



Executive Summary

Introduction

This executive summary gives a synopsis of the project and the project area; gives the project justification; lists the relevant policies, legal and administrative framework; describes the project environment; provides potential impacts and mitigation /enhancement measures; stipulates public consultations and disclosure processes; and outlines the monitoring with its cost estimates.

Project Description and Justification

Project area

The proposed Alamata – Mehoni – Mekele high voltage transmission line, 141 km in length will be constructed between Alamata substation, Mehoni (new substation) and Mekele substation. The existing Alamata substation will be upgraded with 2 outgoing line bays and additional installation of 132/15, 1 X 25 MVA. The Mehoni substation will be newly constructed, with 230/33 kV, 1 X 63 MVA and the existing Mekele substation will be upgraded with 2 incoming line bays of 230 kV.

It is located between 12^o 47' North and Longitudes 39^o 32' East at Alamata substation and from Latitude 13^o 30' North and from Longitude 39^o 27' East at Mekele.

The transmission line traverses 3 Zones and 5 Woredas all of which are found in Tigray Regional State.

Project Justification

The project has been studied at feasibility level and is already approved by the Government and EEPCo's Board of Directors. EEPCo's Board of Directors has approved the MOU signed with TBEA of China.

Policy, Legal and Administrative Framework

National Requirement

Institutional and Administrative Frame work

The following paragraph discusses the institutional and administrative frame work at the Federal and Regional level and organizations responsible for the preparation of environmental policy and technical guidelines.



Federal Democratic Republic of Ethiopia

The Federal Democratic Republic of Ethiopia (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 numbers 33 of 1992 and 41 of 1993, and 4 of 1995. Under these proclamations, duties and responsibilities of Regional States include planning, directing and developing social and economic development programs, as well as the protection of natural resources of their respective regions.

Regional Governments

The power transmission line expansion project is designed to be constructed in Tigray Regional State. The Tigray Regional State is one of the nine regional states established by the federal Government. The Region has Zones and Woredas. Within each Woreda there are Kebeles or Peasant associations. Each administrative unit has its own local government elected by the people. The Regional Governments have established sectoral Bureaus, commissions and Authorities.

Ministry of Mines and Energy (MoME)

Ministry of Mines and Energy is the regulatory body for the energy sector. Based on the delegation from EPA, 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 give approval /certify the implementation of the project and monitoring the performance of the development project will also be undertaken by the Ministry.

Environmental Protection Authority (EPA)

The Environmental Protection Authority (EPA) was reestablished in October 2002 under the proclamation No. 295/2002. It is an autonomous government body reporting directly to the prime minister.

EPA has broad mandates covering environmental matters at federal level. The proclamation sets out the main responsibilities and broad organizational structures of EPA such as:

- Preparing policies and laws on environmental protection.
- Preparing directives and implementation of systems for the evaluation of the impact of projects on the environment.
- Preparing environmental protection standards and implementation of directives on soil, water, and air.



- Enforcing implementation of EIA process (i.e., Review EIA reports) etc.

Agricultural Institutions

The Ministry of Agriculture and Rural Development has delegated almost its authority to the regional bureau of Agriculture and Rural Developments. The Ministry has different technical departments working in.

National Policies and Strategies

The constitution

As the supreme law of Ethiopia, all national policies, laws and regulations as well as the institutional frameworks of the country must comply with the constitutional provisions. The constitution of the Federal Democratic Republic of Ethiopia, Proclamation 1/1995, contains a number of articles, which are relevant to environmental matters in connection with development projects, as well as to the environment in general.

Article 43 gives the right to people to improved living standards and to sustainable development.

Article 44 provides that all persons have the right to live in a clean and healthy Environment.

The constitution itself addresses land tenure issue to some extent when it guarantees Ethiopian Peasants and Pastorals the right to have access to land as well as the protection against eviction from their possession (Art. 40.4 and 40.5).

Article 40.3 of the constitution provides for the public ownership of both rural and urban land as well as all natural resources. It further states that land is the common property of Ethiopian people and cannot be subject to sale or to other means of exchange.

