Over all housing types in the urban areas almost 97% corrugated iron roofed, while in rural areas entirely almost 90% tukuls.

5.3.3.4. Economy

5.3.3.4.1. Livelihood

Agriculture

The major sectors of economic activities are based on crop production and cattle rearing. Crop production is the dominant economic practices for means of subsistence in general project affected. Based on data sources obtained from sector offices of agriculture, in the general project affected Woredas, Major crops grown in the area are annual and perennial types. The major annual crops produced in the area are cereals: such as, teff, sorghum and maize, The major perennial crops types identified in the project area and recorded during field assessment period are mango, lemon, orange, papaya, sugarcane, hops and chats .Based on field observation and data sources obtained from agricultural sector office of Woredas.

Off- Farm Activities

Off farm market based economic activities are other forms of livelihood, in the general project affected areas along ZOIs. Most income generation schemes that communities are currently engaged in are traditional, uniform and meant mostly to meet daily needs. Some of the activities widely undertaken include, sell of fuel wood, petty trading

5.2.3.5.2. Physical Infrastructures and Social facility Services

Major Top 10 Diseases in the Area: The ten main cause of morbidity in the general project affected areas are given in the table. Accordingly, ten top cases of morbidity are specified here under, based on data obtained from project affected Woredas health office (2015).

No.	Types of Diseases	Number of Cases
		People Affected
1	Diseases of the Muscular System and Connective Tissue	6728
2	Acute Upper Respiratory Infections(AURI)	6014
3	Acute Febrile Illness (API)	5305
4	Diarrhea (non-Bloody)	4595
5	Infections of the Skin and Subcutaneous Tissue	4461
6	Trauma (injury, fracture etc.)	4339
7	Urinary Tract Infection(UTI)	3980
8	Helminthiasis	3708
9	Other or Unspecified Diseases the of Respiratory System	2888
10	Dyspepsia	2827
6	Diseases of the Muscular System and Connective Tissue	4907
7	Acute Upper Respiratory Infections(AURI)	4000
8	Dyspepsia	3269
9	Typhoid Fever	3585
10	Infections of the Skin and Subcutaneous Tissue	3282

5.2.3.5.4. Water Supply

The main sources of water supplies both for human and livestock population are streams, rivers, shallow and hand dug unprotected and protected wells.

5.2.3.5.5. Transportation and Communication Services

Transport and communication services are fundamental factors in determining development endeavours being undertaken in a given locality. Since they provide services to other sectors of the economy, it would be impossible to conceive of social and economic development in the absences of adequate transport and communication infrastructure and services. Based on that facts, the existing aforementioned services have been assessed during the study period.

Roads

Improved infrastructure, especially road transport would greatly assist the development and utilization of resources and promotes investment in the area. Such investment and development activities generally bring significant economic and social benefits both at local and national level. To this end, the general project area is no exception. Accordingly, the network of the aforementioned area is predominantly connected by gravel road along the proposed transmission route line

Mode of Transport and communication services

The major means of transportation in the project area are public bus, which serves urban and rural sites. Besides to that taxi services in the urban sites. While, in the rural mules, camels and donkeys are used for the said services. Regarding communication services, there are a digital telephone and mobile service in general project woredas and along ZOIs.

5.2.3.5.6. Banks and Other Financial Institutions

The availability of access to financial resources and institutions is the key to the expansion of rural demand for goods and services, promoting credit and savings, accelerating rural investment and accumulation of capital. In this regard, The major financial institutions, which can contribute significantly to rural and agricultural development are micro-credit and saving institution, commercial and development banks, as, well as, cooperatives can be taken as a cases in a points. Accordingly, the aforementioned institutions only exist in general project urban sites along ZOIs.

5.2.3.5.7. Market and Other Commercial Services

Local markets along ZOIs are operating in Saturday, Tuesday and Thursday. Various services that have been undertaken in the market places exchange and sale of livestock and livestock production, and others (clothes, shoes, agricultural tools stationary supplies, salt etc) are offered for sale.

5.2.3.6. Gender Issue

In the general project affected area, women participation compared to men in overall development endeavors are less, even though improvements have been made since the past a few years ago. Based on data sources obtained from project Woredas, the burden of the work in the family is on the shoulder of the women. They are responsible for food preparation, care of the children etc. in the family. The women are also the principal collector of the fire woods and fetching of water.

The main harmful practices affecting the women in the general project area are: circumcision, abduction, traditional birth attendants, based on information sources obtained from Woreda health offices, interview and discussion with women along ZOIs.

5.2.3.7. Vulnerable Groups

Few numbers of vulnerable groups who need special care (Female-headed households, the poor's, the elderly persons etc) were observed during field visit and study period along the route alignment. The RAP has identified three vulnerable elderly and women headed people that require special support and allocated budget. But, later on during implementation, if there are other vulnerable people that require support, a budget from the contingency will be used to provide the required support.

5.2.3.8. Historical Cultural, Archeological, etc. importance Sites

During the field visit and study period, sites of Historical, Cultural, Archeological, etc. importance (if any) have been assessed. Accordingly, the said sites of importance were not identified and recorded by the ESIA team.

CHAPTER SIX

6. PUBLIC CONSULTATIONS AND DISCLOSURE PLANNING (PCDP)

The Need for PCDP in ESIA Process

In ESIA process, Public Consultations and Disclosure Planning (PCDP) are a paramount importance and mandatory practices, in accordance to the requirements, as set forth in national and the WB policy and legal frameworks on ESIA procedures and course of actions, as well as, on public consultation and participation.

Public consultation is useful for gathering environmental data, understanding likely impacts, determining community and individual preferences, selecting project alternatives and determines community and individual preferences, designing viable and sustainable mitigation and compensation plans. Public consultation in the ESIA process is undertaken during at all stages of project phases (the project planning, design, implementation and operation phases). The aim is to disseminate information to interested and affected parties, solicit their views and consult on sensitive issues. Hence, PCDPs are important components of development projects. To this end, the proposed Electric Power Transmission Line Projects, that will be implemented at four lot sites here bellow are no exceptions:

- LOT-I: 230 kV Metu-Mesha EPTLP to be constructed in SNNPR and Oromia.
- LOT-II: 230 kV Finchaa-Shambu EPTLP to be constructed in the Oromia region.
- LOT-III: 132 kV Bahir Dar- Dangila EPTLP to be constructed in the Amhara region.
- LOT-IV: 132 kV Azezo-Chiliga EPTLP to be constructed in the Amhara region.

In view of the above, therefore, field visit and survey activities on public consultation and disclosure planning has been carried out at each of the 4 LOTs Project targeted sites mentioned here above. (From November1 –20, 2015), based on Terms of Reference (TOR), the main objectives of the present PCDPs are to:

- Provide information to all projects concerned stake stakeholders and other interested groups about the projects activities , probable impacts and possible enhancement and mitigation measures ;
- Disseminate the ESIA stage associated information to project concerned and interested groups in particular and the public at large;
- Assess and record the proposed projects probable impacts and possible enhancement/mitigation measures with stakeholders participation an d consultation;
- Maintain the rights of contacted stake holders participation with respect to policies and projects that affect their livelihoods, as per requirements of the national and the project financier /WB policy and legal frameworks;
- Assess and record the project targeted stakeholders awareness, attitudes and open ions towards the project;
- Record and integrate the results of stakeholders consultation in to the proposed projects' ESIA report

Policy and Legal Frameworks Used for PCDP

During field visit and study period, the National/Ethiopians and International Banks Group project financier/WB PCDP policy and legal framework requirements in the context of the project have been used by the ESIA Team.

Stakeholders Identification and Categorization for PCDP

The primary and secondary stakeholders are identified and categorized for consultation are as follows:

At Federal Level

- Ministry of Finance and Economic Cooperation (MOFEC)
- Ministry of Environment, Forest and Climate Change (MEFCC)
- Ministry of Water, Irrigation and Electricity (MoWIE) and
- Ethiopian Electric Power (EEP)

At project affected three Regions and six Zones levels

SNNPR, Amhara and Oromia Regional Administrative Officials

- West Gojam and North Gonder zones administrative officials. Based on Amhara regions
- Illubabor and Horo Guduru zones Administrative Officials. Based on Oromia National Regional State.

At thirteen project affected Woredas and kebeles along ZOIs levels

Thirteen Woredas administrative and sector development institutions officials and Kebele (rural and urban sites) levels stakeholders along ZOIs (Kebele administrative and development agents; community elders; Religious leaders; PAPs; Women; Youth; and other community members along ZOIs)

Consultation Methodology

During the study period, the ESIA Team has used interview method to consult the selected stakeholders at Federal, Regional and Zonal levels. FGDs have enriched the study for Woreda and Kebele level stakeholders.

Summary of Consultation

6.5.1.1. Results of Consultations with Woreda Officials

The EEP ESIA Team has been conducted FGD with minutes of meetings, at each four project affected sites along the transmission line route with administration and sector office development representatives (please refer Annex-III: Minutes of meetings, under Appendix section).

The FGD was on:

- Contacted Woreda stakeholders prior awareness and attitude towards the project
- Soliciting the views of Woreda officials on impacts of the project at existing biophysical and socioeconomic environment
- Identification and record of stakeholders views and opinions on project`s impacts enhancement and mitigation measures

The summary of Woreda FGD consultation results are:

FGD participants Prior Awareness and Attitudes towards the project, All members of the Woreda FGD participants have prior awareness about the project and positive attitude towards the implementation of the proposed project targeted site.

Major opinions of Woreda FGD Participants,

a. They agreed that they will provide all information/data and support required for the success of the proposed development endeavor.
b. All participants of the FGD reached on consensus and made a promise to provide land for construction camps and other associated sites, replacement land for the relocation of affected persons, if any.
c. Declared to respect the ROW and prevent people to build any new houses, fences, etc, in the designated ROW width, since whoever builds a house or any structure in ROW will not be paid any compensation (after the cut-off date).
d. On top of that, they recommended the following issues for future plan of actions:
    - The projects contractor, consultant and project owner and the workers who come to the project area should respect the community culture
    - If the temporary job opportunities will not provide for the local unemployed, conflict will occur. Hence, it is recommended that the project contractor should give the priority to the community unemployed during the project construction period.
    - The influx of labor to the construction areas and their interactions with the local communities may create access for the spread of communicable diseases in the area. Hence, the project contractor should provide health awareness program in collaboration with the projects affected site health sector offices prior to and during the implementation of the proposed projects to overcome the problem.

- For the projects affected private and public properties, census and payment of compensation should be done in accordance to Proclamation No 455/2005 and regulation No 135/2007**.**
- During the projects construction period for anticipated accidents/ injuries etc... On temporary employed workers from community area, the contractor should provide medical and insurances services.

Photo: Consultation with Woreda Officials

6.5.1.2. Results of Consultation with Local Community

The involvement of local community members and other stakeholders in any development project will ensure the sustainability of the project under consideration. Accordingly, the ESIA team visited local communities in the project areas to assess and record their views and opinions about the projects. In view of this, the team has carried out consultations with distinct groups of community members like traders, drivers, housewives, students, teachers, religious leaders, community elders, etc along projects affected urban and rural sites of ZOIs.

Community meeting, interview and discussion have been conducted within aforementioned sites. The details of contacted persons are attached and enclosed under annex 2, while, minute of meeting with community members under annex -III, in the appendix section.

The primary purpose of local community's consultation is to assess and record the community members' awareness, attitudes and opinions towards the proposed project. Accordingly, during community consultation, the following areas of discussions have been raised. These are:

- Social (community awareness about the projects, health and safety, compensation and relocation, sites of historical, cultural and heritage properties, job opportunities, vulnerable groups, skill and knowledge transfer, gender issue, etc);
- Environmental (Biodiversity, environmental pollution, sites of ecological importance, climate change, deforestation, water resources, exotic and indigenous tree plantations, domestic and wild animals)

Congruently, the results of community consultation and discussions reveal the followings:

- All consulted members of the community have prior awareness about the projects and have positive attitude towards their implementation.
- All consulted community members unanimously agreed on the implementation of proposed projects. All of them believed that the realization of the proposed projects will bring improvements in other social facility services, improve the socio-economic development of the areas and creates employment and income opportunities.

Photos: Consultation with local community members. Public consultation meeting at Dangla woreda Gult Kebele.

6.5.1.3. Results of Consultations with the Project Affected People (PAP)

The study team has also consulted the projects affected people along ZOIs with interview and discussions. Major environmental and socio-economic issues raised during interview and discussion period were:

- Environmental, health and safety,
- Employment and job creation issues,
- Investment and tourism issues,
- Access issues, Land acquisition, Resettlement and compensation.

The primary purpose of PAPs consultation is to assess and record their awareness, major attitudes and opinions towards the projects, In view of the above, the results of PAPs consultation and discussions reveal the followings:

PAPs Awareness towards the Project: All consulted PAPs have awareness about the projects, prior to the present environmental and socio economic data collection and study period

PAPs Attitudes towards the Projects: All consulted PAPs have positive attitude towards the implementation and operation of the projects.

Major Opinions of Contacted PAPs

Assessment of major opinions of contacted PAP reveals the followings:

- All consulted PAPs believes that the proposed projects are the basic priorities for socio-economic development of their Woreda.
- They also believe that the envisaged projects will supply electric power along ZOI.
- Further, the Projects are expected to contribute for solving the existing problem in shortage of electric power supply.

Project affected households should get appropriate compensation and relocated in suitable areas before the start of the project construction. Finally, it was assured that they will contribute all what is possible for the successful implementation of the projects.

Photos: consultation with Project Affected People (PAPS)

CHAPTER SEVEN

7. ASSESSMENT OF ENVIRONMENTAL AND SOCIAL IMPACTS; IMPACTS ENHANCEMENT AND MITIGATION MEASURES

General Approaches

Development projects, like electric power transmission line, either by new routes or through the rehabilitation, maintenance and upgrading of existing ones may accompanied by positive/beneficial and negative/adverse impacts on existing biophysical and socioeconomic environment. These will occur during construction, operation and maintenance phases of the intended projects. To this end, the proposed electric power transmission line projects, which are located at four lots project targeted sites in Ethiopia are no exceptions.

Environmental and Social Impacts, Enhancements and Mitigation measures of the envisaged project activities were assessed by field visit and survey (November – December 23, 2015) at each four lot project targeted sites, review of relevant documents (MEFCC EIA Guidelines, projects feasibility studies, route line selection and land acquisition survey result etc.). Moreover, consultation with projects concerned stakeholders (Administrative officials, PAPs, other distinct sector office experts and members of the community at large). Impacts have been identified and quantified, where possible. Moreover, the identified impacts described with respect to the likelihood of their occurrences, magnitude/degree of disturbance, duration, socio-economic, environmental value /relative importance of the affected environment, and reversibility/ the possibility for mitigation and intensity. This following sections will entertain notable potential impacts, both positive and negative presumably derived from the proposed project components based on the results obtained from the ESIA assessment.

Anticipated Positive Impacts and Enhancement Measures

Obviously, there will be a multitude of benefits or potential positive impacts assumed to be generated as a result of the implementation of the proposed electric power transmission line projects in the four target project locations and surrounding environs.

The anticipated potential positive impacts are environmental and social benefits that are assumed to be derived, due to the implementation of each proposed electric power transmission line project activities that are located at four targeted sites:

- LOT-I: 230 kV Metu-Mesha EPTLP to be constructed in SNNPR and Oromia.
- LOT-II: 230 kV Finchaa-Shambu EPTLP to be constructed in the Oromia region.
- LOT-III: 132 kV Bahir Dar- Dangila EPTLP to be constructed in the Amhara region.
- LOT-IV: 132 kV Azezo-Chiliga EPTLP to be constructed in the Amhara region.

Positive Impacts Common to all Sites

7.2.1 Employment and Income opportunities for local people

The most immediate benefit that the local people can drive from these projects will be temporary employment opportunities. During the construction period of the projects, it is expected to hold a workforce that can be employed in the construction works of the aforementioned power transmission line projects. As the result, the labours recruited from the community area and its immediate surroundings will drive income and employment opportunities for themselves and their families. Hence, it could bring growth and development to the local communities and national economy at large. It has been learnt that the following numbers of workforce is expected to be employed in these sites:

- 230-250 people LOT- I site
- 128-160 people LOT- II site
- 203-254 people LOT- IIII site
- 130-162 people LOT- IV site

Enhancement Measures: the benefits could be enhanced through workers' capacity enhancement via appropriate on-the job skills and knowledge transfers, so that the benefits will be endured for longer period of time.

7.2.2 Brings Improvements in Various Social Facility Services

During the study period, data sources obtained by consultation with the projects concerned stakeholders at directly targeted projects area reveals the following:

Currently, the attendance levels at primary school, particularly along ZOIS of the rural sites existing in the projects area are low. Among others, the major causes for the low education coverage are lack of access to the immediate learning institutions and insufficient or unavailability of electric power supply. It is therefore; clear that the provision of electric power supply would mean the availability of light to provide efficient education services at day and night classes. Hence, the implementation of the projects would encourage students to continue their education in the nearby schools. Regarding health services in the proposed project areas, data sources also indicated that the health institutions have problems associated to electric power supply mainly for sterilization of medical appliances, refrigeration of vaccines and other medicines, cold storages/ preservation of medicines and medical laboratory tests. Hence, the implementation of the envisioned projects will undoubtedly contribute to detain the stated limitations and therefore expected to bring improvements of health services in the areas. In general, the implementation of the envisaged projects will brings improvements in the establishment and functions of various social facilities in the targeted sites, such as education , health, water supply and other social facility services currently existing or planned to be under taken in the area.

Enhancement Measures: This benefit can be enhanced by providing power supplies to existing and imminent social and economic service infrastructures from the main incoming transmission lines so as to make power access as per their demand and requirement of the universal electrification access

program to ensure that households are connected and can reap the benefits of electricity service. The additional finance will support access expansion efforts under component 2, especially in the areas where grid coverage exists. In most of these areas, a growing number of prospective customers who have requested service (and even paid for the connection) are put on a waiting list because of network constraints and/or a shortage of connection equipment, including meters.

7.2.3 Reduce Work Burden from Women

The availability of power supply will anticipate in easing the burden of women in the study areas. The electrification process will in turn facilitate the setting up of grind mills in the vicinities, promoting the use of improved technology for the preparation of food using electric stoves, the initiation and development of motorized water pumps, etc. These were mentioned as potential benefits evidencing for the stated inference, towards sharing women's burden and further triggering for the improvement in women's quality of lives in the proposed project target areas. It is also believed to facilitate communication and interaction of women both within and outside of the ZOI using mobile phone service.

Enhancement Measures: Availing of sustainable power supply, improving distribution network and improving access through new transmission lines would enhance the above mentioned benefit of the projects.

7.2.4 Facilitate Humanitarian Aid

Construction of the proposed projects would greatly facilitate humanitarian work in times of crises like famine, epidemic diseases (morbidity), particularly, for emergency services, laboratory tests, sterilization of health equipment and cold storages of medicines.

Enhancement Measures: This benefit can be enhanced by efficient power supply to urban and rural villages to the main incoming power supply system so as to make access for facilitation services of the humanitarian aid people living in remote rural areas as per their demand and requirement of the universal electrification access program to ensure that households are connected and can reap the benefits of electricity service. The additional finance will support access expansion efforts under component 2, especially in the areas where grid coverage exists. In most of these areas, a growing number of prospective customers who have requested service (and even paid for the connection) are put on a waiting list because of network constraints and/or a shortage of connection equipment, including meters.

7.2.5 Cultural Diffusions

The in-migrant people for job opportunities will bring both positive and negative impacts to the local people. Yet, some of them will have different cultural backgrounds that might be important for the culture of the local communities and will bring more social interactions, skill transfer and other socio-cultural developments.

Enhancement Measure: This benefit can be enhanced by creating awareness among the workforce about the traditions and cultural norms of the local communities and through respecting local norms and cultures.

7.2.6 Provision of Electric Power Supply for Factories and Industries

Provision of electric power supply would facilitate for existing companies, investors and other enterprises demanding electric power supply. Moreover, supply of the said services in various development sectors in the near future is a must. Like: agriculture, commerce, health, education etc.

Enhancement Measure: This benefit can be enhanced by adopting timely maintenance and rehabilitation of the main line as well as up grading of the aforementioned main line to create conducive environment for demand of power in the projects areas and their immediate environs.

