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THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

REPUBLIC OF KENYA

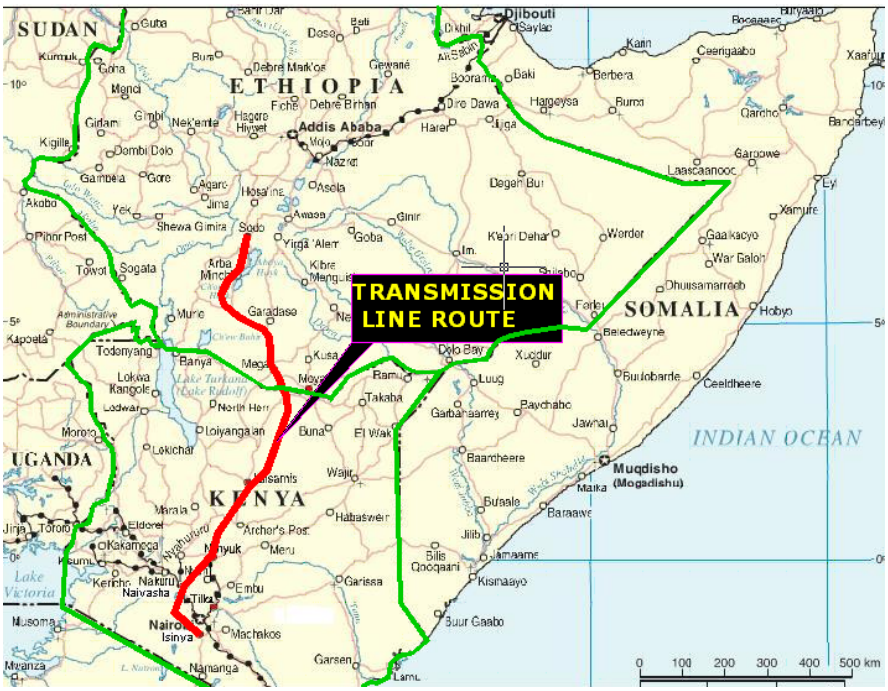
ETHIOPIAN ELECTRIC POWER CORPORATION (EEPCo)

KENYA ELECTRICITY TRANSMISSION COMPANY LIMITED

ETHIOPIA-KENYA POWER SYSTEMS INTERCONNECTION PROJECT

REVISION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND RESETTLEMENT ACTION PLAN STUDIES

ESIA FINAL REPORT



PART 1: ETHIOPIA

JANUARY 2012

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Abbreviations

AC	Alternating Current
AFD	Agence Française de Développement
AfDB	African development Bank
AIA	Appropriation in Aid
ARCCH	Authority for Research and Conservation of Cultural Heritage (Ethiopia)
BP	Bank Procedure (of the World Bank)
CBO	Community Based Organisation
CIS	Corrugated Iron Sheet
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CSE	Conversation Strategy of Ethiopia
DC	Direct Current
DC	District Commissioner Democratic Republic of Congo and Kenya
EAPP	East African Power Pool
EELPA	Ethiopian Electric Light and Power Authority (now EEPCo)
EEPCO	Ethiopian Electricity and Power Corporation
EHS	Environmental, Health & Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMU	Environmental Management Unit of EEPCo
EPA	Environmental Protection Authority (Ethiopia)
EPC	Engineering, Procurement and Construction
EPE	Environmental Policy of Ethiopia
ERC	Energy Regulatory Commission (Kenya)
ESA	Environmental and Social Assessment
ESAP	Environmental and Social Impact Procedures
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FAO	Food and Agriculture Organization of the United Nations
FDRE	Federal Democratic Republic of Ethiopia
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GIS	Geographic Information System

GPS	Global Positioning System
ha	hectare (100 x 100 meters)
HV	High Voltage
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IAPs	Interested and affected parties
IBA	Important Bird Area
IESIAG	Integrated Environmental and Social Impact Assessment Guidelines
IFC	International Finance Corporation
IFC EHS	International Finance Corporation Environmental, Health & Safety
IUCN	International Union for Conservation of Nature
Kebele	Smallest Administrative Unit (Ethiopia)
KfW	Reconstruction Loan Corporation in Germany (KfW Entwicklungsbank),.
Km	Kilometre
Km^2	Square Kilometre
KPLC	Kenya Power & Lighting Company Ltd.
kV	kilo volt – 1,000 volts
m	Meters
masl	Meter above sea level
MoE	Ministry of Energy (Kenya)
MoFED	Ministry of Finance and Economic Development
NELSAP	Nile Equatorial Lakes countries: Uganda, Rwanda, Burundi, Tanzania,
NFPA	*National Forest Priority Areas*
NEMA	National Environment Management Authority (Kenya)
NFPA	National Forest Priority Area
NGOs	Non-governmental Organizations
NIP	National Implementation Plan for the Stockholm Convention
NO_X	Nitrogen oxides
NRRLAS	Natural Resource and Rural Land Administration Sector
OEPO	Oromia Environmental Protection Office
OIA	Organizational and Institutional Analysis Report
OP	Operational Policy of the World Bank
pa	per annum