Article 40.7 of the constitution states that “every Ethiopian shall have full right to the immovable property he builds and to the permanent improvements he brings about on the land by his labour or capital, ” it further states, among other things, that the owner of such rights is entitled to compensation and that the particulars shall be determined by law.

Article 40.8 in turn strengthens this by providing for expropriation of private property by the government for public purposes subject to the payment in advance of compensation commensurate to the value of the expropriated property.

The right of the public and the community to full consultations and participation as well as to the expression of their views in the planning and implementation of Environmental Policies and development projects that affect them is enshrined in the constitution (Article 92.3 and 43.2).



The right of women to full consultations in the formulation of national development policies and in designing and execution of projects especially when such projects are likely to affect their interests.

Conservation Strategy of Ethiopia (CSE)

Since the early 1990s, the Federal Government has undertaken a number of initiatives to develop regional, national and sectoral strategies for environmental conservation and protection. Paramount amongst these was CSE, approved by the council of ministers, which provided a strategic framework for integrating environmental planning into new and existing policies, programs and projects. The CSE provides a comprehensive and rational approach to environmental management in a very broad sense, covering national and regional strategies, sectoral and cross sectoral strategy, action plans and programs, as well as providing the basis for development of appropriate institutional and legal frame works for implementation.

Based on CSE, the Tigray Regional States have already developed Conservation Strategy document for region. The document gives details about environmental issues prevalent in the territory and outlining how the environmental issues be addressed.

Environmental Policy of Ethiopia

The Environmental policy (EPE) of the Federal Democratic Republic of Ethiopia was approved by the Council of Ministers in April 1997 (EPA/MEDAC 1997). It is based on the CSE, which was developed through a consultation process over the period 1989-1995.

The policy has the broad aim of rectifying previous policy failures and deficiencies, which in the past have led to serious environmental degradation. It is fully integrated and compatible with the overall long term economic development strategy of the country, known as Agricultural Development Led Industrialization (ADLI), and other key national policies like the national population policy and the national policy on women.

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

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

Sectoral Environmental Policies

Among the sectoral policies, the wildlife policy is the one developed by the Ministry of Agriculture and Rural Development, aiming to preserve, develop and sustainably utilize the countries wildlife resources. Water resource policy is to enhance and promote all national efforts towards the efficient and optimum utilization of the available water resources for socio-



economic development on sustainable bases. The policy is to establish and institutionalize environmental conservation and protection requirements as internal parts of water resources planning and project development.

Environmental Framework Legislation

Proclamation on Institutional Arrangement for Environmental Protection

The Proclamation for the establishment of Environmental Protection Organs, No. 295/2002, was issued to establish a system that fosters coordinated but differentiated responsibilities among Environmental Protection Agencies at Federal and Regional levels. The proclamation recognizes assigning responsibilities to separate organizations for environmental development and management activities on the one hand, and environmental protection, regulations and monitoring on the other, is instrumental for the sustainable use of environmental resources, thereby avoiding possible conflicts of interests and duplication of efforts.

Proclamation on Environmental Pollution Control

The Proclamation on Environmental Pollutions Control No.300/2002 is mainly based on the right of each citizen to live in a healthy environment, as well as the obligation to protect the environment of the country. The primary objective of the Proclamation is to provide the basis from which the relevant ambient environmental standards applicable to Ethiopia can be developed, and to make the valuation of these standards a punishable act. The proclamation states that the “polluter pays” principle will be applied to all persons. Under this proclamation, EPA is given the authority to ensure implementation and enforcement of environmental standards and related requirement to inspectors assigned by EPA or Regional Environmental Agencies.

Legal Framework for Expropriation and Compensation.

Land tenure

Land in Ethiopia is state owned by Proclamation No.31/1975, issued to deal with government ownership of rural land and proclamation No. 47/1975, issued to cover government ownership of urban land, under article 3 (1) of the first proclamation, all rural land shall be the collective property of the Ethiopian People.

In December 1994 the new Constitution retained land under the control of the people and government of Ethiopia. Article 40 states that ownership of both urban and rural land is vested in the state and the people, and is common property, which is not subject to sale or other means of exchange. Peasants have the right to obtain land without payment and are protected against eviction from land in their possession.