7.2.7 Economic Growth and Development

With the proposed projects construction, as stated here above, there will be employment and income opportunities, improvements of social facility services. Such as health, education and water supply in the areas selected for the proposed projects. Hence, the economy of people along the general sites of the proposed projects would be improved, contributing their share to the overall economic improvement of the country. Besides, implementation of these projects will complement the national electric supply network system. These and other positive impacts would help to increase the overall economy of the people along the projects influence areas and that of the country as a whole.

Enhancement Measures: This benefit can be enhanced by adopting timely maintenance of the network and construction of other supply system to connect the local community residential areas. These will create good opportunities for households' consumption, commerce and training while also will create conducive environment for investors to invest in tourism, agro-forestry development, irrigated farm and apiculture, etc in the projects area and nearby environs.

Negative Impacts and Mitigation Measures

7.3.1. LOT- I Project targeted site: 230kV Metu-Masha EPTLP

7.3.1. 1. Impacts on Bio-Physical Environment

A. Loss of land under various use

The proposed route options will have impacts on the existing land use, both temporarily and permanently. This would be affected by the construction of the transmission line, erection of tower pads, construction of new substation and access roads.

Accordingly, the transmission line will have a free corridor of 30 meters Right of Ways (ROWs). As a result, during the construction period, about 260ha of land are expected to be affected temporarily due to the formation of ROWs. The total number of towers assumed to be erected are about 186 with an average span of 310 meters. Each tower pad is expected to occupy about 100 m2 and altogether a total of about 1.9 ha of land will be affected permanently due to the erection of tower pads. Besides,

there will be a permanent loss of land to be affected by the construction of new substation at Masha town. Accordingly, it occupies about 9ha (300m X 300m) of land area. Assuming 5% (3.25km) increment, out of the total length of R1 for the construction of access road with 5m wide. Hence, at R1 alignment site about 1.63 ha of land would be affected by construction of access road temporarily and will not be restriction permanently. The permanent impact of land is for transmission tower pads and substation construction while the temporary land acquisition will be until the construction is finalized.

Therefore, totally about 272.53 ha of land would be affected, as the result of the formation of ROWs, erection of tower pads, construction of new substations, relocation of affected houses and construction of access roads. The summary of loss of land use and cover types is outlined and presented in the table 7.2 here below.

Table 7.2: Permanently and temporarily affected land area by Metu-Masha Project along R1

Route sections	Length (km)	No. of towers	Permanently affected (ha)	Temporarily affected (ha)	Total affected area (ha)
From Metu Town Existing substation to Masha town newly selected substation site	65	186	1.9	260	261.9
Construction of new substation at Masha town	-	-	9	-	9
Access road construction	3.25	-	-	1.63	1.63
Total	68.25	186	10.9	261.63	272.53

Source: results of field assessment (2015)

The land use and land cover types affected by the project along R1 are outlined and presented in the table7.2 here below.

Table 7.3: Affected Land Use and land cover types by project component along R_1

Project affected land use and cover type	ROW	Access road	Erection of Tower pad	new substation	residential area occupied by Tukuls and CIS	Total area (ha)	% coverage
Cultivated land covered with annual crops	15	-	-	-	-	15	5.47
Arable land covered with perennial crops and trees	191.63	1	0.80	-	-	193.43	70.55

Forest land covered by trees, bushes and shrubs	50	0.63	-	-	-	50.63	18.47
Grazing land	5	-	0.1	-	-	5.1	1.86
Bare land			1	9	-	10	3.65
Total	261.63	1.63	1.9	9	-	274.16	100

Source: results of field assessment (2015)

As can be observed in the table 7.2 here above, land use and land cover types comprises Cultivated land covered with annual crops , Arable land covered with perennial crops and trees , Forest land covered by trees, bushes and shrubs , Grazing land and Bare lands. Hence, Out of the total land uses to be affected, Arable land covered with perennial crops and trees take the largest proportion, which is 193.43 ha or cover 70.55 %. While, the Grazing land occupies the smallest portion which is 5.1ha or 1.86%

B. Risk of land sliding and Soil erosion

During erection of tower pads, construction of new substation and access roads of the proposed projects along route option 1, there will be clearing of vegetation and excavation works, which may lead the top soil to be threatened by wind and water erosion Particularly, mountainous terrain structures the land slopes along the route alignments. The use of machineries during the construction period may also exacerbate the problem of soil erosion in the area. The risk of erosion would be higher where there is an increase in land slope.

The emergence of erosion may cause the increase of sedimentation load and deterioration of quality of streams nearby. But the risk of erosion would be minimum, since the slope is minimum along R_1 alignment. However, prior to launch the construction works, the projects shall ensure there is an approved conservation plan for the proper management and control of soils at transmission line project targeted sites.

C. Impacts on Air and Water Quality

Impact on air Quality

The proposed project along route option-1 will have adverse impact on air quality. This occurs as a result of dust and smoke releases during construction period. The machineries involved in the construction activities especially in the clearing of ROWs and construction of access roads are the major causative elements for the problem. However, the impacts will be minimized acceptably by taking proper dust abatement measures (e.g. watering) where necessary, and by using properly handled/maintained machineries.

Impacts on Water Quality

Rivers, ground water and springs are used for water supply sources in the project area for drinking, cooking and washing purposes for human's .While, for cattle drinking purpose. Therefore, pollution of this resource may arise during construction period from construction camp site ,accidental and deliberate spillage of polluting materials into water bodies adversely affects those who depends on

local water resources in general and ground water pollution in particular ,which can have a serious long term effects on water quality. Inappropriate disposal waste materials into water can also lead to public and animal health hazards. Pollutions of water impacts can be avoided by managing properly the construction materials, particularly chemicals fuel and lubricants.

Hence, the contractor should take all appropriate mitigation measures to minimize pollution. Accordingly, it is recommended to include a clause in the construction contracts, which requires, the contractor to prepare Environmental and social management plan for the site works prior commencements of the construction activities.

Impacts on Biodiversity

Flora

There will be clearing of trees, bushes and shrubs in the given ROWS, during the construction period of the proposed project along route option-1. Clearing of trees, shrubs and bushes may cause habitat loss and favors the expansion of alien invasive species in the study areas.

In addition to the clearance of ROWs, the practice of forest encroachment may increase in the project area due to the opening of new access roads to the natural vegetation. Particularly, towards one of the National forest priority area, which is found along the western edge of the plateau between Metu and Tepi towns in Illuababor zone of Oromia region. The general name used for the said forest is Metu-Gore-Tepi Natural Forest priority Area. In this forest the dominant tree species currently existing are:

- "TID" (Juniperus procera) with some patches of "WEIRA" (Olea europaea sub species),
- Acacia species such as green wattle (Acacia decurents) and black wattle (A. mearnsii).
- Large lived albeizia (Albiza grandibracta)
- Sudan teak (Cordia africana)
- African fan palm (Barasasus aethiopum)
- Cockspur coral tree (Erythrina crista galli)
- Blue gum (Eucalyptus globules)

Hence, selection of R1 is taken into consideration not to encroach the said forest priority area and it goes along side to side with the existing 33kV power transmission line. Therefore, selection of route one minimizes encroachment towards the aforementioned forest area and it has not any negative adverse impact.

Fauna

During the field assessment, observation of wild animals in the project areas along R1 has been almost nil, despite some common wild animals are reported to exist in the projects areas. However, some wild animals may still be affected during the construction period. Some of their shelters would be disturbed and forced to evacuate or exposed to illegal hunting. Therefore, great care would have to be taken to avoid adverse impacts on wild animals during the construction period at the natural forest priority area.

Impacts on National Parks and Reserved Area

At present, there are no known wildlife national parks, reserve areas or sanctuaries due to be crossed or affected by the proposed transmission line route option R1.

Impacts on Birds

Around the project site, the Metu-Gore-Tepi natural forest area is one of the important bird sites (IBA). Therefore, during the assessment period of route selection a great care has been taken not to encroach the IBA. While there may be no direct adverse effects on the important bird area, transmission lines can be a nuisance to birdlife. Further information on this bird site could be found at http://www.birdlife.org/datazone/sitefactsheet.php?id=6280. Although not known, the IBA has a considerable distance from the identified site.

Ethiopia is recognized as one of Africa's bird hotspots with over 850 species recorded, out of which around 30 species are endemic (There are 17 species endemic to Ethiopia and a further 13 species restricted to the geographical region of the Ethiopian Highlands, which includes parts of Eritrea). It is also worth noting that there are over 200 paleartic migrants and many of these have breeding populations in Ethiopia. Key areas include the wetlands and the rift valley migratory routes. The main source of information on bird populations is the Ethiopian Wildlife and Natural History Society (EWNHS) who have been identifying "Endemic Bird Areas" and "Important Bird Areas".

Protection from Bird Collision and Electrocution

There are two main approaches to dealing with the issue; that is, design and insulation of distribution poles and attaching "flappers" to the lines so that they can be more easily seen and avoided in flight. Research carried out on different pole configurations has shown that the armless compact construction design is regarded as being the safest. However, even with the armless compact design, raptors flying into land on one of the short support brackets can contact both of the lower phase conductors at the same time. Birds usually are thought to select their breeding habitats on the basis of vegetation coverage. After the construction of the transmission /distribution line the vegetation clearing activity in the ROW will affect birds in many ways. Bird collision nowadays is also becoming a significant issue not only from environmental point of view, but also from economical and technical viewpoints.

- The threats are immense to those birds with relatively large body size, fast flight, flocking behavior, long appendages relative to body size, poorly developed fovea and spending relatively high proportion of time in the air.
- Some of the conductors are thinner and are more difficult to be seen hence, causes bird collision.
- Birds at most risks are due to their relatively wide wingspans and tendency to use poles as nesting platforms.
- Also bird collisions with the transmission line occur especially to those night active once.
- Electrocution and death of birds occur when bird's body bridges the gap between two energized components of conductors.
- Moreover, other birds also are more often killed through direct flying into wires at high speed.

Mitigation Measures

- Careful pre-construction siting should avoid transecting wetlands or separating known roosting and foraging habitats. The line should also be parallel to prevailing winds condition, and on prominent landscape features such as cliffs it should utilize existing transmission line corridors.
- Power lines should be modified and re-designed to make sure that wires are more visible to avifauna to protect them from power line collisions.
- Remove all static leftover lines from poles.
- Use wire markers on static lines to make it more visible.
- Minimize opportunities for birds to come in contact with wires by placing perches above wires.
- Ensure that wires are spaced to accommodate the wingspan of the largest birds and provide nesting platforms in areas where raptors are likely to nest on poles.
- Install deflectors /flapper devices or balloons in sensitive areas with potential for bird collision, which will be fixed on shield wires to make it more visible and reduce or minimize collision of birds significantly.
- Increasing the distance between phase conductors and installing molded plastic insulation on conductors.

In general EEP in this project adheres to the Ethiopian government's Proclamation No. 635/2009 of June 2009.

7.3.1.2. Socio-economic Impacts

Impacts on Residential Areas and Community Services

Based on the general field assessment along ZOIs, within the distance of 65.1km along the selected route option R1 (Metu-Masha transmission line project) there are 73 dwelling houses (20 CIS +53 Tukuls) and community services affected by the project.

The area size of each residential house for Tukuls is medium (30 m^2). While each CIS (roofs covered by iron sheet, walls made of wooden materials and plastered by mud, floors half masonry) is 70 m^2 (7 m x 10 m). The unit cost for each medium sized tukul (30 m^2) is 25,000.00 ETB, while the estimated cost for CIS type houses is 75,000.00 ETB. Thus, the total cost for the 53 Tukuls to be affected (53 x 25,000.00 ETB) is 1, 325,000.00 ETB, while the 20 CIS will cost 1,400,000.00 ETB (20x75, 000.00 ETB). The project affected Tukuls and CIS building types are presented in the table 7.3 here below

Table7.3: Affected Tukuls and CIS

Route section	Route length km	Type of Houses	Unit of Measurment	No. of Houses	Size of affected houses			Unit Price in Birr			Total cost (ETB)
					S	M	L	S	M	L	
	65.1	Tukul	NO	53	-	53	-	-	25,000.00	-	1,325,000.00
		CIS	Meter	20	-	-	-	-	75,000.00		1,500,000.00
	Over all compensation cost										**2,825,000.00**

Source: Field visit and surveyor's data

All 73 residential houses mentioned here above will be affected permanently, due to land acquisition for the Metu-Masha EPTLP. Hence, there is a need of replacement land for the PAPs. This land by land replacement should be undertaken by the project affected Woreda Administration (Maha Woreda), in accordance with the Ethiopian Proclamation of 455/2005 and Regulation on expropriation of land holding for public purposes and compensation payment. Based on data sources obtained during interview and discussion period with the PAPs, indicated that they have available on their own existing settlement site land to reconstruct the affected houses. Hence, physically the said PAPs will not be moved outside of their existing residential site. The project, however, will have to compensate the PAPs for loss of assets such as their houses and any other properties that may be affected. Also, the project will provide financial support for the movement of property from the site to be demolished to any new housing sites selected by the PAPs.

Impacts on Community Services

During the line survey no community services' structures or facilities were found to be affected by the project. Schools, health institutions, churches, mosques, and other major community services have been made to be kept away from ROWs during the selection of route alignment.

Impacts on Crop Production

The proposed 230 kV Metu-Masha 230 kV power transmission line project along Route-1 will affect some of the croplands and crop productions temporarily. But the proposed substation site is expected to be constructed entirely on bare land, which does not hold any crops. Thus, no adverse impacts are expected on crop production. The farmers' seasonal agricultural activities may be disrupted by the construction activities. On farm crops may also be affected temporarily during the construction period. They can however be mitigated either by undertaking the construction works after the crops harvest or doing proper compensation payments for all damaged crops. It is estimated that the cultivated land to be occupied by the proposed transmission line and temporarily kept out of crop production along the ROW will be about 15ha. The land will be utilized back after construction, but no permanent crops are allowed. The costs for the temporary loss of crop production would be about Birr **380,500.00.** Therefore, comparing to the total crop production in the project area, the loss as a whole is negligible.

The details of affected annual crop land with an estimated compensation cost are presented in the table 7.4 here below.

Table7.4: Estimated Compensation Costs for Loss of Annual Crops (temporarily) along R1

Route section	Type of crop	Crop coverage in ha	Production Qtl / ha	Unit price / Qtl Birr	Total cost in ETB
From existing substation in Metu to the new substation site in Masha	Maize	7	40	700	**196,000.00**
	Sorghum	5	25	900	**112,500.00**
	Teff	3	16	1500	**72,000.00**
	Total compensation cost in ETB				**380,500.00**

The proposed new substation site in Masha: The land use of the proposed substation site is bare land. Hence, no houses were found to be affected by the projects.

Photo: Proposed New Substation Site in Masha

B. Impacts on socio-economically valued plantations

The proposed projects will affect some trees, such as coffee, mango and eucalyptus trees as a result of the formation of right off ways (ROWs) along route option R1. It was noted that as many as 80 stand pole eucalyptus trees will be affected per each kilometer on the selected route. At a pole price of 70.00 ETB set by the country's promulgation of compensation, the total amount expected to be paid as compensation for these trees on 65km is 364,000.00 ETB (80*65*70.00 ETB).

Impacts on Cultural, Historical and Archaeological Sites

During the field assessment, the study team has made a search in the projects areas both from key informants in the field and from literatures review if there are any significant heritages liable to be affected by the proposed projects. The search was mainly focused on archaeological, anthropological, cultural, and religious artifacts.

So far there are no significant archaeological cultural, historical and religious artifacts along the proposed transmission line project along R1 that would be directly impacted by the project.

If during the construction period there should be any accidental "Chance finds" of some archaeological or historical importance on the selected line routes, the construction workforces shall let their immediate supervisors know who will then report to EEP's project office. Then, EEP will report to the Authority for Research and Conservation of Cultural Heritage (ARCCH) about the findings.

Photo: Project affected residential houses (Tukul and CIS) on the Metu-Mashal EPTLProject

7.3.1.3. Impacts on Health and Safety

Dust Emission

During the construction period, dust may arise due to the construction works and traffic increase. The problem though is temporary and limited, it causes dust pollution and may sometimes result in respiratory problems on some of the construction workforces and local communities living around. The dust problem however can be managed through taking proper dust abatement measures like watering of roads and control of traffic speed limits. The contractors will be required to incorporate the issue into their management plan and submit with their contract proposals.

Noise

There is a standard noise limit value that is acceptable both nationally and internationally. The limit value should not exceed 55 dB in the day time and 45 dB in the night time. The noise pollution due to the construction of the transmission lines is temporary and limited. However, if it is found beyond the stated limits, it can be minimized by adopting appropriate mitigation measures such as the provision and use of proper hearing equipment for construction workers. The working time should be limited in order not to affect the local communities in the vicinities.

Sexually Transmitted Infections (STIs)

The major impacts on health and safety are related to the work force engaged in the construction and operation of the transmission lines. Communicable diseases like sexually transmitted infections (e.g. HIV/AIDS, Hepatitis, etc.) and malaria can be spread around and in the construction areas. The influx of labor to the construction areas and their interactions with the local communities may create access for the spread of communicable diseases in the area.

The mitigation plan will take an aggressive approach to control the spread of STIs, health education programs, control of illegal or socially prohibited informal sector activities like drug abuse, prostitution, smuggling and other associated socially unacceptable activities near the projects sites.

Even with the most vigorous campaign and safeguards, an increase in STIs resulting from the project is predictable. Therefore systematic blood testing like voluntary counseling and testing VCT practice in the projects areas are quite necessary so as to keep the cases minimal. The blood testing must be used merely for information purposes and not to be used to discriminate or dismiss infected employees.

Other Infectious Diseases

Some diseases like hepatitis, intestinal and respiratory cases may occur in situations where a large work force exists and not provided with proper sanitary and work place facilities in construction camps. Therefore, if the contractor wants to have construction camps, he should keep and maintain them in a clean and healthy condition as prescribed by acceptable standards.

Public and Occupational Safety

Public safety at any time is worthwhile even though, residents within the ROW would be relocated. For instance, during the construction period, the movement of heavy tracks will increase and sometimes may cause road accidents, especially among the local residents who are not accustomed to heavy traffic. Some work accidents and minor injuries (e.g., fall from above, hit by object, car accidents, cuts, etc.) may also occur mainly due to lack of safety precautions. Therefore, contractors should regularly provide adequate safety equipment and health and safety orientation to their employees. All accidents and near misses will be recorded with corresponding corrective actions taken. Only trained and certified workers will install, or decommission electrical equipment. Projects related vehicles will be required to abide by good driving conducts, obey speed limits and follow the rules of safe driving especially in the projects areas.

During operation period, most of the impacts are related with electrocutions and possible induce effects from Electromagnetic Fields (EMF). Thus, the placement of low slung lines or lines near human activities (e.g. high ways, buildings) may increase the risk of electrocutions. Therefore, the lines should be checked regularly, whether or not they are at low slung, so that prompt actions would be taken to avoid the risks on high ways and residential areas.

Towers and transmission lines may disrupt air plane flight paths in and near airports and endanger low flying aircraft. However it is proved that there are no airports or landing strips nearby that would be

affected by the transmission line during operation period. Safety orientations in schools along the transmission line will further minimize impacts on the local community.

Electro Magnetic Fields (EMF)

Electromagnetic fields (EMF) are invisible lines of force that surround any electrical device. Power transmission lines, electrical wiring and electrical equipment all produce EMF. Electric fields are produced by voltage and increase in strength as the voltage increases. Electric fields are shielded or weakened by materials that conduct electricity - even materials that conduct poorly, including trees, buildings and human skin. Magnetic fields, however, pass through most materials and are therefore more difficult to shield. However, both electric fields and magnetic fields decrease rapidly as the distance from the source increases.

As a precautionary measure, Ethiopian Electric Agency adopted standard of ROW width of 30m for its high voltage transmission lines of 132 KVs and 230KVs[11]. All habitation and structures are excluded from the ROW to ensure safety of people and animals from EMFs produced as well as from direct electric shocks and 'flash over'. With respect to substations, in general, the strongest EMF around and outside of a substation comes from the power lines entering and leaving the substation. The strength of the EMF from equipment within the substations, such as transformers, reactors, and capacitor banks, decreases rapidly with increasing distance. Beyond the substations' fence or wall, the EMF produced by the substations' equipment is typically indistinguishable from back ground levels. (http://www. Niehs. Nih.gov/emfrapid).