Expropriation

The Constitution of the Federal Democratic Republic of Ethiopia (FDRE) has several provisions, which have direct policy, legal and institutional relevance for the appropriate implementation of the Environmental and Social Impact Assessment /ESIA/ plans prepared by development projects and programs.

The Constitution of FDRE on Article 44 No. 2 states that:

“All persons who have been displaced or whose livelihoods have been adversely affected as a result of state programs have the right to commensurate monetary or alternative means of compensation, including relocation with adequate state assistance”.

The Constitution also guarantees people whose livelihood is land based and pastoralists the right to have access to land as well as the protection against eviction from their possession (Article 40.4 and 40.5). On article 40.8, it also states that; private property may be expropriated for public use subject to payment in advance of compensation commensurate to the value of the property”.

In July 2005, the Government of Ethiopia has issued a new proclamation entitled, “Proclamation to provide for the Expropriation of Land holdings for Public Purposes and Payment of Compensation” proclamation No.455/2005. This new proclamation has several articles on determination of compensation, on displacement compensation, valuation procedures, property valuation committees, and on complaints and appeals in relation to compensation.

In part two, article 3, No.1 of the proclamation states that; “ A Woreda or an urban administration shall, up on payment in advance of compensation in accordance with this proclamation, has the power to expropriate rural or urban land holdings for public purpose where it believes that it should be used for a better development project to be carried out by public entities, private investors, cooperative societies or other organs, or where such expropriation has been decide by the appropriate higher regional or federal government organ for the same purpose”.

Proclamation No. 455/2005 provides a better displacement compensation for rural land holdings compared to previous laws.

Recently, Council of Ministers Regulation No. 135/2007 on the payment of compensation for property situated on land holdings expropriated for public purpose is issued for the proper implementation of the proclamation No. 455/2005, expropriation of land holdings for public purposes and payment of compensation. This regulation was issued for the purpose of not only paying compensation but also to assist displaced persons to restore their livelihood.



This regulation set forth details to determine the amount of compensation for different assets found on land holdings expropriated for public purpose and stipulated the formula to calculate the amount of compensation payable for different assets.

In part 3 of article 8 it states that:

“A rural land holder whose land holding has been permanently expropriated shall, in addition to the compensation payable under Article 7 of this proclamation, 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”.

The proclamation also states that in urban areas PAPs will be provided with a plot of land (land for land compensation) for their expropriated land to be used for the construction of house, and also be paid with compensation for displacement.

Compensation

Regarding the determination of compensation in part three, article 7 of this proclamation (Proclamation No. 455/2005), the basis and amount of compensation is clearly explained. In article of sub article 1, a land holder 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 such land.

Article 7(2) states that the amount of compensation for property situated on the expropriated land shall be determined on the basis of replacement cost of the property.

Under Article 8(1) of proclamation 455/2005 a survival landholder whose land holding has been permanently expropriated shall in addition to the compensation payable under Article 7 of this proclamation is paid displacement compensation, which shall be equivalent to ten times the average annual income he secured to bring the five years preceding the expropriations of the land.

All PAPs and organizations (whether public or private) that loss houses, crops or sources of income will be compensated or rehabilitated according to the types and amount of their losses. The cut-off-date for compensation eligibility will be set once all detailed measurements have been completed; compensation will also not be paid for any structure elected, or crops and trees planted purely for the purpose of gaining additional compensation. Cultivating land, constructing settlement in project affected areas after the cut-off-date will not be eligible for compensation or subsidies.

EEPCo's Strategy for Expropriation and Compensation

It is the objective of EEPCo to avoid or reduce the environmental and social impacts of its power projects to a minimum level. If adverse social impacts to be occurred are unavoidable, EEPCo then will open consultation with PAPs and perform legal compensation for loss of all



their properties. To achieve the social mitigation goal, EEPCo will allocate adequate budget for compensation before the implementation of project starts. EEPCo in consultation with the administrations of Regional State Governments, Zones, Woredas and Kebele Associations shall establish property valuation committees as per the proclamation No. 455/2005. It is the project's prime task to initiate the establishment of property valuation committee to properly implement compensation payment for PAPs on time before the start of the project construction.

International Requirements

Multi-Lateral Agreements

The Federal Democratic Republic of Ethiopia has ratified several international convention and protocols and these includes:-

- Vienna Convention and Ozone Layer Protection (1990)
- Montreal Protocol for Substances Depleting the Ozone Layer (1990)
- Convention on Biodiversity (Rio convention) 1997
- Framework Convention of United Nations on Climate Change (1997)
- Convention on the Control of Trans-boundary movement of Hazardous Substance (1987)
- African Convention on the Conservation of Nature and Natural Resources
- Convention on Wetlands of International Importance especially as waterfowl habitat (Ramsar)
- Convention to Combat Desertification
- Convention Concerning the Protection of World Cultural and Natural Heritage
- Convention on International Trade in Endangered Species (CITES)
- Stockholm convention on persistent organic pollutants (PAPs, 22nd may 2001)

Regional Requirements

The Regional Development Banks, such as the European Bank for Reconstruction and Development (EBRD), the African Development Bank (AfDB) and the Asian Development Bank (ADB), all have environmental policies and guidelines which in most respects resemble those of the World Bank.



The African Development Bank

In January 2004 the AfDB Boards approved the new Bank Group Policy on the Environment, which incorporates and redefines the former policy on environmentally sustainable development in Africa.

The new policy acknowledges that to sustain economic growth in Africa, there is an urgent need to preserve and enhance the ecological capital that enriches such growth. The main goals of the new policy are to:

- ✚ Promote a long-term view and perspective of economic and social development;
- ✚ Reverse where possible and halt the impoverishment process in Africa by enhancing the access of the poor to environmental resources;
- ✚ Help Regional Member Countries (RMCs) to build their environmental management capacity and sensitize policy makers on environmental issues and bring about institutional changes to achieve sustainable development;
- ✚ Reinforce the existing partnerships with international institutions and network also with regional and sub regional organizations to coordinate interventions in environmental sustainable development.

Description of the Project Environment

Alamata - Mehoni –Mekele 230 kV Transmission Line Project is located entirely in Tigray Regional State. The basic details of the region, where the line crosses are given below.

The proposed route line will cross three Zones, namely, Dehub (South), Dehub Misirak (South East) and Mekele Zones of Tigray Regional State. The Woredas that are traversed by the proposed transmission line are Alamata, Raya Azebo, Hintalo Wajirat, Enderta and Mekele/Semein Woredas. The total area of the region is 53,368 km².

Land use pattern of Tigray Regional State

Land use	Percentage in hectare
Built up area	12,960
Cultivated land	2,667,710
Grazing /grass land	1,512,160
Vegetated or bush/shrub land	954,090
Wet land	5,590
Bare land	1,640
Water body	1,760
Total	5,155,910



Topography

The area between Alamata and Meholi for about 20 km is plain agricultural land with about three plateaus with scattered vegetation cover. From Meholi to Kukuftu about 20.8 km to the north the area is plain but without any crop production activity (except cactus). Then after, for about 75 km, the area very steep and rugged mountain chains. From Adikeyih up to Mekele about 26 km, it is a plain agricultural land.

Altitude of the Region ranges between 600 m.a.s.l – 3,935 m.a.s.l.

Climate

The variation in altitude is primarily the cause for variation in climate. The annual mean temperature of the region varies from less than 10⁰c to 27.5⁰c.

The Region is stratified into five temperature zones, these are, highland comprising 11.5 %, semi highland 40.3%, lowland 47.9%, Arid 0.2 % and sub alpine 0.01 %.

The Region's mean annual seasonal rainfall is 690 mm.

Soil

The soils types in Tigray Regional State are Leptosols 54.09 %, Cambisols 21.91%, Vertisols 11.99 %, Luvisols 4.85 % etc.

Soil erosion problems have been noticed particularly in rugged highland and mountainous areas, and intensively cultivated areas of the Region.

Water Resource

The major rivers like Tekeze, Werdi, Kaza, Asem, Ferfer and Girebgiba flow permanently throughout the year in the Region. There are also several seasonal rivers /streams in the region which are usually the source of water supply for human being as well as animal consumption.