It should be noted that there is a concern for homes, schools and public recreational facilities including playing grounds located near the high voltage transmission line. Playing ground and schools especially located near electrical components with high magnetic fields are a concern because the developing child is at a greater danger of biological effects from magnetic field exposure than an adult would be. (http://brain101.inf/EMF.php). The study team confirmed that there are no schools or play grounds close along the proposed route to present such a risk.

Effects of Polychlorinated Biphenyls (PCBs)

PCBs are a mixture of individual chemicals which are no longer produced in the United States and in most European countries by 1980 but are still found in the environment. Health problems associated with exposure to PCBs include acne like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are also known to cause cancer in animals. PCBs are a mixture of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. PCBs have no known smell or taste.

PCBs have been used as coolants and lubricants in transformers, capacitors and other electrical equipment because they don't burn easily and are good insulators. The manufacturing of PCBs was

[11] Ethiopian Electricity Agency issued Directives on Overhead Electric Line Clearances and Quality of Supply in 2005 based on the Council of Ministers regulation no 49/1999 stated that for 132-230KV transmission lines the ROW at 30 meter. Thus, this RAP takes the country legal framework in determining the ROW for the proposed project at 30m

stopped in the US in 1997 because of evidence they build up in the environment and can cause harmful health effect. (http://www.atddr.cdc.gov/tfacts17.hm bookmark02).

The Stockholm Convention is a global treaty which Ethiopia has signed and ratified to protect human health and the environment from persistent organic pollutant (POPs) which PCBs are one of them.

For the proposed new substations they would install new PCB free transformers, capacitors and other electrical equipment. As per the Convention most manufacturers have stopped manufacturing PCB containing transformers and capacitors. Most transformers and capacitors manufactured after 1980s are said to have not contained PCBs. A good practice in this regard would be the work of EEP in cooperation with the MEFCC have undertaken preliminary inventory of all equipment to identify the presence of PCBs. The completion of the inventory will help EEP to develop a program for the safe removal and disposal of any PCBs found in accordance with the Convention to which it is signatory.

7.3.1.4. Impacts on Women and Vulnerable Groups

Women embrace disproportionately large number of poor in most countries due to gender discrimination. The situation limits the women to have an access to resources, opportunities, and public services necessary to improve the standard of living for themselves and their families. In the projects affected areas, women's economic activities are limited to household management and some major farm practices like weeding and so on. They have a burden of works (They work at least 13 hours a day) but are still economically dependent upon men and have no right to decide on most of the economic and social matters in the family. Therefore, the economic, social and political position of women in the projects affected area is still very weak.

Women are very interested in the proposed projects than other social groups because they are more beneficiaries from the opportunities provided through the proposed projects. The availability of electricity would help in improving the existing infrastructures and services to the level that it can provide adequate services to the communities. Especially the burden of women will be reduced because of improved infrastructures and social services (health, education, flour mills,) accessible to them. They may not need to go long distance for seeking flour mills, collecting fire wood, fetching water for drinking and cooking etc.

The availability of electricity in the projects area also helps to encourage investments in different economic sectors so women can have opportunity to get employments, participate in micro businesses, selling foods, etc. This may help to increase their income. Vulnerable groups can include households headed by women, households victimized by HIV/AIDS who are headed by children, households made up of the aged or handicapped whose members are socially stigmatized (as a result of traditional or cultural bias) and economically marginalized. Special assistance to be rendered to vulnerable groups may consist of the following:

- Provision for separate and confidential consultation.
- Priority in site selection in the host areas.
- Relocation near to kin and former neighbors.
- Assistance with dismantling salvageable materials from their original homes.

- Priority access to all other mitigation and development assistance

Women with children also have less physical mobility to travel to find ways of earning a livelihood. For these reasons, efforts to maintain the social continuity of communities affected by a project whether through the physical design of new sites, measures to prevent the disintegration of the community or the provision of specialized social services at those sites are important.

7.3.1.5. Synthesis of Environmental and Social Impacts

The possible negative and positive impacts predicted were classified as very important, more important, important, fairly important, and less important. They are seen in the environmental matrix table 7.8 (for the 230 kV Metu-Masha EPTL Project) here below. The impacts identified and classified are scored by assignments of capital letters from "A-E" for positive impacts. While, by small letters from "a-e" and in numerical number zero for negative impacts. The cases at stake are presented here below:

Assigned Matrix Scores for Positive Impacts

- A=Very important
- B=More Important
- C=Important
- D=Fairly I\important
- E= Less important

Assigned Matrix Scores for Negative Impacts

- a=Very important
- b=More important
- c=Important
- d=Fairly Important
- e=Less Important
- 0=Not important

Therefore, the assigned score values for assessments of both positive and negative impacts are applicable and similar for both projects (230 kV Metu-Masha electric power transmission line project) except environmental components of residential houses against the project activity.

In the above connection, it should be noted that synthesis of all environmental impact matrix parameters (Socio-economic and Bio-physical environment) against the proposed project activities at different phases of the projects cycle are considered for both projects. Except synthesis of project activities impact on environmental components of the residential areas for the project. Because the said project activities have no impact on the residential areas. Therefore, the ESIA team takes into account the said parameters only for the project.

Table 7.5: Synthesis of Environmental Impact Matrix

The following table is presented based on the prior environmental and social impact analysis at different phases of the project. The qualitative description of the issues is discussed overall under section seven.

No	Environmental and socio-economic? Components	Pre-construction phase		Construction phase activity components				Operation phase		
		Line route survey	Land Acquisition	Equipment and material mobilization	Tree cutting & corridor freeing	Foundation tower erection and stringing	Access roads const.	Induction influence	Electro-magnetic Wave effluence	Radio Interfe-rence
I	Socio-economic Environment.									
	Residential areas	a	a	E	0	d	0	0	0	0
	Income	E	C	A	0	A	D	0	0	0
	Cultural and historical sites	0	0	0	0	0	0	0	0	0
	Health & safety	0	0	e	0	d	e	E	e	0
	Quality of daily life	0	0	A	0	A	D	0	0	0
	Social unrest	0	0	e	0	e	e	E	0	0
II	Physical Environment									
	Soil and water quality?	0	0	e	0	c	e	0	0	0
	Air quality	0	0	e	0	e	e	0	0	0
	Land use	a	a	e	0	b	d	0	0	0
	Water resources	0	0	0	0	0		0	0	0
III	Biological Environment									
	Flora	0	0	0	0	0	0	0	0	0
	Fauna	0	0	0	0	0	0	d	d	D
	Parks and reserves	0	0	0	0	0	0	0	0	0

i. 7.3.2 LOT- II Project Targeted Site: Finchaa-Shambu230KV EPTLP

1. Impacts on Bio-Physical Environment

Loss of land under various uses

The proposed route options will have impacts on the existing land use, both temporarily and permanently. This would be affected by the construction of the transmission line, erection of tower pads, construction of new substation and access roads. Accordingly, the transmission line will have a free corridor of 30 meters Right of Ways (ROWs). As a result, during the construction period, about 166.4ha of land are expected to be affected temporarily due to the formation of ROWs.

The total numbers of towers assumed to be erected are about 134 with an average span of 310 meters. Each tower pad is expected to occupy about 100 m2 and altogether a total of about 1.34 ha of land will be affected permanently due to the erection of tower pads. Besides, there will be a permanent loss of land to be affected by the construction of new substation at Masha town .Accordingly, it occupies about 9ha (300m X 300m) of land area. Assuming 5% (2.1km) increment, out of the total length of R1 for the construction of access road with 5m wide. Hence, at R1 alignment site about 1.1 ha of land would be affected by construction of access road temporarily. Therefore, totally about 178 ha of land would be affected, as the result of the formation of ROWs, erection of tower pads, construction of new substations and construction of access roads. The summary of the said loss of land use and cover types are outlined and presented in the table 7.6 here below.

Table 7.6: Permanently and temporarily affected land area by Fincha Shambu Project along R1

Route sections	Length (km)	No. of towers	Permanently affected (ha)	Temporarily affected (ha)	Total affected area(ha)
From Finchaa Town Existing substation to Shambu town newly selected substation site	41.6	134	-	-	-
ROW	-	-		166.4	166.4
Construction of new substation at Masha town	-	-	9	-	9
Erection of tower pads	-	-	134		134
Access road construction	3.25	-	-	1.1	1.1
Total	**44.45**	**134**	**143**	**167.5**	**310.5**

Source: results of field assessment (2015)

The land use and land cover types affected by the project along R1 are outlined and presented in the table7.10 here below.

Table 7.7: Affected Land Use and land cover types by project component along R_1

Project affected land use and cover type	ROW	Access road	Erection of Tower pad	new substation	Total area (ha)
Cultivated land covered with annual crops	8	-	-	-	**8**
Arable land covered with perennial crops and trees	30	0.1		-	**30.1**
Forest land covered by trees, bushes and shrubs	3		-	-	**50.63**
Grazing land	3	-		-	**3**
Bare land	120	1	1.34	9	**131.34**
Total	164	1.1	1.34	9	**175.44**

Source: results of field assessment (2015)

Risk of land sliding and Soil erosion

During erection of tower pads, construction of new substation and access roads of the proposed projects along route option 1, there will be clearing of vegetation and excavation works, which may lead the top soil to be threatened by wind and water erosion. Particularly, mountainous terrain structures the land slopes along the route alignments. The use of machineries during the construction period may also exacerbate the problem of soil erosion in the area. The risk of erosion would be higher where there is an increase in land slope.

The emergence of erosion may cause the increase of sedimentation load and deterioration of quality of streams nearby. But the risk of erosion would be minimum, since the slope is minimum along R_1 alignment. However, prior to launch the construction works, the projects shall ensure there is an approved conservation plan for the proper management and control of soils at transmission line project targeted sites.

Impacts on Air and Water Quality

Impact on Air Quality

The proposed project along route option-1 will have adverse impact on air quality. This occurs as a result of dust and smoke releases during construction period. The machineries involved in the construction activities especially in the clearing of ROWs and construction of access roads are the major causative elements for the problem.

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

Impacts on water quality

Rivers, ground water and springs are used for water supply sources in the project area for drinking, cooking and washing purposes for humans. While, for cattle drinking purpose. Therefore, pollution of this resource may arise during construction period from construction camp site ,accidental and deliberate spillage of polluting materials into water bodies adversely affects those who depends on local water resources in general and ground water pollution in particular ,which can have a serious long term effects on water quality. Inappropriate disposal waste materials into water can also lead to public and animal health hazards. Pollutions of water impacts can be avoided by managing properly the construction materials, particularly chemicals fuel and lubricants.

Hence, the contractor should take all appropriate mitigation measures to minimize pollution. Accordingly, it is recommended to include a clause in the construction contracts, which requires, the contractor to prepare Environmental and social management plan for the site works prior commencements of the construction activities.

iii. Impacts on Biodiversity

D.1 Flora

There will be clearing of trees, bushes and shrubs in the given ROWS, during the construction period of the proposed project along route option-1. Clearing of trees, shrubs and bushes may cause habitat loss and favors the expansion of alien invasive species in the study areas. In addition to the clearance of Rows, the practice of forest encroachment may increase in the project area due to the opening of new access roads to the natural vegetation. Hence, the impacts on existing flora are minimum.

D.2. Fauna

During the field assessment, observation of wild animals in the project areas along R1 has been almost nil, despite some common wild animals are reported to exist in the projects areas. Therefore, a great care should be taken to avoid adverse impacts on wild animals during the construction period.

D.3. Impacts on National Parks and Reserved Area

At present, there are no known wild life national parks, reserve areas or sanctuaries due to be crossed or affected by the proposed transmission line route option R1.

D.4. Impacts on Birds

Around the project site Fincha Neshe swamps at 50 km distance there is important bird sites (IBA). There are no birds observed during the field assessment and migratory birds identified in the area.

Therefore, the project will not have an adverse impact on important bird sites.

2. Socio-economic Impacts

Impacts on Residential Areas and Community Services

Based on the general field assessment along ZOIs, there is no an adverse impact on residential impacts and community services. Moreover, Shambu New Substation Site is bare land. Hence, no houses were found to be affected by the project. No need for compensation.

Impacts on Community services

During the line survey no community services' structures or facilities were found to be affected by the project. Schools, health institutions, churches, mosques, and other major community services have been made to be kept away from ROWs during the selection of route alignment.

ii. Impacts on Crop Production

The proposed Fincha –Shambu 230 kV power transmission line project along route-1 will affect some of the croplands and crop productions temporarily. But the proposed substation site is lies entirely in the bare land; it does not possess any crop lands and causes no impacts on crop productions.

Therefore, the cultivated lands to be occupied by the proposed transmission line will be about 8 ha of the land would be affected temporarily by ROW formation. The costs for the temporary loss of crop production would be about Birr **189, 000.00** Therefore, comparing to the total crop production in the project area, the loss as a whole is found negligible.

The farmers' seasonal agricultural activities may be disrupted by the construction activities. On farm crops may also be affected temporarily during the construction period. They can however be mitigated either by undertaking the construction works after the crops harvest or doing proper compensation payments for all damaged crops. The details of affected annual crop land with an estimated compensation cost are presented in the table 7.7 here below.

Table7.7. Estimated Compensation costs for loss of annual crops(Temporarily)along R1

Route section	Type of crop	Crop coverage in ha	Production Qtl / ha	Unit price / Qtl Birr	Total cost in ETB
From Fincha existing substation to Shambu the new substation site	Maize	5	40	600	**120,000.00**
	Sorghum	2	25	900	**45,000.00**
	Teff	1	16	1500	**24,000.00**
	Total compensation cost in ETB				189, 000.00

Photo: Masha New Substation site

Impacts on Socio-Economically Valued Plantations

The proposed projects will affect some trees, such as coffee, mango and eucalyptus trees as a result of the formation of right off ways (ROWs) along route option--1. Accordingly, the said asset affected within entire length OF R1 (65.1 km) are as follows:

30 eucalyptus trees/km*41.6=1248 in number (all are stand pole types)

Therefore, data sources obtained from project woreda reveals the unit price per stand pole, which was calculated for compensation purpose. Based on proclamation and regulation of compensation is 70.00 Birr.

Hence, the total cost of compensation is:

1248 *60.00=74,880.00 Birr

Impacts on Cultural, Historical and Archaeological Sites

During the field assessment, the study team has made a search in the projects areas both from key informants in the field and from literatures review if there are any significant heritages liable to be affected by the proposed projects. The search was mainly focused on archaeological, anthropological, cultural, and religious artifacts. So far there are no significant archaeological cultural, historical and religious facts along the proposed transmission line project along R1 that would be directly impacted by the project.

During the construction period, where there are any accidental "Chances of findings" of some archaeological artifacts on the line routes, the construction workforces shall be informed to let their immediate supervisors know and report to EEP's project office. Then, EEP will report to the Authority for Research and Conservation of Cultural Heritage (ARCCH) about the findings.

Photo: one of project affected residential houses(Tukul and CIS) due to the construction of Finchaa ShambuTLP

3. Impacts on Health and Safety

Dust Emission

During the construction period, dust may arise due to the construction works and traffic increase. The problem though is temporary and limited, it causes dust pollution and may sometimes result a respiratory problem on some of the construction workforces and local communities living around. The dust problem however can be managed through taking proper dust abatement measures like watering of roads and control of traffic speed limits. The contractors will be required to incorporate the issue in to their management plan and submit with their contract proposals.

Noise

There is a standard noise limit value that is acceptable both nationally and internationally. The limit value should not exceed 55 dB in the day time and 45 dB in the night time.

The noise pollution due to the construction of the transmission lines is temporary and limited. However, if it is found beyond the stated limits, it can be minimized by adopting appropriate mitigation measures such as the provision and use of proper hearing equipment for construction workers. The working time should be limited in order not to affect the local communities in the vicinities.

Sexually Transmitted Infections (STIs)

The major impacts on health and safety are related to the work force engaged in the construction and operation of the transmission lines.

Communicable diseases like sexually transmitted infections (e.g. HIV/AIDS, Hepatitis, etc) and malaria can be spread around and in the construction areas.

The influx of labor to the construction areas and their interactions with the local communities may create access for the spread of communicable diseases in the area.

The mitigation plan will take an aggressive approach to control the spread of STIs, health education programs, control of illegal or socially prohibited informal sector activities like drug abuse, prostitution, smuggling and other associated socially forbidden activities near the projects sites.

Even with the most vigorous campaign and safe guards, an increase in STIs resulting from the project is predictable. Therefore systematic blood testing like voluntary counseling and testing VCT practice in the projects areas are quite necessary so as to keep the cases minimal. The blood testing must be used merely for information purposes and not to be used to dismiss infected employees.

Other Infectious Diseases

Some diseases like hepatitis, intestinal and respiratory cases may occur in situations where a large work force exists and not provided with proper sanitary and work place facilities in construction camps.

Therefore, if the contractor wants to have construction camps (storage for construction materials) in the new sub-station establishment identified areas, he/she should keep, maintained them in a clean and healthy condition as prescribed by acceptable standards. The workers will be living in the nearby towns.

Public and Occupational Safety

Public safety at any time is worthwhile even though, residents within the ROW would be relocated. For instance, during the construction period, the movement of heavy tracks will increase and sometimes may cause road accidents, especially on the local residents who are not accustomed to heavy traffic.

Some work accidents (e.g., fall from above, hit by object, car accidents, etc) may also occur mainly due to lack of safety precautions. Therefore, contractors should regularly provide adequate safety equipment and orientation to their employees. Projects related vehicles will be required to abide by good driving conducts, obey speed limits and follow the rules of safe driving especially in the projects area.

During operation period, most of the impacts are related with electrocutions and possible induce effects from Electromagnetic Fields (EMF). Thus, the placement of low slung lines or lines near human activities (e.g. high ways, buildings) may increase the risk of electrocutions. Therefore, the lines should be checked regularly, whether or not they are at low slung, so that prompt actions would be taken to avoid the risks on high ways and residential areas.

Towers and transmission lines may disrupt air plane flight paths in and near airports and endanger low flying air craft. However it is proved that there are no air ports or land strips nearby that would be affected by the transmission line during operation period. Safety orientations in schools along the transmission line will further minimize impacts on the local community.

Electro Magnetic Fields (EMF)

Electromagnetic fields (EMF) are invisible lines of force that surround any electrical device. Power transmission lines, electrical wiring and electrical equipment all produce EMF. Electric fields are produced by voltage and increase in strength as the voltage increases.

Electric fields are shielded or weakened by materials that conduct electricity - even materials that conduct poorly, including trees, buildings and human skin. Magnetic fields, however, pass through most materials and are therefore more difficult to shield. However, both electric fields and magnetic fields decrease rapidly as the distance from the source increases.

As a precautionary measure, Ethiopian Electric Agency adopted standard of ROW width of 30m for its high voltage transmission lines of 132 KVs and 230KVs. All habitation and structures are excluded from the ROW to ensure safety of people and animals from EMF's produced as well as from direct electric shocks and 'flash over'. With respect to substations, in general, the strongest EMF around and outside of a substation comes from the power lines entering and leaving the substation. The strength of the EMF from equipment within the substations, such as transformers, reactors, and capacitor banks, decreases rapidly with increasing distance. Beyond the substations' fence or wall, the EMF produced by the substations' equipment is typically indistinguishable from back ground levels. (http://www. Niehs. Nih.gov/emfrapid).

Based on a recent in depth review of extensive scientific literature (World Health Organization's /WHO/ international EMF project), has concluded that "despite extensive research to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health" (http://www.who intpeh.emf./what is EMF/en.htm).

Therefore, it is concluded that there will not be any adverse health impact on people along the routes provided the proposed 30 meters ROWs is enforced along the proposed transmission line routes. It should be noted that there is a concern for homes, schools and public recreational facilities including playing grounds located near the high voltage transmission line.

Playing ground and schools especially located near electrical components with high magnetic fields are a concern because the developing child is at a greater danger of biological effects from magnetic field exposure than an adult would be. (http://brain101.inf/EMF.php). The survey confirmed that there are no schools and play grounds in close distance to have impacts on children.

Effects of Polychlorinated Biphenyls (PCBs)

PCBs are a mixture of individual chemicals which are no longer produced in the United States and in most European countries by 1980 but are still found in the environment. Health problems associated with exposure to PCBs include acne like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are also known to cause cancer in animals. PCBs are mixture of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. PCBs have no known smell or taste. PCBs have been used as coolants and lubricants in transformers, capacitors and other electrical equipment because they don't burn easily and are good insulators. The manufacturing of PCBs was stopped in the US in 1997 because of evidence they build up in the environment and can cause harmful health effect. (http://www.atddr.cdc.gov/tfacts17.hm bookmark02).