Biological Environment

Flora

Some indigenous flora that commonly found in the region is *Cordia Africana*, *Juniperus procera*, *Ficus vasta*, *Ficus sur*, *Acacia spp*s and *Eucalyptus spp*s.

Fauna

The diversity of wild animals in the study area is very low because of the decline of their natural habitat. However, some common wild animals like, hyena (*Crocuta crocuta*), *Monkey*



(Cereopithecus aethiops, guinea fawl, Warthog (Phacochlerus aethiopicus), Fox (Otocyon megalotis), elephant, eland, greater kudu, leopard, etc

Protected Areas in the Region

The Region has 598,207 hectare of conservation land or protected area.

Socio Economic Environment of Tigray Region

Population

The total population of the Region according to census projection of 2009 is 4,682,310 and the average population density of the Region is 0.02 persons per km².

Major agricultural products produced in the Region are cereals like maize, wheat, sorghum, teff, and barley.

Social Services

Education

In the last decade, encouraging efforts have been made in the region to expand educational opportunity to reach unaddressed section of the population. As a result, the no. of kindergarten 144, primary (1-4) 757, primary (5-8) 1186 and high schools and TVET 97 schools are established and enrollment was 1,133,133 pupils.

Health

Health is important social indicator that has enormous development implication. In the Region there are 14 hospitals, 230 health centers, 614 health posts and 48 drug shops/pharmacies.

5. Potential Impacts

As linear facility, the impacts of transmission line are mostly localized to the Right of Way (ROW). The impact can be minimized through careful route selection.

Socio Economic Impacts

All possible measures are undertaken during routing alignment to avoid settlement such as cities, villages etc. However, the negative impacts are 54 PAPs with their 56 residential (tukuls 34 and iron roofed houses 22), backyard vegetation, eucalyptus trees, allocation of land for relocation, loss of farmland, decline in farm products, indigenous trees and bushes clearing, etc.



No community services, infrastructures or facilities such as schools, health institutions, churches, mosques and other major community services were found to be not affected by the project.

For the houses and tukuls to be affected, there will be compensation payment as per the national proclamation and regulations and relocate on their own land holdings.

Impacts on Farmland

The construction of the transmission line will cause permanent and temporary loss of land. Generally about 196 ha of farmland will be affected. The permanent loss of land due to tower foundation is about 1.45 ha. On the other hand, 194.55 ha of farmland would be affected temporarily due to creation of ROW and temporary access road construction.

Impact on Crop Production

During the construction phase, in areas where lines traverses agricultural land, the farmers' seasonal agricultural activities may be disrupted and on farm crop may also be affected temporarily. About 564 ha of land will be affected due to ROW clearance.

Impacts on Trees

In some section of the transmission line some eucalyptus trees, acacia trees and cactus spp. shall be cleared during the construction period.

Impacts on Historical, Cultural, Archaeological and Religious Sites

During the line assessment no such historical, cultural monuments are affected by the proposed route alignment. However, during construction period if any accidental "*chance findings*" of some archaeological artifacts were found, the workers and surveyors shall report to the PSP of EEPCo.

Noise

Noise associated with the proposed construction activity of the transmission line and access roads would have minor impacts in the immediate project area. Machinery used to clear site and vehicles used on site would emanate noise which is temporary and limited.

Dust

During the construction period, it may cause temporary and limited dust pollution which may sometimes cause respiratory problems on construction workers and local communities. The impact of dust can be mitigated through taking proper dust abatement measures, like watering of roads and control of traffic speed limit.



Public Health and Safety

During operation impacts on public health and safety are related mainly with possible electrocution induced effects from electromagnetic fields.

Polychlorinated Biphenyl /PCBs/

After it was found out that PCBs are non biodegradable and has carcinogenic tendency, the manufacturing of PCBs has been stopped since 1997. Keeping in mind, EEPCo has taken all possible steps to check and ensure that the newly imported transformers, capacitors and other electrical equipments are free from PCBs.

Sexually Transmitted Infections /STIs/

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

The mitigation measure will take an aggressive approach to control the spread of STIs through health education programs, control informal sector activities near the project site.

Protection of Workers' Health/ Safety

The construction crews receive specific and routine safety trainings and are issued with hazard and job specific safety equipment.

Substance Abuse

A large construction labour force comprising primarily of young men living away from their families, with rather stable wages and ideal time, with few recreational pursuits and no domestic responsibilities, can often lead to the overindulgence of alcohol. This can lead to abuse, fighting and injury, particularly if women are involved. Men who live in the area who work in the construction of the transmission line (TL) return home in an inebriated state and can abuse and injure family members and generally can cause a good deal of domestic upheaval.

Health Effect of Electro Magnetic Fields (EMF)

Electro magnetic fields (EMF) are invisible force that surrounds any electrical device. Power transmission lines, electrical wiring and electrical equipment all produce EMF.

Impacts on Biological Environment

Flora

The main impact will be the clearance of vegetation from the ROW and access roads. Clearing of trees and bushes may also cause habitat loss as well.



Fauna

Some wild animals may be affected due to clearing of vegetation. Some of their shelters /habitat would be disturbed and forced to evacuate or exposed to illegal hunting.

Impacts on Birds

Large predatory birds, including night active birds are the ones most affected by HVTL. Various migratory birds are considered endangered as they visit fifty sites in Ethiopia every year (according to Ethiopian wildlife and natural history of society, there are 69 sites so far registered as important bird areas in Ethiopia) at international level.

However, in the study area, there are no known migratory bird routes or important bird area to be affected by the proposed transmission line.

Impact Protected and Reserve Areas

There are no national parks and reserve forest areas to be crossed or affected by the proposed transmission line.

Impacts on Wetlands

There is no wetland along the entire route of the transmission line.

Impact on Physical Environment

Land Use

The proposed 230 kV transmission line route will have impacts on the existing land use both temporarily and permanently. Agricultural land will be lost permanently at each tower foundation. Temporary access roads also will be required during construction phase.

Soil

During access road construction and vegetation clearing works may lead to the top soil to be removed /threatened by wind and water erosion.

Air Quality

CO₂ gas which emanates from the exhaust of the engine of the machinery and dust arising during the proposed construction activity could also have a small potential for affecting the air quality.



Water Quality

The proposed transmission line would cross water courses but the construction activity associated with the proposed electric transmission project will not have any direct effect on rivers or streams.

Positive Impacts

Some of the positive impact of the project is, reduce power problems/outages, connecting more households and institutions to the national grid, will enable to reduce poverty, improve living standards, job creation opportunities for skilled, unskilled labour, boost the economy through investment and expansion of businesses and income generation opportunities.

It is assumed that for irreversible negative impacts appropriate compensation payment will be undertaken by EEPCo (for demolition and relocation of houses, for homestead vegetation loss, etc). For temporary impacts, such as loss of agricultural products during construction and stringing, access roads, etc), EEPCo will pay compensation for one year loss.

Environmental Hazard Management

The only risk or accident that is expected to happen during the construction of high voltage transmission line are like fall from above, hit by objects, car accidents, etc.

Mitigation Measures

Mitigation is undertaken in order to reduce /minimize the impacts of the project.

(i) The most important measure concerning the natural environment is targeted at the right-of-way /ROW/, where a selective clearing is recommended. Clearance for construction work and inspection shall be to no more than absolutely necessary extent. At completion of construction work areas not needed anymore should be replanted / reforested as far as the line security is not impeded.

(ii) Regarding soil erosion, some technical measures include sensitive planning of access ways, careful construction work as well as re-cultivating cleared areas with suitable sediment binding grasses such as *Cynodon dactylon*, *Pennisetum clandestinum*, *Cenchrus ciliaris*, *Chloris roxburghiana* and *Eragrostis superba*, avoiding use of heavy machinery in the clearance of the way-leave and use of better gabions instead of stone walls.

(iii) The impacts on housing, social infrastructures and cultivated areas will be mitigated significantly by the line routing alternatives that avoid settlements and above all by the implementation of a Resettlement Action Plan (RAP) which will include all compensation issues and meet many complains of stakeholders.