The Stockholm convention is a global treaty which Ethiopia has signed and ratified to protect human health and the environment from persistent organic pollutant (POPs) which PCBs are one of them. For the proposed new substations they would install new PCBs free transformers, capacitors and other electrical equipment. As per the convention most manufacturers have stopped manufacturing PCBs contain transformers and capacitors. Most transformers and capacitors manufactured after 1980s are said to have not contained PCBs.

A good practice in this regard would be the work of EEP in cooperation with the MEFCC have undertaken preliminary inventory of all equipment to identify the presence of PCBs. The completion of the inventory will help EEP to develop a program for the safe removal and disposal of any PCBs found in accordance with the Convention to which it is signatory.

4. Impacts on Women and Vulnerable Groups

Women embrace disproportionately large number of poor in most countries due to gender discrimination. The situation limits the women to have an access to resources, opportunities, and public services necessary to improve the standard of living for themselves and their families.

In the projects affected areas, women's economic activities are limited to household management and some major farm practices like weeding and so on. They have a burden of works (They work at least 16 hours a day) but are still economically dependent upon men and have no right to decide on most of the economic and social matters in the family. Therefore, the economic, social and political position of women in the projects affected area is still very weak.

Women are very interested on the proposed projects than other social groups because they are more beneficiaries from the opportunities provided through the proposed projects. The availability of electricity would help improving the existing infrastructures and services to the level that it can provide adequate services to the communities. Especially the burden of women will be reduced because of improved infrastructures and social services (health, education, flour mills,) accessible to them. They may not need to go long distance for seeking flour mills, collecting fire wood, fetching water for drinking and cooking etc.

The availability of electricity in the projects area also helps to encourage investments in different economic sector so women can have opportunity to get employments, participate in micro businesses, selling foods, etc. This may help to increase their income. Vulnerable groups can include households headed by women, households victimized by HIV/AIDS who are headed by children, households made up of the aged or handicapped whose members are socially stigmatized (as a result of traditional or cultural bias) and economically marginalized.

Special assistance to be rendered to vulnerable groups may consist of the following:

- Provision for separate and confidential consultation.
- Priority in site selection in the host areas.
- Relocation near to kin and former neighbors.
- Assistance with dismantling salvageable materials from their original home.
- Priority access to all other mitigation and development assistance

Women with children also have less physical mobility to travel to find ways of earning a livelihood. For these reasons, efforts to maintain the social continuity of communities affected by a project whether through the physical design of new sites, measures to prevent the disintegration of the community or the provision of specialized social services at those sites are important.

At present, there are no known wild life national parks, reserve areas or sanctuaries due to be crossed or affected by the proposed transmission lines and new substations.

5. Synthesis of Environmental and Social Impacts

The possible negative and positive impacts predicted were classified as very important, more important, important, fair important, and less important. They are seen in the environmental matrix table 7.5 (for Fincha shambu) here below. The impacts identified and classified are scored by assignments of capital letters from "A-E" for positive impacts. While, by small letters from "a-e" and in numerical number zero for negative impacts. The case at stakes are presented here below:

Assigned Matrix scores for Positive Impacts

- A=Very important
- B=More Important
- C=Important
- D=Fair Important
- E= Less important

Assigned Matrix scores for Negative Impacts

- a=Very important
- b=More Important
- c=Important
- d=Fair Important
- e=Less Important
- 0=No important

Therefore, the assigned score values for assessments of both positive and negative impacts are applicable and similar for both projects (Fincha -Shambu power transmission line projects) except environmental components of residential houses against the project activity.

In the above connection, it should be noted that synthesis of all environmental impact matrix parameters (Socio-economic and Bio-physical environment) against the proposed project activities (Fincha-Shambu) at different phases of the projects cycle are considered.

Table 7.8: Synthesis of Environmental Impact Matrix

The following table is presented based on the prior environmental and social impact analysis at different phases of the project. The qualitative description of the issues is discussed overall under section seven.

No	Environmental Components	Pre-construction phase		Construction phase activity components				Operation phase		
		Line route survey	Land Acquisition	Equipment and material mobilization	Tree cutting &corridor free	Foundation tower erection and stringing	Access roads const.	Induc-tion influe-nce	Electro-magnetic Wave effluence	**Radio Interfe-rence**
I	Socio-economic Environment.									
	Residential areas	a	a	E	0	d	0	0	0	**0**
	Income	E	C	A	0	A	D	0	0	**0 0**
	Cultural and historical sites	0	0	0	0	0	0	0	0	**0**
	Health & safety	0	0	e	0	d	e	e	e	**0**
	Quality of daily life	0	0	A	0	A	D	0	0	**0**
	Social unrest	0	0	e	0	e	e	e	0	**0**
II	Physical Environment									
	Soil	0	0	e	0	c	e	0	0	**0**
	Air quality	0	0	e	0	e	e	0	0	**0**
	Land use	a	a	e	0	b	d	0	0	**0**
	Water resources	0	0	0	0	0		0	0	**0**
III	Biological Environment									
	Flora	0	0	0	0	0	0	0	0	**0**
	Fauna	0	0	0	0	0	0	0	0	**0**
	Parks and reserves	0	0	0	0	0	0	0	0	0

Negative Impacts and Mitigation Measures

LOT- III Project Targeted Site: Bahir-Dar-Danigila132kv EPTLP

Impacts on Bio-Physical Environment

Loss of land under Various Uses

The proposed route options will have impacts on the existing land use, both temporarily and permanently. This would be affected by the construction of the transmission line, erection of tower pads, construction of new substation and access roads.

Accordingly, the transmission Line will have a free corridor of 30 meters Right of Ways (ROWs). As a result, during the construction period, about 270ha of land are expected to be affected temporarily due to the formation of ROWs. The total numbers of towers assumed to be erected are about 218 with an average span of 310 meters. Each tower pad is expected to occupy about 100 m2 and altogether a total of about 2.2 ha of land will be affected permanently due to the erection of tower pads.

Besides, there will be a permanent loss of land to be affected by the construction of new substation at Masha town .Accordingly, it occupies about 9ha (300m X 300m) of land area. Assuming 5% (3.4km) increment, out of the total length of R1 for the construction of access road with 5m wide. Hence, at R1 alignment site about 1.7 ha of land would be affected by construction of access road temporarily.

Therefore, totally about 283 ha of land would be affected, as the result of the formation of ROWs, erection of tower pads, construction of new substations, relocation of affected houses and construction of access roads. The summary of the said loss of land use and cover types are outlined and presented in the table 7.9 here below

Table 7.9: Permanently and temporarily affected land area by Bahirdar-Dangila Project along R1

Route sections	Length (km)	No. of towers	Permanently affected (ha)	Temporarily affected (ha)	Total affected area(ha)
From Bahirdar Town Existing substation to Dangila town newly selected substation site	67.5	218			
Tower pad		-	2.2	-	2.2
ROW		-	-	270	270
Construction of new substation at Masha town	-	-	9	-	9
Access road construction	3.25	-		1.7	1.7
Total	**70.75**	**218**	**11.2**	**271.7**	**283**

Source: results of field assessment (2015)

The land use and land cover types affected by the project along R1 are outlined and presented in the table7.10 here below.

Table 7.10: Affected Land Use and land cover types by project component along R_1

Project affected land use and cover type	ROW	Access road	Erection of Tower pad	new substation	residential area occupied by Tukuls and CIS	Total area (ha)
Cultivated land covered with annual crops	10	-	-	9	-	19
Arable land covered with perennial crops and trees	10	0.5		-	-	10.5
Forest land covered by trees, bushes and shrubs	10			-	-	10
Grazing land	-			-	-	
Bare land	240	1.2	2.2	-	-	143.4
Total	270	1.7	2.2	9	-	283

Source: results of field assessment (2015)

Risk of land sliding and Soil erosion

During erection of tower pads, construction of new substation and access roads of the proposed projects along route option 1, there will be clearing of vegetation and excavation works, which may lead the top soil to be threatened by wind and water erosion .Particularly, mountainous terrain structures the land slopes along the route alignments.

The use of machineries during the construction period may also exacerbate the problem of soil erosion in the area. The risk of erosion would be higher where there is an increase in land slope.

The emergence of erosion may cause the increase of sedimentation load and deterioration of quality of streams nearby. But the risk of erosion would be minimum, since the slope is minimum along R_1 alignment. However, prior to launch the construction works, the projects shall ensure there is an approved conservation plan for the proper management and control of soils at transmission line project targeted sites.

Impacts on Air and Water Quality

Impact on Air Quality

The proposed project along route option-1 will have adverse impact on air quality. This occurs as a result of dust and smoke releases during construction period. The machineries involved in the construction activities especially in the clearing of ROWs and construction of access roads are the major causative elements for the problem. However, the impacts will be minimized acceptably by taking proper dust abatement measures (e.g. watering) where necessary, and by using properly handled /maintained machineries.

Impacts on Water Quality

Rivers, ground water and springs are used for water supply sources in the project area for drinking, cooking and washing purposes for humans. While, for cattle drinking purpose. Therefore, pollution of this resource may arise during construction period from construction camp site ,accidental and deliberate spillage of polluting materials into water bodies adversely affects those who depends on local water resources in general and ground water pollution in particular ,which can have a serious long term effects on water quality. Inappropriate disposal waste materials into water can also lead to public and animal health hazards. Pollutions of water impacts can be avoided by managing properly the construction materials, particularly chemicals fuel and lubricants.

Hence, the contractor should take all appropriate mitigation measures to minimize pollution. Accordingly, it is recommended to include a clause in the construction contracts, which requires, the contractor to prepare Environmental and social management plan for the site works prior commencements of the construction activities.

Impacts on Biodiversity

D.1 Flora

There will be clearing of trees, bushes and shrubs in the given ROWS, during the construction period of the proposed project along route option-1. Clearing of trees, shrubs and bushes may cause habitat loss and favors the expansion of alien invasive species in the study areas. Hence, the impacts on existing flora is minimum.

D.2. Fauna

During the field assessment, observation of wild animals in the project areas along R1 has been almost nil, despite some common wild animals are reported to exist in the projects areas. Therefore, a great care should be taken to avoid adverse impacts on wild animals during the construction period.

D.3. Impacts on National Parks and Reserved Area

At present, there are no known wild life national parks, reserve areas or sanctuaries due to be crossed or affected by the proposed transmission line route option R1.

Socio-economic Impacts

Impacts on Residential Areas and Community Services

Based on the general field assessment along the route alignments of 67.5km there are about 57 residential houses (54 CIS +3 Tukuls) will be affected by the project

Moreover, Dangla New Substation Site which is totally 9 ha of land. Out of this about 1170 m^2or 0.1ha of land is occupied by 2 CIS and 2 Tukul. Each CIS covers 90 m^2 and each tukul covers 27 $m^{2,}$ and owned by 2 house hold living with 10 families. The remaining 8.9ha of substation area is occupied by annual crop area. Therefore the compensation cost for the annual crops and the residential houses are presented in the following tables. Iron sheet, walls made of wooden materials and plastered by mud, floors half masonry) is 70 m^2 (9 mx 1o m) .The unit cost for each medium sized (30 m^2) is 27,000 .00 ETB. While, for CIS (70 m^2) is 80,000.00 ETB.

Therefore, 3 Tukuls x 27,000.00 ETB =81,000.00ETB. While, 54 CIS x 80,000.00ETB=4,320,000.00ETB. The project affected Tukuls and CIS building types are presented in the table here below 7.13.

Table7.13: Affected Tukuls and CIS

Route section	Route length km	Type of Houses	Unit of Measurment	No. of Houses	Size of affected houses			Unit Price in Birr			Total cost (ETB)
					S	M	L	S	M	L	
	65.1	Tukul	NO	3	-	3	-	-	81,000.00	-	81,000.00
		CIS	Meter	54	-	-	-	-	4,320,000.00		4,320,000.00
	Over all compensation cost										**4,401,000.00**

Source: Field visit and surveyor's data

Impacts on Community services

During the line survey no community services' structures or facilities were found to be affected by the project. Schools, health institutions, churches, mosques, and other major community services have been made to be kept away from ROWs during the selection of route alignment.

Impacts on Crop Production

The proposed Bahirdar-Dangila 230 kV power transmission line project along route-1 will affect some of the croplands and crop productions temporarily. But the proposed substation site is lies entirely in the bare land; it does not possess any crop lands and causes no impacts on crop productions.

Therefore, the cultivated lands to be occupied by the proposed transmission line will be about 8 ha of the land would be affected temporarily by ROW formation. The costs for the temporary loss of crop production would be about Birr **2,889,100.00** Therefore, comparing to the total crop production in the project area, the loss as a whole is found negligible.

The farmers' seasonal agricultural activities may be disrupted by the construction activities. On farm crops may also be affected temporarily during the construction period. They can however be mitigated either by undertaking the construction works after the crops harvest or doing proper compensation payments for all damaged crops. The details of affected annual crop land with an estimated compensation cost are presented in the table 7.11 below.

Table7.11: Estimated Compensation costs for loss of annual crops (Temporarily)along R1

Route section	Type of crop	Crop coverage in ha	Production Qtl / ha	Unit price / Qtl Birr	Total cost in ETB
From Bahirdar existing substation to Dangila the new substation site	Maize	5	40	650	**130,000.00**
	Sorghum	2	25	850	**42,500.00**
	Teff	3	16	1300	**62,400.00**
	Total compensation cost in ETB				234, 900.00

Table. 7.15 Estimated compensation cost of substation area of permanently affected crop area

Route section	Type of crop	Crop coverage in ha	Production Qtl / ha	Unit price / Qtl Birr	Total cost in ETB	Compensation for ten years
From Bahirdar existing substation to Dangila the new substation site	Maize	4	40	650	162,600.00	**2,654,200.00**
	Sorghum	2	25	850	42,500.00	
	Teff	2.9	16	1300	60,320.00	
	Total compensation cost in ETB				265,420.00	

Impacts on Socio-economically Valued Plantations

The proposed projects will affect some trees, such as coffee, mango and eucalyptus trees as a result of the formation of right off ways (ROWs) along route option--1. Accordingly, the said asset affected within entire length OF R1 (67.5 km) are as follows:

211 eucalyptus trees/km*67.5=14,242 in number (all are stand pole types)

Therefore, data sources obtained from project woreda reveals the unit price per stand pole, which was calculated for compensation purpose .Based on proclamation and regulation of compensation is 70.00 Birr. Hence, the total cost of compensation is:

14,242 *70.00=996,940.00 Birr

Impacts on Cultural, Historical and Archaeological Sites

During the field assessment, the study team has made a search in the projects areas both from key informants in the field and from literatures review if there are any significant heritages liable to be affected by the proposed projects. The search was mainly focused on archaeological, anthropological, cultural, and religious artifacts. So far there are no significant archaeological cultural, historical and religious facts along the proposed transmission line project along R1 that would be directly impacted by the project.

During the construction period, where there are any accidental "Chances of findings" of some archaeological artifacts on the line routes, the construction workforces shall be informed to let their immediate supervisors know and report to EEP's project office. Then, EEP will report to the Authority for Research and Conservation of Cultural Heritage (ARCCH) about the findings.

7.4.1.3. Impacts on Health and Safety

Dust Emission

During the construction period, dust may arise due to the construction works and traffic increase. The problem though is temporary and limited, it causes dust pollution and may sometimes result a respiratory problem on some of the construction workforces and local communities living around. The dust problem however can be managed through taking proper dust abatement measures like watering of roads and control of traffic speed limits. The contractors will be required to incorporate the issue in to their management plan and submit with their contract proposals.

Noise

There is a standard noise limit value that is acceptable both nationally and internationally. The limit value should not exceed 55 dB in the day time and 45 dB in the night time. The noise pollution due to the construction of the transmission lines is temporary and limited. However, if it is found beyond the stated limits, it can be minimized by adopting appropriate mitigation measures such as the provision

and use of proper hearing equipment for construction workers. The working time should be limited in order not to affect the local communities in the vicinities.

Sexually Transmitted Infections (STIs)

The major impacts on health and safety are related to the work force engaged in the construction and operation of the transmission lines. Communicable diseases like sexually transmitted infections (e.g. HIV/AIDS, Hepatitis, etc) and malaria can be spread around and in the construction areas. The influx of labor to the construction areas and their interactions with the local communities may create access for the spread of communicable diseases in the area.

The mitigation plan will take an aggressive approach to control the spread of STIs, health education programs, control of illegal or socially prohibited informal sector activities like drug abuse, prostitution, smuggling and other associated socially forbidden activities near the projects sites.

Even with the most vigorous campaign and safe guards, an increase in STIs resulting from the project is predictable. Therefore systematic blood testing like voluntary counseling and testing VCT practice in the projects areas are quite necessary so as to keep the cases minimal. The blood testing must be used merely for information purposes and not to be used to dismiss infected employees.

Other Infectious Diseases

Public and Occupational Safety

Public safety at any time is worthwhile even though, residents within the ROW would be relocated. For instance, during the construction period, the movement of heavy tracks will increase and sometimes may cause road accidents, especially among the local residents who are not accustomed to heavy traffic. Some work accidents and minor injuries (e.g., fall from above, hit by object, car accidents, cuts, etc.) may also occur mainly due to lack of safety precautions. Therefore, contractors should regularly provide adequate safety equipment and health and safety orientation to their employees. Projects related vehicles will be required to abide by good driving conducts, obey speed limits and follow the rules of safe driving especially in the projects areas.

During operation period, most of the impacts are related with electrocutions and possible induce effects from Electromagnetic Fields (EMF). Thus, the placement of low slung lines or lines near human activities (e.g. high ways, buildings) may increase the risk of electrocutions. Therefore, the lines should be checked regularly, whether or not they are at low slung, so that prompt actions would be taken to avoid the risks on high ways and residential areas.

Towers and transmission lines may disrupt air plane flight paths in and near airports and endanger low flying aircraft. However it is proved that there are no airports or landing strips nearby that would be affected by the transmission line during operation period. Safety orientations in schools along the transmission line will further minimize impacts on the local community.

Electro Magnetic Fields (EMF)

Electromagnetic fields (EMF) are invisible lines of force that surround any electrical device. Power transmission lines, electrical wiring and electrical equipment all produce EMF. Electric fields are produced by voltage and increase in strength as the voltage increases.

Electric fields are shielded or weakened by materials that conduct electricity - even materials that conduct poorly, including trees, buildings and human skin. Magnetic fields, however, pass through most materials and are therefore more difficult to shield. However, both electric fields and magnetic fields decrease rapidly as the distance from the source increases.

As a precautionary measure, Ethiopian Electric Agency adopted standard of ROW width of 30m for its high voltage transmission lines of 132 KVs and 230KVs. All habitation and structures are excluded from the ROW to ensure safety of people and animals from EMFs produced as well as from direct electric shocks and 'flash over'. With respect to substations, in general, the strongest EMF around and outside of a substation comes from the power lines entering and leaving the substation. The strength of the EMF from equipment within the substations, such as transformers, reactors, and capacitor banks, decreases rapidly with increasing distance. Beyond the substations' fence or wall, the EMF produced by the substations' equipment is typically indistinguishable from back ground levels. (http://www. Niehs. Nih.gov/emfrapid).

It should be noted that there is a concern for homes, schools and public recreational facilities including playing grounds located near the high voltage transmission line. Playing ground and schools especially located near electrical components with high magnetic fields are a concern because the developing child is at a greater danger of biological effects from magnetic field exposure than an adult would be. (http://brain101.inf/EMF.php). The survey confirmed that there are no schools and play grounds in close distance to the proposed transmission line.

Effects of Polychlorinated Biphenyls (PCBs)

PCBs are a mixture of individual chemicals which are no longer produced in the United States and in most European countries by 1980 but are still found in the environment. Health problems associated with exposure to PCBs include acne like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are also known to cause cancer in animals.

PCBs are a mixture of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. PCBs have no known smell or taste.

PCBs have been used as coolants and lubricants in transformers, capacitors and other electrical equipment because they don't burn easily and are good insulators. The manufacturing of PCBs was stopped in the US in 1997 because of evidence they build up in the environment and can cause harmful health effect. (http://www.atddr.cdc.gov/tfacts17.hm bookmark02).

The Stockholm Convention is a global treaty which Ethiopia has signed and ratified to protect human health and the environment from persistent organic pollutant (POPs) which PCBs are one of them.

For the proposed new substations they would install new PCB free transformers, capacitors and other electrical equipment. As per the Convention most manufacturers have stopped manufacturing PCB containing transformers and capacitors. Most transformers and capacitors manufactured after 1980s are said to have not contained PCBs.

A good practice in this regard would be the work of EEP in cooperation with the MEFCC have undertaken preliminary inventory of all equipment to identify the presence of PCBs. The completion of the inventory will help EEP to develop a program for the safe removal and disposal of any PCBs found in accordance with the Convention to which it is signatory.

7.4.1.4. Impacts on Women and Vulnerable Groups

Women embrace disproportionately large number of poor in most countries due to gender discrimination. The situation limits the women to have an access to resources, opportunities, and public services necessary to improve the standard of living for themselves and their families.

In the projects affected areas, women's economic activities are limited to household management and some major farm practices like weeding and so on. They have a burden of works (They work at least 16 hours a day) but are still economically dependent upon men and have no right to decide on most of the economic and social matters in the family. Therefore, the economic, social and political position of women in the projects affected area is still very weak.

Women are very interested on the proposed projects than other social groups because they are more beneficiaries from the opportunities provided through the proposed projects. The availability of electricity would help improving the existing infrastructures and services to the level that it can provide adequate services to the communities. Especially the burden of women will be reduced because of improved infrastructures and social services (health, education, flour mills,) accessible to them. They may not need to go long distance for seeking flour mills, collecting fire wood, fetching water for drinking and cooking etc.

The availability of electricity in the projects area also helps to encourage investments in different economic sector so women can have opportunity to get employments, participate in micro businesses, selling foods, etc. This may help to increase their income.

Vulnerable groups can include households headed by women, households victimized by HIV/AIDS who are headed by children, households made up of the aged or handicapped whose members are socially stigmatized (as a result of traditional or cultural bias) and economically marginalized.

Special assistance to be rendered to vulnerable groups may consist of the following:

- Provision for separate and confidential consultation.
- Priority in site selection in the host areas.
- Relocation near to kin and former neighbors.
- Assistance with dismantling salvageable materials from their original home.
- Priority access to all other mitigation and development assistance

Women with children also have less physical mobility to travel to find ways of earning a livelihood. For these reasons, efforts to maintain the social continuity of communities affected by a project whether through the physical design of new sites, measures to prevent the disintegration of the community or the provision of specialized social services at those sites are important.

At present, there are no known wild life national parks, reserve areas or sanctuaries due to be crossed or affected by the proposed transmission lines and new substations

7.4. Synthesis of Environmental and Social Impacts

The possible negative and positive impacts predicted were classified as very important, more important, important, fair important, and less important. They are seen in the environmental matrix table 7.12(for Bahirdar-Dangila) here below. The impacts identified and classified are scored by assignments of capital letters from "A-E" for positive impacts. While, by small letters from "a-e" and in numerical number zero for negative impacts. The case at stakes are presented here below:

Assigned Matrix scores for Positive Impacts

- A=Very important
- B=More Important
- C=Important
- D=Fair Important
- E= Less important

Assigned Matrix scores for Negative Impacts

- a=Very important
- b=More Important
- c=Important
- d=Fair Important
- e=Less Important
- 0=No important

Therefore, the assigned score values for assessments of both positive and negative impacts are applicable and similar for both projects (BahirDar-Dangila power transmission line projects) except environmental components of residential houses against the project activity.

In the above connection, it should be noted that synthesis of all environmental impact matrix parameters (Socio-economic and Bio-physical environment) against the proposed project activities (Bahirdar-Dangila) at different phases of the projects cycle are considered.

Table 7.12: Synthesis of Environmental Impact Matrix

The following table is presented based on the prior environmental and social impact analysis at different phases of the project. The qualitative description of the issues is discussed overall under section seven.

No	Environmental Components	Pre-construction phase		Construction phase activity components				Operation phase		
		Line route survey	Land Acquisition	Equipment and material mobilization	Tree cutting &corridor free	Foundation tower erection and stringing	Access roads const	Induction influence	Electromagnetic Wave effluence	Radio Interfe-rence
I	Socio-economic Environment.									
	Residential areas	a	a	E	0	d	0	0	0	0
	Income	E	C	A	0	A	D	0	0	0
	Cultural and historical sites	0	0	0	0	0	0	0	0	0
	Health & safety	0	0	e	0	d	e	e	e	0
	Quality of daily life	0	0	A	0	A	D	0	0	0
	Social unrest	0	0	e	0	e	e	e	0	0
II	Physical Environment									
	Soil	0	0	e	0	c	e	0	0	0
	Air quality	0	0	e	0	e	e	0	0	0
	Land use	a	a	e	0	b	d	0	0	0
	Water resources	0	0	0	0	0		0	0	0
III	Biological Environment									
	Flora	0	0	0	0	0	0	0	0	0
	Fauna	0	0	0	0	0	0	0	0	0
	Parks and reserves	0	0	0	0	0	0	0	0	0

7.5.1.1.LOT- IV Project Targeted Site: Azezo – Chilga 132kv EPTLP

7.5.1.2.Impacts on Bio-Physical Environment

Loss of land under Various Uses

The proposed route options will have impacts on the existing land use, both temporarily and permanently. This would be affected by the construction of the transmission line, erection of tower pads, construction of new substation and access roads. Accordingly, the transmission Line will have a free corridor of 30 meters Right of Ways (ROWs). As a result, during the construction period, about 165.2ha of land are expected to be affected temporarily due to the formation of ROWs.

The total numbers of towers assumed to be erected are about 133 with an average span of 310 meters. Each tower pad is expected to occupy about 100 m2 and altogether a total of about 1.33 ha of land will be affected permanently due to the erection of tower pads.

Besides, there will be a permanent loss of land to be affected by the construction of new substation at Masha town. Accordingly, it occupies about 9ha (300m X 300m) of land area. Assuming 5% (2.2km) increment , out of the total length of R1 for the construction of access road with 5m wide. Hence, at R1 alignment site about 1.1 ha of land would be affected by construction of access road temporarily.

Therefore, totally about 177 ha of land would be affected, as the result of the formation of ROWs, erection of tower pads, construction of new substations, relocation of affected houses and construction of access roads. The summary of the said loss of land use and cover types are outlined and presented in the table 7.13 here below

Table 7.13: Permanently and temporarily affected land area by Azezo-Chilga Project along R1

Route sections	Length (km)	No. of towers	Permanently affected (ha)	Temporarily affected (ha)	Total affected area(ha)
From Azezo Town Existing substation to Chilga town newly selected substation site	43.1	133			
Tower pad		-	1.33	-	1.33
ROW		-	-	165.2	165.2
Construction of new substation at Masha town	-	-	9	-	9
Access road construction	1.1	-		1.1	1.1
Total	**44.2**	**133**	**10.33**	**166.3**	**177**

Source: results of field assessment (2015)

The land use and land cover types affected by the project along R1 are outlined and presented in the table7.14 here below.

Table 7.14: Affected Land Use and land cover types by project component along R_1

Project affected land use and cover type	ROW	Access road	Erection of Tower pad	new substation	residential area occupied by Tukuls and CIS	Total area (ha)
Cultivated land covered with annual crops	10	-	1.33	3	-	**14.33**
Arable land covered with perennial crops and trees	10	0.1		-	-	**10.1**
Forest land covered by trees, bushes and shrubs	2	-	-	-	-	**2**
Grazing land	-			-	-	
Bare land	143.2	1	-	6	-	**147.2**
Total	165.2	1.1	1.33	9	-	177

Source: results of field assessment (2015)

Risk of land sliding and Soil erosion

During erection of tower pads, construction of new substation and access roads of the proposed projects along route option 1, there will be clearing of vegetation and excavation works, which may lead the top soil to be threatened by wind and water erosion .Particularly, mountainous terrain structures the land slopes along the route alignments.

The use of machineries during the construction period may also exacerbate the problem of soil erosion in the area. The risk of erosion would be higher where there is an increase in land slope.

The emergence of erosion may cause the increase of sedimentation load and deterioration of quality of streams nearby. But the risk of erosion would be minimum, since the slope is minimum along R_1 alignment. However, prior to launch the construction works, the projects shall ensure there is an approved conservation plan for the proper management and control of soils at transmission line project targeted sites.

Impacts on Air and water Quality

Impact on Air Quality

The proposed project along route option-1 will have adverse impact on air quality. This occurs as a result of dust and smoke releases during construction period. The machineries involved in the construction activities especially in the clearing of ROWs and construction of access roads are the major causative elements for the problem. However, the impacts will be minimized acceptably by taking proper dust abatement measures (e.g. watering) where necessary, and by using properly handled /maintained machineries.

Impacts on Water Quality

Rivers, ground water and springs are used for water supply sources in the project area for drinking, cooking and washing purposes for humans. While, for cattle drinking purpose. Therefore, pollution of this resource may arise during construction period from construction camp site ,accidental and deliberate spillage of polluting materials into water bodies adversely affects those who depends on local water resources in general and ground water pollution in particular ,which can have a serious long term effects on water quality. Inappropriate disposal waste materials into water can also lead to public and animal health hazards. Pollutions of water impacts can be avoided by managing properly the construction materials, particularly chemicals fuel and lubricants.

Hence, the contractor should take all appropriate mitigation measures to minimize pollution. Accordingly, it is recommended to include a clause in the construction contracts, which requires, the contractor to prepare Environmental and social management plan for the site works prior commencements of the construction activities.

Impacts on Biodiversity

Flora

There will be clearing of trees, bushes and shrubs in the given ROWS, during the construction period of the proposed project along route option-1. Clearing of trees, shrubs and bushes may cause habitat

loss and favors the expansion of alien invasive species in the study areas. Hence, the impacts on existing flora are minimum.

Fauna

During the field assessment, observation of wild animals in the project areas along R1 has been almost nil, despite some common wild animals are reported to exist in the projects areas. Therefore, a great care should be taken to avoid adverse impacts on wild animals during the construction period.

Impacts on National Parks and Reserved Area

At present, there are no known wild life national parks, reserve areas or sanctuaries due to be crossed or affected by the proposed transmission line route option R1.

7.5.1.3. Socio-economic Impacts

Impacts on Residential Areas and Community Services

Based on the general field assessment along the route alignments of 43.1k, the proposed project has no impact on residential house and settlements.

Impacts on Community services

During the line survey no community services' structures or facilities were found to be affected by the project. Schools, health institutions, churches, mosques, and other major community services have been made to be kept away from ROWs during the selection of route alignment.

Impacts on Crop Production

The proposed Azezo Chilga 230 kV power transmission line project along route-1 will affect some of the croplands and crop production temporarily. But the proposed substation site lies entirely in the bare land; it does not possess any crop land and causes no impacts on crop productions.

Therefore, the cultivated lands to be occupied by the proposed transmission line will be about 10 ha of the land would be affected temporarily by ROW formation. The costs for the temporary loss of crop production would be about Birr **2,343,800.00.** Therefore, comparing to the total crop production in the project area, the loss as a whole is found negligible.

The farmers' seasonal agricultural activities may be disrupted by the construction activities. On farm crops may also be affected temporarily during the construction period. They can however be mitigated either by undertaking the construction works after the crops harvest or doing proper compensation payments for all damaged crops. The details of affected annual crop land with an estimated compensation cost are presented in the table 7.15 below.

Table7.15.: Estimated Compensation costs for loss of annual crops(Temporarily)along R1

Route section	Type of crop	Crop coverage in ha	Production Qtl / ha	Unit price / Qtl Birr	Total cost in ETB
From Azezo existing substation to Chilga the new substation site	Maize	5	40	650	**130,000.00**
	Sorghum	2	25	850	**42,500.00**
	Teff	3	16	1300	**62,400.00**
	Total compensation cost in ETB				234, 900.00

Table. 7.15 Estimated compensation cost of substation area of permanently affected crop area

Route section	Type of crop	Crop coverage in ha	Production Qtl / ha	Unit price / Qtl Birr	Total cost in ETB	Compensation for ten years
From Azezo existing substation to Chilga the new substation site	Maize	4	40	650	162,600.00	**2,108,900.00**
	Sorghum	1	25	850	21,250.00	
	Teff	1.3	16	1300	27,040.00	
	Total compensation cost in ETB				210,890.00	

Impacts on socio-economically Valued Plantations

The proposed projects will affect some eucalyptus trees as a result of the formation of right off ways (ROWs) along route option-1. Accordingly, the said asset affected within entire length OF R1 (43.1km) are as follows:

110 eucalyptus trees/km*43.1=4741in number (all are stand pole types)

Therefore, data sources obtained from project woreda reveals the unit price per stand pole, which was calculated for compensation purpose .Based on proclamation and regulation of compensation is 70.00 Birr. Hence, the total cost of compensation is:

4	**741 *70.00=331**	**870.00 Birr**

Impacts on Cultural, Historical and Archaeological Sites

During the field assessment, the study team has made a search in the projects areas both from key informants in the field and from literatures review if there are any significant heritages liable to be

affected by the proposed projects. The search was mainly focused on archaeological, anthropological, cultural, and religious artifacts. So far there are no significant archaeological cultural, historical and religious facts along the proposed transmission line project along R1 that would be directly impacted by the project.

During the construction period, where there are any accidental "Chances of findings" of some archaeological artifacts on the line routes, the construction workforces shall be informed to let their immediate supervisors know and report to EEP's project office. Then, EEP will report to the Authority for Research and Conservation of Cultural Heritage (ARCCH) about the findings.

7.5.1.4. Impacts on Health and Safety

Dust Emission

During the construction period, dust may arise due to the construction works and traffic increase. The problem though is temporary and limited, it causes dust pollution and may sometimes result a respiratory problem on some of the construction workforces and local communities living around. The dust problem however can be managed through taking proper dust abatement measures like watering of roads and control of traffic speed limits. The contractors will be required to incorporate the issue in to their management plan and submit with their contract proposals.

Noise

There is a standard noise limit value that is acceptable both nationally and internationally. The limit value should not exceed 55 dB in the day time and 45 dB in the night time. The noise pollution due to the construction of the transmission lines is temporary and limited. However, if it is found beyond the stated limits, it can be minimized by adopting appropriate mitigation measures such as the provision and use of proper hearing equipment for construction workers. The working time should be limited in order not to affect the local communities in the vicinities.

Sexually Transmitted Infections (STIs)

The major impacts on health and safety are related to the work force engaged in the construction and operation of the transmission lines. Communicable diseases like sexually transmitted infections (e.g. HIV/AIDS, Hepatitis, etc) and malaria can be spread around and in the construction areas. The influx of labor to the construction areas and their interactions with the local communities may create access for the spread of communicable diseases in the area.

The mitigation plan will take an aggressive approach to control the spread of STIs, health education programs, control of illegal or socially prohibited informal sector activities like drug abuse, prostitution, smuggling and other associated socially forbidden activities near the projects sites.

Even with the most vigorous campaign and safe guards, an increase in STIs resulting from the project is predictable. Therefore systematic blood testing like voluntary counseling and testing VCT practice in the projects areas are quite necessary so as to keep the cases minimal. The blood testing must be used merely for information purposes and not to be used to dismiss infected employees.

Other Infectious Diseases

Some diseases like hepatitis, intestinal and respiratory cases may occur in situations where a large work force exists and not provided with proper sanitary and work place facilities in construction camps. Therefore, if the contractor wants to have construction camps, he should keep maintained them in a clean and healthy condition as prescribed by acceptable standards.

Public and Occupational Safety

Public safety at any time is worthwhile even though, residents within the ROW would be relocated. For instance, during the construction period, the movement of heavy tracks will increase and sometimes may cause road accidents, especially on the local residents who are not accustomed to heavy traffic.

Some work accidents (e.g., fall from above, hit by object, car accidents, etc) may also occur mainly due to lack of safety precautions. Therefore, contractors should regularly provide adequate safety equipment and orientation to their employees. Projects related vehicles will be required to abide by good driving conducts, obey speed limits and follow the rules of safe driving especially in the projects area.

During operation period, most of the impacts are related with electrocutions and possible induce effects from Electromagnetic Fields (EMF). Thus, the placement of low slung lines or lines near human activities (e.g. high ways, buildings) may increase the risk of electrocutions. Therefore, the lines should be checked regularly, whether or not they are at low slung, so that prompt actions would be taken to avoid the risks on high ways and residential areas.

Towers and transmission lines may disrupt air plane flight paths in and near airports and endanger low flying air craft. However it is proved that there are no air ports or land strips nearby that would be affected by the transmission line during operation period. Safety orientations in schools along the transmission line will further minimize impacts on the local community.

Electro Magnetic Fields (EMF)

Electromagnetic fields (EMF) are invisible lines of force that surround any electrical device. Power transmission lines, electrical wiring and electrical equipment all produce EMF. Electric fields are produced by voltage and increase in strength as the voltage increases.

Electric fields are shielded or weakened by materials that conduct electricity - even materials that conduct poorly, including trees, buildings and human skin. Magnetic fields, however, pass through most materials and are therefore more difficult to shield. However, both electric fields and magnetic fields decrease rapidly as the distance from the source increases.

As a precautionary measure, EEP already adopted internationally accepted standard ROW width of 30 meters along its high voltage transmission lines. All habitation and structures are excluded from the ROW to ensure safety of people and animals from EMF's produced as well as from direct electric shocks and 'flash over'. With respect to substations, in general, the strongest EMF around and outside

of a substation comes from the power lines entering and leaving the substation. The strength of the EMF from equipment within the substations, such as transformers, reactors, and capacitor banks, decreases rapidly with increasing distance. Beyond the substations' fence or wall, the EMF produced by the substations' equipment is typically indistinguishable from back ground levels. (http://www. Niehs. Nih.gov/emfrapid).

Based on a recent in depth review of extensive scientific literature (World Health Organization's /WHO/ international EMF project), has concluded that "despite extensive research to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health "(http://www.who intpeh.emf./what is EMF/en.htm).

It should be noted that there is a concern for homes, schools and public recreational facilities including playing grounds located near the high voltage transmission line.

Playing ground and schools especially located near electrical components with high magnetic fields are a concern because the developing child is at a greater danger of biological effects from magnetic field exposure than an adult would be. (http://brain101.inf/EMF.php). The census team confirmed that there are no schools and play grounds in a close distance to the proposed transmission line.

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PCBs are mixture of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. PCBs have no known smell or taste.

PCBs have been used as coolants and lubricants in transformers, capacitors and other electrical equipment because they don't burn easily and are good insulators. The manufacturing of PCBs was stopped in the US in 1997 because of evidence they build up in the environment and can cause harmful health effect. (http://www.atddr.cdc.gov/tfacts17.hm bookmark02).

The Stockholm convention is a global treaty which Ethiopia has signed and ratified to protect human health and the environment from persistent organic pollutant (POPs) which PCBs are one of them. For the proposed new substations they would install new PCBs free transformers, capacitors and other electrical equipment.

As per the convention most manufacturers have stopped manufacturing PCBs contain transformers and capacitors. Most transformers and capacitors manufactured after 1980s are said to have not contained PCBs.

EEP in cooperation with the MEFCC has already undertaken preliminary inventory of all equipment to identify the presence of PCBs. Following the completion of the inventory, EEP will develop a

program for the safe removal and disposal of any PCBs found in accordance with convention to which it is signatory.

7.5.1.5. Impacts on Women and Vulnerable Groups

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In the projects affected areas, women's economic activities are limited to household management and some major farm practices like weeding and so on. They have a burden of works (They work at least 16 hours a day) but are still economically dependent upon men and have no right to decide on most of the economic and social matters in the family. Therefore, the economic, social and political position of women in the projects affected area is still very weak.

Women are very interested on the proposed projects than other social groups because they are more beneficiaries from the opportunities provided through the proposed projects. The availability of electricity would help improving the existing infrastructures and services to the level that it can provide adequate services to the communities. Especially the burden of women will be reduced because of improved infrastructures and social services (health, education, flour mills,) accessible to them. They may not need to go long distance for seeking flour mills, collecting fire wood, fetching water for drinking and cooking etc.

The availability of electricity in the projects area also helps to encourage investments in different economic sector so women can have opportunity to get employments, participate in micro businesses, selling foods, etc. This may help to increase their income.

Vulnerable groups can include households headed by women, households victimized by HIV/AIDS who are headed by children, households made up of the aged or handicapped whose members are socially stigmatized (as a result of traditional or cultural bias) and economically marginalized.