(iv) To deal with the complaint that villages along the line corridor will not benefit from electrification, might be countered by the timely deployment of shield wire systems (SWS) at least cost conditions, which is best suited for rural electrification in sparsely populated territories traversed by high voltage transmission lines.

(v) Collision of birds with the line can be minimized through reducing the number of conductor levels taking into account also the 230 kV line where running in parallel. This will require different type of towers for the concerned line stretches and fitting of flapper devices on the shield wires which will make them more visible and reduce collisions significantly.

(vi) Mitigation measures against the spread of HIV/AIDS and STI would be through implementation of the most efficient strategy concentrating on awareness and information campaigns on the group of workers (but not neglecting the villagers). Provide voluntary testing and treatment for all workers periodically on HIV/AIDS and ensure full participation of all workers; and also ensure information materials on HIV/AIDS are posted and readily available at all work sites and villages along the way-leave.

(vii) Waste and wastewater contamination may be reduced by constructing and using oil resistant seal of all surfaces in the camps where hydrocarbons (fuels and lubricants) are permanently handled and stored; these areas have to be sheltered and protected against storm water. Storage for hydrocarbons in oil resistant containments in the field, refueling of vehicles and machines in the field should be done using portable oil collection pans only. Waste may be controlled by separately collecting materials suitable for recycling and composting. Other not hazardous wastes have to be deposited at specific landfill sites already used for this purpose in compliance with Ethiopian regulations. Hazardous materials to be handled properly and far away from water bodies, hazardous wastes have to be brought to facilities.

Monitoring Program

Environmental monitoring is an essential component of project implementation. It facilitates and ensures the follow-up of the implementation of the proposed mitigation measures. It helps to anticipate possible environmental hazards and/or detect unpredicted/unforeseen impacts over time.

Methods of monitoring includes: - Visual observation, selection of environmental parameters at specific locations, sampling and regular testing of these parameters.

Public Consultation and Public Disclosure

During field assessment, public consultation and disclosure meeting with the affected community households, elders and chairmen of the *Kebele* (Peasant) Associations was undertaken. The consultation was conducted at Semein Woreda, Felegedearo village.

The team has also conducted various meetings on similar issues with different local government administrations, representatives of sector offices of Agricultural and Rural



Development, Health, Education, Culture and Tourism, Women's affair and HIV/AIDS secretariats.

The participants in the meetings have commonly explained their positive attitude and good impression on the project. The community representatives also explained their keen interest hoping that each of their villages and towns will get electric service in the near future.

On the other hand, the communities have underlined that the government has to follow proper and transparent compensation payment procedures for their assets to be lost.

Mitigation/Enhancement Cost Summary

The cost of standard construction mitigation measures have been integrated into the Project's Bills of Quantities. The total project cost for environmental mitigation and monitoring, the HIV/AIDS campaign and compensation and resettlement is estimated at **7,685,691.05 Birr** in local currency (**556,466.38 USD** in foreign currency) the cost summary is depicted below:

No	Items	Cost in Birr	Cost USD
1	Compensation for Temporary loss of annual crops	180,000.00	13,032.52
2.	Compensation for Temporary loss of crops Due to ROW and Access roads	2,426,830.56	175,709.59
3	Compensation for loss of eucalyptus tree	30,000.00	2172.09
4	Compensation for residential houses	3,394,262.80	245,754.50
	Sub total	6,031,093.36	436,668.70
	Moving and Training Allowance		
1	Moving Allowance (54 hh*Birr 1500)	81,000.00	5864.76
2	Skill Training Allowance (54 hh*2 persons * 90 days* Birr 70)	680,400.00	49,264.01
	Sub Total	761,400.00	55,128.77
	Monitoring and valuation		
1	Monitoring and evaluation	200,000.00	14,480.58
2	Valuation committee per diem	10,000.00	724.03
	Sub Total	210,000.00	15,204.61
	Total	6,986,991.86	505,878.53
	Contingency 10%	698,699.19	50,587.85
	Grand Total	7,685,691.05	556,466.38

Exchange rate date July 6, 2010

Exchange rate 1 USD =13.8116