Special assistance to be rendered to vulnerable groups may consist of the following:

- Provision for separate and confidential consultation.
- Priority in site selection in the host areas.
- Relocation near to kin and former neighbors.
- Assistance with dismantling salvageable materials from their original home.
- Priority access to all other mitigation and development assistance

Women with children also have less physical mobility to travel to find ways of earning a livelihood. For these reasons, efforts to maintain the social continuity of communities affected by a project whether through the physical design of new sites, measures to prevent the disintegration of the community or the provision of specialized social services at those sites are important.

At present, there are no known wild life national parks, reserve areas or sanctuaries due to be crossed or affected by the proposed transmission lines and new substations

7.3.4.3. SYNTHESIS OF ENVIRONMENTAL AND SOCIAL IMPACTS

The possible negative and positive impacts predicted were classified as very important, more important, important, fair important, and less important. They are seen in the environmental matrix table 7.5(for Azezo-Chilga) here below. The impacts identified and classified are scored by assignments of capital letters from "A-E" for positive impacts. While, by small letters from "a-e" and in numerical number zero for negative impacts. The case at stakes are presented here below:

Assigned Matrix Scores for Positive Impacts

- A=Very important
- B=More Important
- C=Important
- D=Fairly I\important
- E= Less important

Assigned Matrix Scores for Negative Impacts

- a=Very important
- b=More important
- c=Important
- d=Fairly Important
- e=Less Important
- 0=Not important

Therefore, the assigned score values for assessments of both positive and negative impacts are applicable and similar for both projects (Azezo-Chilga power transmission line projects) except environmental components of residential houses against the project activity.

In the above connection, it should be noted that synthesis of all environmental impact matrix parameters (Socio-economic and Bio-physical environment) against the proposed project activities (Azezo-Chilga) at different phases of the projects cycle are considered.

Table 7.16: Synthesis of Environmental Impact Matrix

No	Environmental Components	Pre-construction phase		Construction phase activity components				Operation phase		
		Line route survey	Land Acquisition	Equipment and material mobilization	Tree cutting &corridor free	Foundation tower erection and stringing	Access roads const.	Induc-tion influe-nce	Electro-magnetic Wave effluence	Radio Interfe-rence
I	Socio-economic Environment.									
	Residential areas	a	a	E	0	d	0	0	0	0
	Income	E	C	A	0	A	D	0	0	0
	Cultural and historical sites	0	0	0	0	0	0	0	0	0
	Health & safety	0	0	e	0	d	e	e	e	0
	Quit daily life	0	0	A	0	A	D	0	0	0
	Society unrest	0	0	e	0	e	e	e	0	0
II	Physical Environment									
	Soil	0	0	e	0	c	e	0	0	0
	Air quality	0	0	e	0	e	e	0	0	0
	Land use	a	a	e	0	b	d	0	0	0
	Water resources	0	0	0	0	0		0	0	0
III	Biological Environment									
	Flora	0	0	0	0	0	0	0	0	0
	Fauna	0	0	0	0	0	0	0	0	0
	Parks and reserves	0	0	0	0	0	0	0	0	0

CHAPTER EIGHT

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

General

The Environmental and Social Management Plan (ESMP) is concerned with implementation of the recommended mitigations necessary to avoid, minimize or offset adverse impacts and enhance positive impacts. Environmental and social management must be fully integrated with the overall projects management effort at all levels, which itself should be aimed at providing a high level of quality control, leading to a project which has been properly designed and constructed and functions efficiently throughout its life.

8.1.Institutional Arrangement

The implementation responsibility of the ESMP rests on EEP or EEP's contracted representatives unless noted otherwise. To a considerable degree, construction contractors will be responsible for implementing mitigation measures but the ultimate responsibility to ensure the proposed mitigation measures are taken properly rests with EEP. The Federal MoWIE will oversee the environmental and social activities associated with the projects.

The office of agricultural and rural development, health departments and other stake holders will be involved with their specific responsibilities in the environmental and socio economic activities. Their responsibilities are exercised in the different stages, pre-construction, construction, operation and maintenance phases.

8.1.1. Pre-Construction Phase

Prior to contractors' mobilization and commencement of construction, environmental and social management will be concerned with the following principal activities:

- Ensure that all government and funding agency's requirements and procedures relating to ESIA are properly complied with. Ensure the environmental and social considerations have been given due consideration and the major clauses are incorporated in the contract document.
- Implementation of compensation payments and land acquisitions.

As a proponent, EEP will be responsible for submitting the ESIA report to the authorized Ministry of Water and Energy and the Financer for their review and comments.

8.1.2. Construction Phase

Most of the environmental and social management practices would be carried out during the construction phase, because most of the impacts are expected to occur at this stage.

Most of the impacts expected to occur in the construction phase can be reduced or avoided through the application of sound construction guidelines.

The Management is much concerned with controlling impacts that may result from the action of the contractor, through enforcement of the contract clauses related to protection of the environment as a whole and of the components within it. It is important to recognize that successful mitigations can only be achieved if the environmental and social protection measures, as set out in the construction contract are properly enforced.

8.1.3. Operation Phase

Environmental and social management and monitoring at this stage will be the responsibility of the EEP with the implementation being carried out either by its own professionals or by contractors. The environmental and social experts of EEP are expected to take on a general overall advisory role during operation.

8.2.Socio-economic Impacts

8.2.1. Compensation

EEP is fully committed to prepare RAP and pay full compensation for each lost items (houses, Tukuls and other properties) as per the Federal Proclamation No 455/2005. The compensation payments shall thus be completed ahead of the commencement of the construction activities.

In view of that, a property valuation committee will be formed at the level of local or Woreda administration. The committee members would consist of qualified personnel with appropriate experience from different stakeholders to value the properties thereon.

The affected households and their family members would be adequately compensated considering the assets and opportunities they leave behind and expenses that are required for the support of their livelihood.

8.2.2. Impacts on Residential Places and Community Services

Impacts on residential place and community services can be avoided or minimized by careful selection of ROWs. The line surveying team during the route alignment has taken all the necessary measures to minimize the number of residential houses and tukuls to be affected by the proposed project.

To avoid any visual impacts on churches, mosques, graveyards, schools and health institutions, it was given special attention during the line route survey that none of them would be affected by the transmission line construction and operation activities. They are already made to be kept off the corridor line. For the residential houses and tukuls to be affected, there will be paid proper compensation for each household to be affected right before the start of the construction works.

The project affected households have fully agreed and accepted to remove their existing houses and tukuls from the ROWs and rebuild their new ones by themselves as soon as they get due compensation payments. Those affected urban dwellers will be given equivalent land from the municipality to build their houses. The rural affected households on the other hand, will construct their houses and tukuls on their own land holdings, but will be assisted by the project.

8.2.3. Health and Safety

Safety

The contractor is responsible to organize on site environmental and social management and safety trainings for its construction work forces at least a month before the commencement of the project construction. EHS and Quality department of EEP will supervise and monitor the activities.

The contractor during the construction period should regularly provide adequate safety equipment and give orientations to its employees. The contractor and sub–contractors throughout the construction period will be required to use appropriate vehicles and comply with legal gross vehicle and axle load limits. They are also required to repair damages at own expense. The contractor should minimize road safety hazards and inconveniences to other road users by taking all appropriate measures during the construction period. Public safety may not be a significant problem since residents within ROWs will be relocated. During the operation period, the transmission line would be regularly checked whether or not they are at low slung so that prompt action would be taken on time.

During operation, safety orientations and due messages at schools plus where there is a public gathering will also be given to minimize impacts on the local communities.

Hazardous Materials

During the construction of substations and line construction, the contractor shall comply with the following:

- Safely handling and storages of hazardous materials.
- Take the necessary course of actions for safe disposal of hazardous materials.
- Clean up any spills of hazardous materials right away.
- Suppress fires on or adjacent to the construction or ancillary sites.
- In case of spill of hazardous materials, relevant departments will be informed at once and deal with it in accordance with the spill contingency plan.

PCBs Chemicals

- Strict procedures would be followed to order the companies and import PCBs free transformers, capacitors, and other electrical equipment
- For the proposed new substations new PCBs free transformers, capacitors, and other electrical equipment would be installed.
- Effective from the Stockholm Convention, most companies or manufacturers have already stopped manufacturing PCBs containing transformers and capacitors.

Health

Dust nuisance

Watering of roads and control of traffic speed limit will be done by the contractor to minimize dust arising from access roads during the construction phase. **Noise:** During the construction period workers in the vicinity of strong noise will wear ear plugs where necessary. Machines and vehicles related with the project will be maintained to keep noise to acceptable limit.

Sexually Transmitted Infections (STIS)

There should be an aggressive approach to fight against STIs including HIV/AIDS. Health education would be provided to the construction work force and local communities nearby during the construction period. The local administration should play vital role in controlling informal sector activities near the project camps and construction sites. The contractor is expected to provide condoms to construction employees during construction period.

Other Infectious Diseases

Most infectious diseases are associated with the existence of labor camps where the construction workers are sited together. Therefore if camps are to be established in the project areas, the contractor will be instructed to comply with the following tasks during the construction period:

- The contractor should use above the water table pit latrines at major construction sites.
- Provide and maintain safe drinking water.
- There will be taken proper sanitary measures like provision of proper sewerage and disposal facilities at camp site.
- Camps shall be located at least 100 meters away from water sources.
- Make certain that there is a good drainage system to avoid any water bodies containing stagnant water (e.g. old tires) as insect breeding areas.
- Provide adequate health care facilities for workers.
- Comprehensive occupational health standards established by the government would be followed by the contractor.

Bio-physical Environment

Vegetation Clearance

The clearing operation along ROWs of the proposed transmission line during the construction period will be carried out in consultation with the proposed projects targeted administrative site of agriculture office. Avoid any excessive forest clearings either through haphazardly or intentionally and, ensure that all the clearing operation is undertaken with minimal disturbances on the surrounding environment and within the approved sites only.

Protection of Vegetation

Prior to entering in to the construction activities, the contractor shall:

- Identify the type and size of vegetation that need to be removed.
- Remove only the marked trees to minimize damage to the adjacent vegetation.
- Aware the construction crews to take care of the remaining vegetation.

Erosion Controlling Measures

- Prior to start any clearing operation, the clearing areas should be marked visibly. No clearing of vegetation shall be exercised beyond the limited areas.
- Ensure re-vegetation at all work sites at the earliest time and select tree species suitable for soil conservation purposes immediately following the construction works.
- Following the completion of works the contractor shall prepare areas for rehabilitation erosion prone areas by re-vegetation. It is preferred to engage local communities to plant different trees.

Water Pollution

During the construction period the contractor shall assign persons taking care of petro-chemicals against discharges and leakages.

Waste Management

During the construction and site cleanup periods, the contractor shall:

- Remove any busted equipment including machineries from the project area.
- Crush burn and bury all inorganic solid wastes in an approved disposal area only.
- Keep all solid wastes in the designated sites of the construction area only.

Reinstatement of Services

- The contractor would take all inventories of all services to be reinstated prior to interruption of any services.
- Maintain or provide temporary services during construction period including temporary water supply.
- Progressively reinstate or repair all interrupted services to their previous position.
- The engineer would inspect and certify the adequate reinstatement of services.
- The contractor shall fill excavated sites with appropriate fill and finally covered with reserved top soil.

Loss of trees

- During the clearing operation the contractor should avoid any tree clearing outside of ROWs beyond what is required for construction activities.
- The contractor after completion of its construction works shall re-vegetate areas that have been cleared for temporary works according to a re-vegetation action plan.

Re-vegetation

After completion of every 10 km of ROW the contractor should:

- Progressively implement re-vegetation works commencing in the correct planting season.
- EHS and Quality department of EEP will monitor the effectiveness of re-vegetation measures possibly in every six months for two years.

Table 8.1 Table of Environmental and Social Management Plan

Environmental Impact Issues	Proposed Mitigation Measures	Time Segment	Responsible Organization	
			Implementation	Supervision &Monitoring
Pre-Construction Stage				
Land acquisition	Complete the necessary land acquisition as per the laws and regulations.	Before the commencement of construction works	EEP	EEP
	Provide copies of land acquisition details to the resident engineer and contractor.	Before the commencement of construction	EEP	Engineer
Identification and inventory of lost assets	List all PAPs and their properties to be lost.		EEP	EEP
	Perform all compensation payments for lost assets.	Before the commencement of construction	EEP	EEP
	Organize environmental management and safety training.			Engineer
Safety orientation	All contractors and supervising consultants, field supervisors shall attend the training.	At least one month before the commencement of construction	Contractor	
		Before the commencement of construction works		

Construction Stage				
Vegetation clearance	Locate and peg clearing sites. Vegetation clearance shall only be undertaken after getting approval from authorized bodies. Instruct all construction workers not to cut any tree beyond the marked areas. Avoid any harvest of forest products for personal consumption. Ensure that all clearing is under-taken with minimal disturbance to the surrounding environment, within the extent of approved sites only.	Before start clearing operation Before start clearing operation During clearing operation During and after clearing operation	Contractor and Wolekyite Woreda Administration Agriculture Sector Office Contractor	EEP with Agriculture Sector Office EEP with Agriculture Sector Office EEP and Contractor EEP with Agriculture Sector Office EEP with Agriculture Sector Office

On site erosion & runoff	Implement an erosion control measure appropriate to the specific condition of each site (e.g. reforestation and physical conservation measures) Avoid vegetation clearing on steep slopes during the construction of access for trucks, camps and so forth. Following completion of construction works, prepare an approved reinstatement plan for implementation of rehabilitation works Ensure top soils are left in a non-compacted condition for rehabilitation works.	During and after completing construction works Prior to commencement of construction works At the end of the construction period (i.e. before commissioning) Before start rehabilitation works	Contractor Contractor Contractor Contractor	EEP and the resident engineer EEP and the resident engineer EEP and the resident engineer EEP and resident Engineer

Water pollution	Adopt construction methods that will prevent entrance of pollutants like petrochemicals and other wastes into water bodies	Throughout construction	Contractor	Engineer
Waste management	Prepare waste management plan Contain all solid wastes only on approved designated disposal sites. Crush and burn all inorganic solid waste in an approved disposal area. Remove abandoned/disabled equipment, including machinery from the area. Use above water table pit latrines at major construction sites. Compost all green or biodegradable waste.	Before start of construction Throughout construction Throughout construction Throughout construction Throughout construction Throughout construction	Contractor Contractor Contractor Contractor Contractor Contractor	Engineer EEP and the Engineer Engineer Engineer Engineer Engineer
Protection of sensitive environmental areas	Identify environmentally sensitive areas on site plans. Locate construction sites away from sensitive areas. Provide trainings or orientation to construction workforces on the protection of environmentally sensitive areas.	Before the commencement of construction works Before the commencement of construction works Before the commencement of construction works	Contractor Contractor Contractor	Engineer Engineer Engineer
Protection of existing vegetation	Identify vegetation that will need to be removed /protected. Remove only marked trees to avoid any unnecessary tree cuttings Ensure the construction crew is aware of the remaining vegetation against any damage.	Before commencement of construction works	Contractor	EEP and Oromia Forestry &Wildlife Enterprise

Workers' Camp	Contractor to prepare for approval detailed site environmental plans for the base camps and other work sites, which make adequate provision for safe disposal of all wastes and prevention of spillages and leakages of polluting materials, etc.	Before the commencement of construction works	Contractor	Engineer
Archaeological sites	Fence off archeological sites, if any sighted /uncovered during construction works and report it to the appropriate authority.	Prior to the commencement of works and throughout construction	Contractor	Engineer
Disposal of materials	Instruct the construction work force on approved fill /material disposal locations and strictly supervise the correct placement of fill at these sites. Identify, peg and seek approval from the Engineer for permissible disposal locations. Inspect and approve all correctly located disposal locations.	Throughout construction	Contractor	Engineer
Reinstatement of services	Inventory all services to be reinstated. Reinstate or repair all interrupted services to their previous capacity as per the approved reinstatement plan. Inspect and certify the adequate reinstatement of services.	Near the completion of construction works At the end of the construction works Before commissioning	Contractor Contractor Engineer	Engineer Engineer EEP and Engineer
Stockpiling of construction materials	Locate, peg and seek approval from Engineer for the use of stockpile site Obtain written permission from landowners for stockpiling on their temporarily acquired land Get approval of all stockpile sites Site plans shall include all drainage provisions for construction sites	Before start stockpiling Before start stockpiling Before start stockpiling Before start stockpiling Before start stockpiling	Contractor Contractor Engineer Contractor Contractor	Engineer / EEP Engineer Engineer Engineer

	Locate stockpiles or spoil heaps so there is no blocking of drainage lines.			Engineer
Labor camps	Provide and maintain proper drinking water, worker's health check-up and salvage and waste disposal facilities at the camps. Recycle or dispose of solid waste as directed by the Engineer.	Throughout construction Throughout construction	Contractor Contractor	Engineer and EEP Engineer and EEP
Work force management	Ensure workers act in a responsible manner to local people and do not harvest or take personal resources, forest products or wildlife. Ensure that no or minimal wood is burnt by any construction worker on or off site.	Before and during building of construction camps.	Contractor	Engineer EEP.
Dust nuisance	Heavy truck delivering materials shall water / sprinkle roads to reduce dust problem.	Beginning with and continuing throughout construction.	Contractor	Engineer
Noise	Vehicles will be maintained to keep noise at minimum	Beginning with and continuing throughout construction.	Contractor	Engineer
Siltation	Construction materials containing fine particles e.g. aggregates, limestone, etc. will be stored in an enclosure away from water bodies to ensure that sediment laden water does not drain into nearby water courses.	Throughout construction	Contractor	Engineer
Alteration of drainage	In sections along water courses earth and construction waste will be properly disposed of so as to not block rivers and streams, resulting in adverse impact on water quality. All necessary measures will be taken to prevent earth works from impeding cross drainage at rivers/streams, canal/existing irrigation and drainage systems.	Whenever encountered during construction Whenever encountered during construction	Contractor Contractor	Engineer Engineer

Contamination from wastes	All justifiable measures will be taken to prevent the waste water produced at construction camps from entering directly into rivers and irrigation systems. A minimum distance of any sewage source or toilet facility should be 100 m from water sources.	Throughout construction	Contractor	Engineer
Contamination from fuel and lubricants	Vehicle maintenance and refueling will be confined to areas in construction camps designed to contain spilled lubricants and fuels. Waste petroleum products must be collected, stored and taken to approve disposal sites, according to MEFCC regulations.	Throughout construction	Contractor	Engineer
Sanitation and waste disposal in construction camps	Camps shall be located at a minimum distance of 100 m from water sources. Sufficient measures will be taken in the construction camps. Tanks and sanitation facilities including septic tank and soak pits. Waste in septic tanks will be cleared periodically. Drinking water will meet national standards. Garbage will be collected in covered bins and disposed of daily Special attention shall be paid to the sanitary condition of camps.	Before and during building of construction camps. Throughout construction period	Contractor	Engineer
Increase in Water-borne, Insect-borne communicable diseases	Make certain that there is good drainage at all construction areas, to avoid creation of stagnant water bodies especially in urban / industrial areas including water in old tires. Provide adequate health care for workers and locate camps away from vulnerable groups.	During construction	Contractor	Engineer
Cultural Resources	If archaeological relics or remains are discovered, the appropriate authority should be notified immediately. The construction should be stopped until the	Throughout construction	National Archeological Organization	Engineer EEP

	authorized organization assesses the remains and approves continuation of work after appropriate measures are complemented.			

	Prepare disposal plan Handle and store hazardous materials Safely. Clean up spills of hazardous materials immediately. Suppress fires on or adjacent to construction or ancillary sites. In case of spill of hazardous appropriate measures will be taken in accordance with the spill contingency plan. Adopt adequate solid waste collection, storage and disposal procedures	Before start construction works During construction During construction During construction During construction During Construction	Contractor Contractor Contractor Contractor Contractor Contractor	Engineer Engineer Engineer Engineer Engineer EEP EHS&Q and Woreda Environmental Protection and Land Use Management Office. Cost will be included in the Environmental Management budget.
Post Construction Stage				
Re-vegetation	Monitor the effectiveness of re-vegetation measures regularly	After completion of construction activities	Contractor	EEP and local agricultural devt. offices

Site decommissioning	Involve local communities to provide materials and implement re-vegetation Where possible.	Immediately following the completion of construction work	Contractor	Engineer
Ancillary site rehabilitation	Rehabilitate ancillary sites such as borrow areas, camp sites, material storage sites etc. within one month of their final use, including the removal of structures, refuse, stock piles and other temporary features. Re-vegetate the sites with a cover crop and permanent vegetation as appropriate	Within 1 month of final use of the ancillary site	Contractor	Engineer
Total Environmental and Social Management Plan Cost for Two Years (Lump Sum)				250,000.00 ETB

CHAPTER NINE

9. ENVIRONMENTAL AND SOCIAL MONITORING PLANS

General Consideration

This chapter is designed to present environmental and social monitoring plans during all stages of project phases(Namely :Pre-construction ;Construction ;Operation and Maintenance phases),regards to Electric Power Transmission Line Projects(EPTLPs), which are located at four LOTs targeted sites here bellow:

- LOT-I: 230 kV Metu-Mesha EPTLP to be constructed in SNNPR and Oromia.
- LOT-II: 230 kV Finchaa-Shambu EPTLP to be constructed in the Oromia region.
- LOT-III: 132 kV Bahir Dar- Dangila EPTLP to be constructed in the Amhara region.
- LOT-IV: 132 kV Azezo-Chiliga EPTLP to be constructed in the Amhara region.

Therefore, during all stages of the said projects phases, environmental and social monitoring at all targeted sites mentioned here above is a prerequisite, of paramount importance and mandatory task as per requirements set out in ESIA policy and legal frameworks of Ethiopia and the World Bank.

The environmental and social monitoring plans for the aforementioned projects will be undertaken to meet the following objectives:

- To verify that the impacts dos not exceed legal standards, environmental and social protection measures are implemented as planned, potential and actual environmental damages have been identified and prevented or addressed;
- To ensure that the proposed benefit enhancements and mitigations measures are properly implemented;
- To anticipate possible environmental and social hazards and detect unpredicted impacts sooner or later;
- To detect any unforeseen impacts at an early stage and recommend possible corrective measures to be taken before significant damages take place on the existing biophysical and social environment;
- To provide satisfactory information for decision-makers, regards to proposed project`s impacts (both an anticipated and unforeseen) benefit augmentations and mitigation measures.

Accordingly, to meet the aforementioned objectives, various types of environmental and social monitoring forms are currently in practice and each of which, is relevant to an ESIA study. For the purpose of EPTLP, the following two basic forms of monitoring are relevant:

Compliance Monitoring: This form of monitoring will check the implementation of the project, usually by means of inspection or enquiries, to verify the said project`s implementation compliance with recommended environmental and social actions of the ESIA and as per policy and legal frameworks requirements of the FDRE government and the Project Financier/WB.

Effect Monitoring: This form of monitoring will record the consequences of project activities on one or more biophysical and social environmental components. The said type usually involves physical measurement of selected parameters or the execution of surveys to establish the nature and extent of induced changes.

However, compliance monitoring will play a big role in checking whether recommended impacts benefits enhancement and mitigation measures have been carried out or not. Hence for these EPPTLPs, it is recommended to carry out compliance monitoring. Compliance monitoring can be carried out internally by the project proponent (EEP) or externally by other independent firms/ consultant.

In view of the above, therefore, descriptions of the environmental and social monitoring during different stages of project phases are outlined and presented here below under subsection 9.2.1-9.2.3 and the overall summary in the table 9.1.

Monitoring in Different Construction Phases

Pre-construction phases

Monitoring during Pre-construction phase of the project will be concerned with two aspects:

- Checking that project designs and specifications incorporate appropriate measures to minimize negative impacts and to enhance beneficial impacts.
- Checking/inspecting that the appropriate environmental protection clauses have been included in the contract documents to allow control of action by the contractor, which are potentially damaging to the environment.

These activities will have to be carried out as part of the preparation of the design and tender documents for the project.

Monitoring during construction phases

Monitoring Plan: Construction Phase

Monitoring during construction phase will comprise two principal groups of activates namely:

- Review of contractor`s plans, method statements, temporary works designs, and arrangements relating to obtaining necessary approvals from the engineer, so as to ensure that environmental protection measures specified in the contract documents are adopted, and that the contractor`s proposals provide an acceptable level of impact control;
- Systematic observation on a day to day basis of all site activities and the contractor`s office facilities included.

In the following part, monitoring activities are presented for various impact components during the construction phase.

Air Quality

Monitoring will be carried out throughout the construction activities on a basis on alternating observation locations. If nuisance dust is generated around settlement areas during the construction period, it will be the responsibility

of EEP- Environmental and Social to ensure that appropriate control measures are taken.

To avoid emissions of dust unannounced inspection of stock piled material sites (if moistened) will be inspected. In addition, trucks and machinery shall occasionally be inspected unannounced regarding engine emissions and engine maintenance shall be requested in case of any deficiency noticed.

Noise

The implementation of the measures required by the noise control plan will be monitored during construction activities for continuous noise. The noise level near settlements and at construction sites will be monitored with portable sound level meters once in a month and upon complaints by residents, while the routine activities will be monitored by site EEP- Environmental and Social Unit.

At construction sites the efficiency of the implementation of the noise control and health and safety plan will be monitored. Thus compliance with the Regulation on the Assessment and Management of the Environmental Noise and Regulation of Worker's Health and Work Safety will be ensured.

If nuisance noise is generated around settlement areas, religious places, other public and private service giving institutions during the construction period, it will be the responsibility of EEP- Environmental and Social to ensure that appropriate control measure are taken

Water Quality

Monitoring of water quality will ensure proper implementation of the wastewater management plan for the construction phase and complying with the Water Pollution control Regulation.

The wastewaters from the camp sites, access roads and other ancillary construction sites will be monitored.

The water quality monitoring program shall also include the potable water supplied to the construction work camps and work sites. Periodical water analysis of the drinking water provided to the workers and an awareness program on safe water shall be performed in order to limit waterborne diseases regularly once in a month and upon complaints by residents, while the routine activities will be monitored by site EEP- Environmental and Social Unit.

Soil Erosion

Soil erosion due to land sliding and other construction activities from the tower erection pads and improper disposal waste sites should be monitored to ensure the implementation of effectiveness of erosion control measures during construction stage. The monitoring will be done once in a month and upon complaints by residents, while the routine activities will be monitored by site EEP- Environmental and Social Unit.

Waste Management

Wastes will be handled to ensure compliance with related Ethiopian Legislation, and internationally accepted standards. To handle all types of wastes properly during construction, solid waste and spoil, and hazardous waste management plans will be prepared by the contractor. Implementation will be monitored regularly to comply with all relevant legislation and standards. The monitoring will be done once in a month and upon complaints by residents, while the routine activities will be monitored by site EEP- Environmental and Social Unit.

Natural Vegetation

It is the responsibility of EEP- Environmental and Social together with the Woreda office of agriculture and Rural Development to ensure that the recommended mitigation measures for natural vegetation are implemented. Parameters to be monitored include the type and areas of woodland plantation covered. The cutting and removal of trees and bush is carried out in accordance with proper forest conservation practices.

Unique stands of indigenous trees should not be removed for the establishment of towers. The contractor's representative should be in a position to ensure that the unique tree stands identified during the assessment should not be removed.

Equipment, Fueling and Maintenance

It will be the responsibility of EEP- Environmental and Social to check on the proper storage and operations of equipment fueling facilities and maintenance to ensure these facilities are safe and secure.

Wildlife

The habitat and wildlife monitoring should be in place to undertake regular measurements and to detect changes and these include:

- The monitoring should focus on impacts of the project on the wildlife species and their habitats.
- Record of accidents with animals will be kept, and in case of accumulation of incidents on certain locations appropriate measures shall be considered.
- Detection as yet unrecorded species and confirmation of previously recorded species can be simultaneously carried out during the monitoring programme. More species may be added to the list of monitoring indicators if monitoring is conducted continuously and regularly.
- Birds species will be monitored

The monitoring will be done once in a month and upon complaints by residents, while the routine activities will be monitored by site EEP- Environmental and Social Unit.

Monitoring of Accidents/Health

The Contractor must make sure that appropriate signs are posted at appropriate locations/positions to eliminate risk of electrocutions.

In addition, the contractors should make sure that:

- Measures to create awareness regarding sexually transmitted infections, primarily HIV/AIDS, and other diseases such as malaria, etc.
- Policies and enforcement measures for worker misconduct in relation to drugs, alcohol, fraternizartion, etc
- Records are kept on all accidents, incidents and "near misses" including corrective actions taken.
- Periodic health survey is carried out along the transmission line routes.
- Provision of appropriate training for workers and protective equipment

Monitoring during operation phases

Soil Erosion Monitoring

The excavation of earth for the establishment of towers, access roads, work camps and storage facilities will exacerbate soil erosion. Thus, it will be the responsibility of the contractor to take effective erosion controlling measures. Therefore, focus should be given to the specific work sites where soil is disturbed during and after vegetation clearing.

Monitoring Responsibilities

EEP will have overall responsibilities to oversee that all environmental measures are put in place and that regulations are enforced. The construction consultant should assist EEP in this process, in order to make sure that the contractor fulfills the environmental requirements. Some relevant stakeholders, like MoWIE, MEFCC or the project concerned Regional Environmental Protection Office may also conduct joint monitoring as deemed necessary.

Monitoring Indicators

The following parameters could be used as indicators.

- Presence of posted visible signs on towers.
- Presence of sanitary facilities at camp sites.
- Level of awareness of communities pertaining to dangers/risks associated with power lines.
- Presence/absence of unique stands of indigenous trees along the power line establishment route; and
- Accident reports records on accidents associated with the establishment of the transmission lines would be compiled by the assigned engineer and submitted to EHS.
- Size of land loss due to land requirement for road construction, access road, quarry and borrow sites and camp sites (area of affected land use in ha)
- Number of household assets and land affected by the project
- Number of vulnerable groups that got support
- Number of complaints registered and resolved
- Time of complaints resolution
- Disposal of hazardous wastes including PCB materials

Table 9.1 Environmental and Social Monitoring Plan

Phases of the Project	Issues	Indicators/Parameters to be Monitored	Location/ Project Component	Frequency	Responsibility	Cost Estimate in Birr
Pre-construction phase	Inclusion of environmental and social mitigation measures in the contract document	Check whether the mitigation and enhancement measures are properly included in the contract document	EEP head office	Once during the document evaluation	EEP	Part of the routine work
	Displacement of people and loss of properties	Complaints from the affected people • Number of vulnerable groups that got support • Number of complaints registered and resolved • Time of complaints resolution	Settlement areas along the project route line	Twice, before the start of the construction work and at the middle of the construction phase for 7 days at each round	The proposed monitoring team.	20,000.00 ETB
Construction phase	Pollution of water quality by construction activities and improper 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, spring and borehole water samples from construction camp sites	Three times (Before the start of construction, during the construction and after the completion of construction for 5 days at each round)	The proposed monitoring team	43,000.00 ETB
	Land use loss due to land requirement for road construction, access road, quarry and borrow sites and camp sites, etc.	• Size of land loss due to land requirement for road construction, access road, quarry and borrow sites and camp sites (area of affected land use in ha)	Along the project road, access roads, camp sites, quarry sites	Once per year for 7 days at each year	The proposed monitoring team	53,550.00 ETB

Phases of the Project	Issues	Indicators/Parameters to be Monitored	Location/ Project Component	Frequency	Responsibility	Cost Estimate in Birr
		• Number of household assets and land affected by the project				
	Soil erosion	Area exposed for erosion	Cut and fill areas and steep slopes	Once per year	The proposed monitoring team	Could be done at the same time with the above activities
	Loss of roadside plantations and indigenous trees	Number of indigenous trees fallen, Number of nursery established and number of tree seedlings planted	At each Woreda along the project road	Once per year	the proposed monitoring team	Could be done at the same time with the above activities without additional cost
	Disposal of construction spoils	Number of unauthorized spoil disposal sites • Presence of sanitary facilities at camp sites.	Spoil disposed sites along the project road	Once per year	The proposed monitoring team	Could be done at the same time with the above activities without additional cost
	Health and Safety conditions of the people along the project site including status of HIV/AIDS	Overall health and sanitation situation of the project area • Presence of posted visible signs on towers. • Level of awareness of communities pertaining to dangers/risks	Construction campsites, working areas and nearby towns	Once per year for 7 days at each round	The proposed monitoring team	53,550.00 ETB

Phases of the Project	Issues	Indicators/Parameters to be Monitored	Location/ Project Component	Frequency	Responsibility	Cost Estimate in Birr
		associated with power lines. • Accident reports records on accidents associated with the establishment of the transmission lines • Disposal of hazardous wastes including PCB materials •				
	Spread of malaria	Prevalence and trend of malaria	Construction campsites and working areas	Once per year during the pick season	The proposed monitoring team	Could be done at the same time with the above activities without additional cost
Construction completion phase	Aesthetic value and landscape	Un-rehabilitated areas and leftovers	Throughout the project area	Once for 10 days before officially terminating of construction contract	The proposed monitoring team	25,500.00 ETB
Operation phase	Sedimentation of drainage structures, loss of traffic signage, Visibility problems and roadside weeds	Number of blocked drainage structures and section of road with potholes, etc.	Along the project road	Once per year	Operation and maintenance department of ERA	Part of routine work
Total estimated Environmental and Social Monitoring cost (Assuming that construction will take 2 years)						195,550.00 ETB

Table 9.2 Synthesis of Environmental and Social Monitoring Matrix.

Activity Phase	Resource	Environmental Components	Environmental Indicators	Weight Effect	Standardization	Location of the observations	Observation frequency
I- Pre-construction	Site survey	Plants belonging to residents	Plant damage	e	The width of the plant damaged area.	Areas around towers and lines	Once
	Land acquisition	Settlement site	Society complaint	b	The land acquisition has been suitable with the rules.	Areas around towers and lines	Time (before and after land acquisition)
II: Construction	Labor equipment and material mobilization	Workers recruitment	Society complaint	D	Level of labor recruitment	Around the tower close to residence	Once at six months
		Air quality	Dust pollution	e	Air quality Standard	Close to residence part of the tower close to residence	Once at six months
		Notice	Noise	e	Noise quality standard	Part of the tower close to residence.	Once at six months
	Route clearance	Society land	Plant damage	b	New land functions	Part of the tower close to residence	Once
	Tower erection and stringing	Space and area	Land use	e	Changes in area function, erosion and land slide problems.	Part of the tower close to residence	Once at six months
		Traffic	Traffic nuisance	e	Level of traffic nuisance	Part of the tower close to residence	Once at six months
III operation	Electric power transmission	Free area	EM field	e	Free area according to the rules	Under the towers and in the ROW	At the beginning of operations and every six months
	Maintenance	Society plants	Plant damages	e	How many plants are damaged	Part of the tower close to residence	Once at six months
		Excavation activity	Land slide/erosion	e	How much erosion appears	The towers sole	Once at six months

Key The capital letters (A, B, C, D, E, O) represents Positive Impacts. While, Small Letters (a, b, c, d, e, 0) for Negative Impacts.

Positive Impact

- A=Very important
- B=More Important
- C=Important
- D=Fairly Important
- E=Less Important
- O=Not important

Negative Impact

a= Very important
b=More Important
c=Important
d=Fairly important
e=Less important
o= not important

Capacity Building

Capacity building is essential to properly implement the proposed Environmental and Social monitoring plan. This comprises,

The capacity building program including the training to be given to the EEP Social and Environment Office:

- Environmental and Social Management Plan (ESMP),
- Environmental and Social Impact Assessment (ESIA)
- Resettlement Action Plan (RAP),
- Environmental and Social Management Framework (ESMF)
- Resettlement Policy Framework (RPF).

Environmental and social safeguard policies, procedures, environmental laws, and sectoral guidelines

- National environment policies and laws;
- World Bank environmental and social safeguard policies (including the updates), procedures and guidelines;
- International standards ISO 14001 and 14004.

Environmental and Social Impact Assessment process

- Screening process;
- Contents of ESIA and RAP
- Public Consultation methods and process with project affected people (PAPs) and stakeholders;
- Resettlement planning and implementation process;
- Geographic positioning system (GPS).
- GIS
- HIV/AIDS pervasion and awareness creation training

Computer software package for social scientists (SPSS) Training.
Two (2) Vehicles an estimated total cost 4,600,000.00 ETB

For the above mentioned capacity building excluding the cost of vehicles is estimated: **272,000.00 ETB.**

CHAPTER TEN

Environmental and Social Mitigation, Management and Monitoring Costs

This section is designed to outline and present an estimated amount of costs for implementing Environmental and Social Mitigations, Management, Monitoring and Capacity Building of each four electric power transmission line projects that will be implemented at each four lots targeted sites here bellow:

- LOT-I: 230 kV Metu-Mesha EPTLP to be constructed in SNNPR and Oromia.
- LOT-II: 230 kV Finchaa-Shambu EPTLP to be constructed in the Oromia region.
- LOT-III: 132 kV Bahir Dar- Dangila EPTLP to be constructed in the Amhara region.
- LOT-IV: 132 kV Azezo-Chiliga EPTLP to be constructed in the Amhara region.

Accordingly, the total amount of estimated costs for implementing Environmental and Social Mitigations, Management, Monitoring and Capacity Building Plans would be: 22,776, 466.80 ETB or 1,078,431.19 USD. Thus, the cost does not exceed three percent of the total project cost. Details of the cost are presented below in the Table 10.1.

Table 10.1: Summary of Environmental and Social Mitigations, Management, Monitoring and Capacity Building Costs (in ETB)

No.	Items	LOTs			
		Metu-Masha	Finchaa-Shambu	Bahir-Dar-Dangila	Azezo-Chiliga
1	Cash Compensation for project affected assets				
1.1	Compensation for dwelling houses (CIS+ Cottage types)	2,825,000.00	-	4,401,000.00	-
1.2	Compensation for loss of annual crops	380,500.00	189,000.00	2,889,100.00	2,343,800.00
1.3	Compensation for loss of perennial crops	-	-	-	-
1.4	Compensation for loss of trees	364,000.00	74,800.00	996,940.00	331,870.00
Sub Total 1 (1.1+ 1.2+1.3+1.4)		3,569,500.00	263,800.00	8,287,040.00	2,675,670.00
2	Environmental and Social Management (Soil and water conservation activities & afforestation	250,000.00	250,000.00	250,000.00	250,000.00
3	Environmental and Social Monitoring (HIV/AIDS intervention, soil and water quality, etc.)	195,550.00	195,550.00	195,550.00	195,550.00
	Over all total(1+2+3) ETB	4,015,050.00	709,350.00	8,732,590.00	3,121,220.00
Total Project Cost (All Lots)					16,578,210.00
Contingency 8%					1,326,256.80
Capacity building/Trainings (incl. the purchase of two 4-D vehicles)					4,872,000.00
Grand total					22,776,466.80
1USD= 21.12 ETB as on 20/01/2016 Exchange rate of Ethiopian National Bank					1,078,431.19

CHAPTER ELEVEN

11. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on analysis and synthesis of the present ESIA study findings, it is concluded that the construction and operation of:

- LOT-I: 230 kV Metu-Mesha EPTLP to be constructed in SNNPR and Oromia.
- LOT-II: 230 kV Finchaa-Shambu EPTLP to be constructed in the Oromia region.
- LOT-III: 132 kV Bahir Dar- Dangila EPTLP to be constructed in the Amhara region.
- LOT-IV: 132 kV Azezo-Chiliga EPTLP to be constructed in the Amhara region.

At local level: provision of electric power supply for households and to those other various development sectors (agriculture, commerce, health, education, etc.). Based on load forecast demanding study. Creates improvements in social infrastructural facility services (education and health services); Women would benefit from the availability of electric power supply services, and therefore their porter age burden will be reduced. This leads to the potential development of the local economy through improved infrastructure and employment opportunities. The said services will also facilitate the distribution of humanitarian aid. The electric power supply is expected to enhance socio-cultural interaction, and increase skills transfer. Moreover, the electric power supply, stimulates eco- tourism at targeted administrative setups of SNNPR, Oromia and Amhara national regional states of Ethiopia, which are rich in ecological, historical and socio-cultural assets.

On the other hand, the proposed project activities will have some negative impacts on the biophysical and social environments. Many of these impacts will be short-term and reversible in nature. The most significant impact will be the acquisition of land and the loss of some other Assets (private building structures/houses, annual and perennial crops) that could occur during construction period. Other potentially significant impacts also assumed to be occur during construction period are health and safety concerns. These will include, spread of HIV/AIDS and other communicable diseases, disturbances and erosion of cultural values caused by an influx of immigrant workers, injuries by car accidents and fall of objects etc. The said impacts are minimum and will be m prevented by proposed mitigations measures.

In the final analysis, the overall mitigation cost as compared to the total project cost is quite low. It does not exceed 1% of the total project cost. Moreover, benefits of the proposed projects far outweigh the adverse impacts. In terms of biophysical and socio-economic impacts .Hence, there are no severe impacts that cannot be mitigated, and would prevent the construction of the proposed projects.

Recommendations

On top of the aforementioned conclusions, the following recommendations have been made for future plans of an action to be taken at each four lots targeted sites of electric power transmission line projects:

I. At Lot I, the preparation of a full resettlement action plan is recommended.

Analysis of impacts on human environment, at lot I sites of 230 kV Metu-Masha Electric Power Transmission Line Project (EPTLP) reveals an estimated total number of 53 households (268 people) will be affected by the implementation of the project. Hence, the total number of project affected PAPs is more than 200. Therefore, preparation of a full Resettlement Action Plan (RAP) is recommended, in accordance to the requirements of MEFCC- ESIA Guidelines and the WB Involuntary Resettlement Policy (OP 4.12).

II. With regard to Lot II, Resettlement Action Plan or abbreviated resettlement action plan in the project targeted project site is required

Analysis of impacts on human environment reveals that implementation of the proposed project will not affect the residential houses. Hence, relocation of people will not occur by implementation of the said project. Therefore, the preparation of either a full or abbreviated resettlement action plan may be required to cover impacts on crops, grazing area, trees, perineal crops, etc. The project may lead to economic displacement, as a precautionary measure the RPF will be used to prepare a RAP, if needed.

III. With regard to Lot III, a full resettlement action plan is recommended.

Analysis of the 132 kV Bahirdar-Dngila Electric Power Transmission Line Project (EPTLP) indicates an estimated number of 336 families living in 56 households will be affected by the implementation of the project. The total number of the proposed project affected PAPs is more than 200, and hence a full Resettlement Action Plan (RAP) is recommended, in accordance with the requirements of MEFCC- ESIA Guidelines and the WB Involuntary Resettlement (OP 4.12).

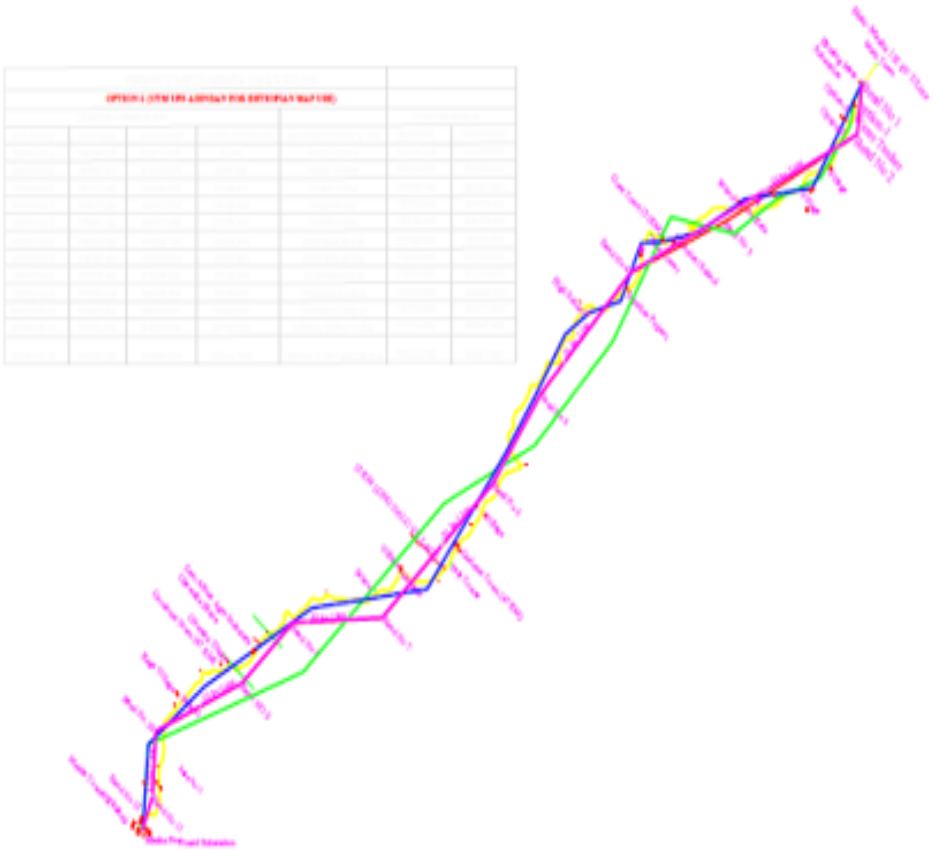
II. With regard to Lot IV, Resettlement Action Plan or abbreviated resettlement action plan in the project targeted project site is required

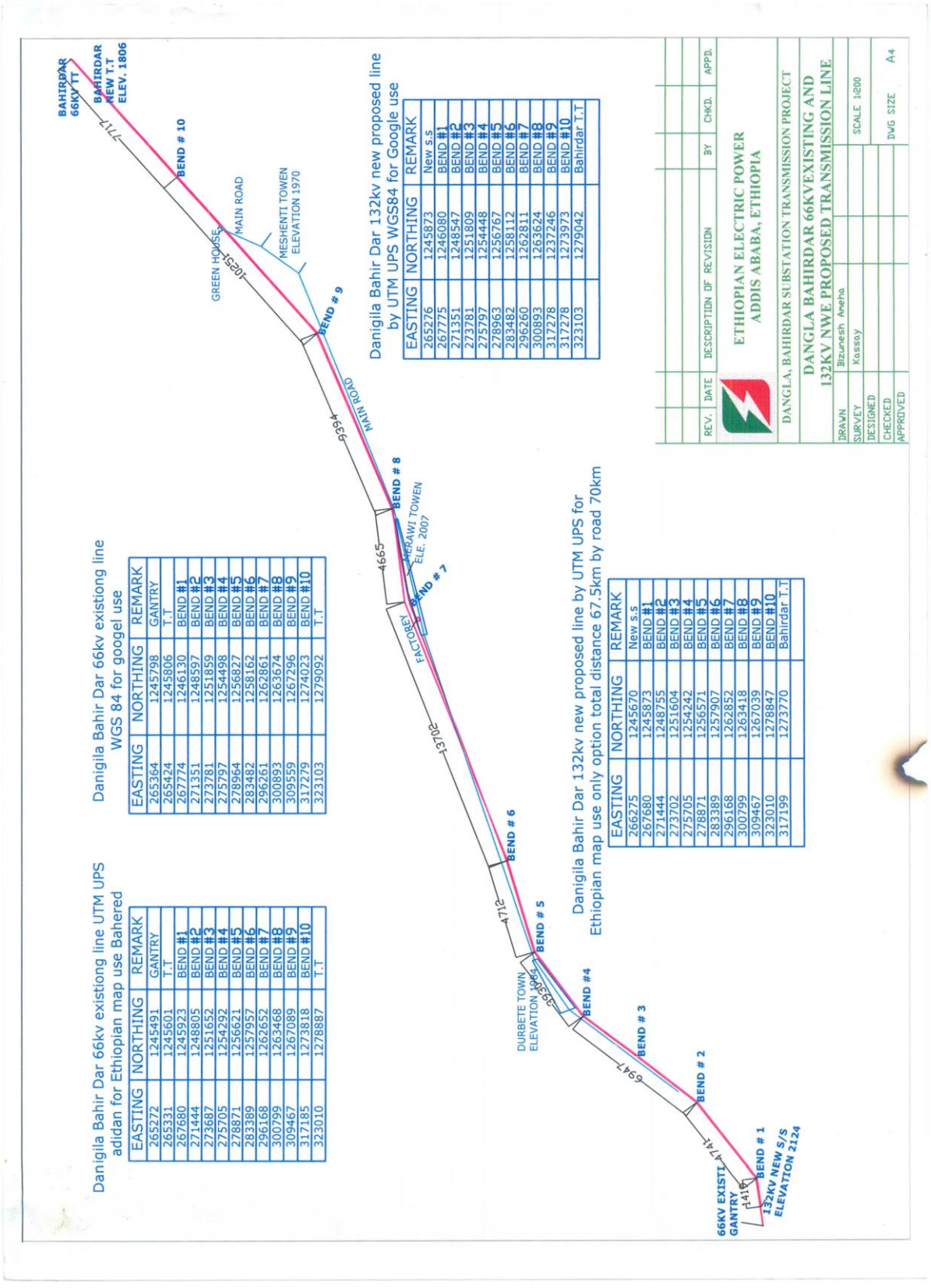
Analysis of impacts on human environment in respect to Lot IV, indicates that implementation of the proposed project will not affect the residential houses. Hence, physical relocation of people will not occur by implementation of the project. Therefore, the preparation of either a full or abbreviated resettlement action plan may be required to cover impacts on crops, grazing area, trees, perineal crops, etc. The project may lead to economic displacement, as a precautionary measure the RPF will be used to prepare a RAP.

There are no ethnic minorities or tribal people in and around the project area whose traditional life style could be compromised through the development of the proposed projects at all four lots targeted sites. Therefore, no indigenous people development plan (IPDP) will be required.

Annex-I Coordinates and Map of the proposed LOT-I-LOT-IV

PROJECT METU-MESHA 132 KV T/LINE								
OPTION 3A UTM UPS ADINDAN FOR ETHIOPIAN MAP								
LENGTH = 66193.863 KM					UTM UPS WGS 84			
STA NAME	EASTING	NORTHING	COMMU DIS	NERSET TOWEN	EASTING	NORTHING		
BEND NO 1	784366.000	916871.000	0.000	METU TOWEN	784444	916579		
BEND NO 2	785390.544	910149.888	6804.913	METU TOWEN	785469	910857		
BEND NO 3	782368.585	906832.735	10792.200	GORE	782446	907041		
BEND NO 4	781174.015	903540.527	14294.432	GORE	781253	903748		
BEND NO 5	779675.529	901641.601	16713.395	GORE	779753	901849		
BEND NO 6	778642.263	900647.636	18147.133	GODOMA	778720	900855		
BEND NO 7	779555.018	897534.779	21391.051	GODOMA	779633	897742		
BEND NO 8	778379.918	895756.992	23522.108	GODOMA	778457	895964		
BEND NO 9	777889.028	893858.781	25482.761	CHEWAKA	777968	894066		
BEND NO 10	778471.593	890037.413	29348.280	CHEWAKA	778549	890245		
BEND NO 11	778864.846	886702.972	32705.830	CHEWAKA	778942	886910		
BEND NO 12	779467.744	878075.249	41354.592	CHEWAKA	779545	878283		
BEND NO 13	774326.376	872400.885	49009.774	CHEWAKA	774407	872608		
BEND NO 14	771585.327	864752.901	57135.086	MESHA TOWEN	771664	864960		
BEND NO 15	770694.181	860098.421	61874.108	MESHA TOWEN	770773	860906		
BEND NO 16	771234.528	856604.580	66193.863	MESHA TOWEN	771313	856812		



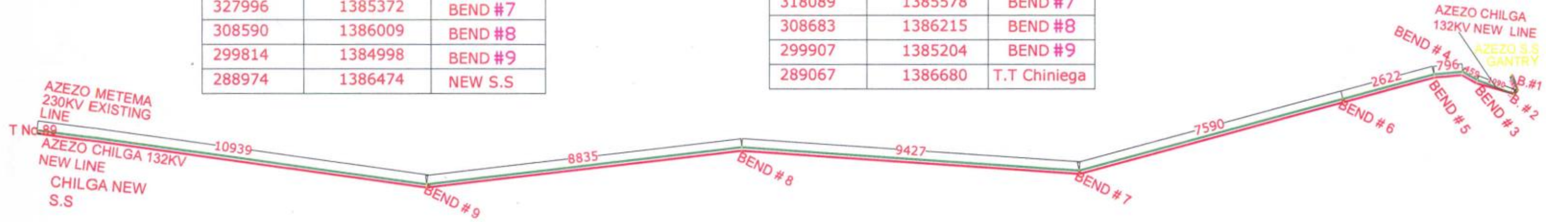

BAHIRDAR 66KV TT
BAHIRDAR NEW T.T ELEV. 1806
717
BEND # 10
GREEN HOUSE
1520
MAIN ROAD
MESHENTI TOWEN ELEVATION 1970
BEND # 9
9394
MAIN ROAD
BEND # 8
4665
MERAWI TOWEN ELE. 2007
BEND # 7
FACTORY
13702
BEND # 6
12474
BEND # 5
DURBETE TOWN ELEVATION 1964
3930
BEND #4
6947
BEND # 3
BEND # 2
1414
66KV EXISTI GANTRY
1416
BEND # 1
132KV NEW S/S ELEVATION 2124
Danigila Bahir Dar 66kv existiong line UTM UPS adidan for Ethiopian map use Bahered
EASTING NORTHING REMARK
265272 1245491 GANTRY
265331 1245601 T.T
267680 1245923 BEND #1
271444 1248805 BEND #2
273687 1251652 BEND #3
275705 1254292 BEND #4
278871 1256621 BEND #5
283389 1257957 BEND #6
296168 1262652 BEND #7
300799 1263468 BEND #8
309467 1267089 BEND #9
317185 1273818 BEND #10
323010 1278887 T.T
Danigila Bahir Dar 66kv existiong line WGS 84 for googel use
EASTING NORTHING REMARK
265364 1245798 GANTRY
265424 1245806 T.T
267774 1246130 BEND #1
271351 1248597 BEND #2
273781 1251859 BEND #3
275797 1254498 BEND #4
278964 1256827 BEND #5
283482 1258162 BEND #6
296261 1262861 BEND #7
300893 1263674 BEND #8
309559 1267296 BEND #9
317279 1274023 BEND #10
323103 1279092 T.T
Danigila Bahir Dar 132kv new proposed line by UTM UPS WGS84 for Google use
EASTING NORTHING REMARK
265276 1245873 New s.s
267775 1246080 BEND #1
271351 1248547 BEND #2
273781 1251809 BEND #3
275797 1254448 BEND #4
278963 1256767 BEND #5
283482 1258112 BEND #6
296260 1262811 BEND #7
300893 1263624 BEND #8
317278 1237246 BEND #9
317278 1273973 BEND #10
323103 1279042 Bahirdar T.T
Danigila Bahir Dar 132kv new proposed line by UTM UPS for Ethiopian map use only option total distance 67.5km by road 70km
EASTING NORTHING REMARK
266275 1245670 New s.s
267680 1245873 BEND #1
271444 1248755 BEND #2
273702 1251604 BEND #3
275705 1254242 BEND #4
278871 1256571 BEND #5
283389 1257907 BEND #6
296168 1262852 BEND #7
300799 1263418 BEND #8
309467 1267039 BEND #9
323010 1278847 BEND #10
317199 1273770 Bahirdar T.T
REV. DATE DESCRIPTION OF REVISION BY CHKD. APPD.
ETHIOPIAN ELECTRIC POWER
ADDIS ABABA, ETHIOPIA
DANGLA, BAHIRDAR SUBSTATION TRANSMISSION PROJECT
DANGLA BAHIRDAR 66KVEXISTING AND 132KV NWE PROPOSED TRANSMISSION LINE
DRAWN Bizunesh Aneha
SURVEY Kassay
DESIGNED
CHECKED
APPROVED
SCALE 1:200
DWG SIZE A4

Azezo to Chiliega 132kv new proposed line UTM adindan for Ethiopian map use only option 42.3km by road 50km

EASTING	NORTHING	REMARK
329998	1387943	GANTRY
330043	1387929	T.T Azezo
330168	1387565	BEND #1
330082	1387464	BEND #2
329062	1387849	BEND #3
328658	1388067	BEND #4
327864	1387999	BEND #5
325331	1387325	BEND #6
327996	1385372	BEND #7
308590	1386009	BEND #8
299814	1384998	BEND #9
288974	1386474	NEW S.S

Azezo to Chiliega 132kv new proposed line UTM WGS84 for google use

EASTING	NORTHING	REMARK
330091	1388149	GANTRY
330136	1388135	T.T Azezo
330261	1387771	BEND #1
330175	1387670	BEND #2
329155	1388055	BEND #3
328751	1388273	BEND #4
327957	1388205	BEND #5
325424	1387531	BEND #6
318089	1385578	BEND #7
308683	1386215	BEND #8
299907	1385204	BEND #9
289067	1386680	T.T Chiniega



Azezo to Chiliega 230kv existiong line UTM adindan for Ethiopian map use

EASTING	NORTHING	REMARK
330014	1387956	GANTRY
330056	1387945	T.T
330185	1387554	BEND #1
330097	1387451	BEND #2
329050	1387743	BEND #3
328637	1387965	BEND #4
327882	1387901	BEND #5
325357	1387228	BEND #6
318006	1385272	BEND #7
308593	1385909	BEND #8
299813	1384898	BEND #9
288961	1386375	NEW S.S

Azezo to Chiliega 230kv existiong line UTM WGS84 for google use

EASTING	NORTHING	REMARK
330107	1388162	GANTRY
330149	1388151	T.T
330278	1387760	BEND #1
330190	1387657	BEND #2
329143	1387949	BEND #3
328730	1388171	BEND #4
327975	1388107	BEND #5
325450	1387434	BEND #6
318099	1385478	BEND #7
308686	1386115	BEND #8
299906	1385104	BEND #9
289054	1386581	NEW S.S

REV.	DATE	DESCRIPTION OF REVISION	BY	CHKD.	APPD.

ETHIOPIAN ELECTRIC POWER
ADDIS ABABA, ETHIOPIA

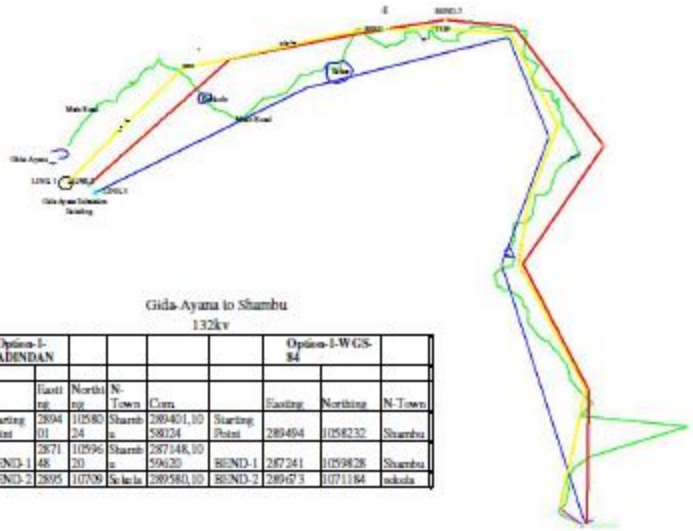
AZEAEO, CHALIGA SUBSTATION TRANSMISSION PROJECT

AZEAEO TO CHALIGA 230KV EXSISTING AND 132KV NEW PROPOSED TRANSMISSION LINE

DRAWN	Bizunesh Ameha	
SURVEY	Kassay	SCALE 1 :150
DESIGNED		
CHECKED		DWG SIZE A4
APPROVED		

Gida-Ayana to Shambu 132kv Route Plan

	80	76		70976				
BEND-3	283222	1082837	Alibo	283222,1082837	BEND-3	283315	1083045	Alibo
BEND-4	284118	1088773	Alibo	284118, 1088773	BEND-4	284211	1088981	Alibo
BEND-5	286968	1095937	Umeru	286968, 1095937	BEND-5	287061	1096145	Umeru
BEND-6	282445	1104655	Umeru	282445, 1104655	BEND-6	282538	1104863	Umeru
BEND-7	275263	1105187	Korkote	275263, 1105187	BEND-7	275356	1105395	Korkote
BEND-8	268273	1104976	Korkote	268273, 1104976	BEND-8	268366	1105184	Korkote
BEND-9	251395	1101340	Gida-Ayana	251395, 1101340	BEND-9	251488	1101548	Gida-Ayana
Gida-Ayana Sub	240358	1090493	Gida-Ayana Sub	240358, 1090493	BEND-10	240451	1090701	Gida-Ayana



Gida-Ayana to Shambu 132kv

Option-1-ADINDAN					Option-1-WGS-84			
	Easting	Northing	N-Town	Com.		Easting	Northing	N-Town
Starting Point	289401	1058024	Shambu	289401,1058024	Starting Point	289494	1058232	Shambu
BEND-1	287148	1059620	Shambu	287148,1059620	BEND-1	287241	1059828	Shambu
BEND-2	289580	1070900	Sekela	289580,1070900	BEND-2	289673	1071184	sekela