PAP	Project affected persons
PCBs	Polychlorinated Biphenyls
PCR	Physical Cultural Resources
PIC	Project Implementation Committee
PIU	Project Implementation Unit
PMUs	Project Management Units
POPs	Persistent Organic Pollutants
PPA	Power Purchase Agreement
ppb	Parts per billion, e.g. one ozone molecule for every thousand million air molecules
PSC	Project Steering Committee
RAP	Resettlement Action Plan
RLA	The Registered Land Act
ROW	Right of Way
SNNP(RS)	South Nations and Nationalities People's (Regional State)
STP	Shovel Test Pits
TL	Transmission Line
TOR	Terms of Reference
UEAP	Universal Electricity Access Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UTM	Universal Transverse Mercator (projection)
WB	World Bank
WB EHS	World Bank Environmental Health and Safety (guidelines)
WGS84	World Geodetic System of 1984
Woreda	Rural Town and Local Government Administrative Division (Ethiopia)

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E. EXECUTIVE SUMMARY

E.1 Introduction

Government of the Federal Democratic Republic of Ethiopia and the Government of the Republic of Kenya have reached an understanding to implement a power interconnection project between the two systems after taking into consideration recent developments in the countries and the region at large.

In view of that a memorandum of understanding for the implementation of Ethiopia–Kenya interconnection line has been signed which eventually led to the preparation of the ESIA/RAP study.

Tropics Consulting Engineers Plc of Ethiopia and Gama Systems Ltd. of Kenya are jointly undertaking the ESIA/RAP of the Project under the contract agreement signed between the Consultants and Clients

The main objective of preparing an ESIA is to ensure that potential impacts of the project are identified at the early stage of a feasibility study and minimizing or avoiding strategies can be developed. The implementation of the Project should be carried out without creating much adverse impacts on the environment and the livelihood of the project area population. The main principle is that people living in the project area should not be impoverished due to the implementation of the Project. Appropriate mitigation and compensation measures have to be taken to ensure, that adverse impacts from the construction of the transmission line are reduced to as low as reasonable acceptable level.

E.2 Transmission Line Route Options

Four route lines were considered before selecting the preferred route based on certain technical and environmental consideration. The four routes had been analyzed in details and compared with each other to arrive at a decision on the best environmentally friendly alternative. In this route study, several environmental factors including physical, biological, socio-cultural, technological conditions and constraints have been discussed. As a result route A/C was selected for further study on ESIA/RAP.

Route A/C starts from Sodo substation and passes through Arba Minch, Konso Brindar, Yabello, Mega and proceeds southwardly entering the Kenyan territory and stretching up to Lngonot.

The total length of the project in the routing in Ethiopia can be divided into two distinct sections. The first section of the route for the transmission line, which is from km 00 to km 204 (from Sodo substation to Konso woreda) comprises about 53% of the total km distance and is located in SNNPRS. This section is known for its intensive cultivation and dense population. In this section, one can say that, there existing no uncultivated land or without settlements.

The second section, which is from km 204 to the border (433 km), covers a very wide uninhabited area with very low cultivation and thinly distributed population and is located in the Oromia region. This section is partly occupied by crop producer, agro pastoralist and also by pastoralist nomadic communities. Agro climatically, it is located in mid land and low land areas except for some specific locations (Kenya-Ethiopia border) located in the high lands. In this section, the transmission line partly traverses through bush areas, natural forest and grazing area for livestock.

A substation will be located in Sodo Zuria Woreda at a place named Waranza Lasho (Gantry Center), approx. 5 km north-western from the town of Sodo. The substation will like 200,000 m² (or 20 hectare) and will be constructed on a plot size of 500m x 400m.

E.3 Project description

The infrastructure to be constructed for the power interconnection project is mainly conventional lattice self-supporting steel tower and substations.

The system consists of 1082 km, ±500 kV HVDC bipolar overhead line, from Wolayta/Sodo S/S on the Ethiopian side to a new Longonot 400 kV S/S on the Kenyan side.

Approximate number of towers: in Ethiopia are 1060 (assuming 2.5 towers per line–km as average) on flat and hilly terrain as mentioned in the feasibility study. The supply comprises of:

- Approximate average span length: 400 m
- Width of line corridor (RoW): 50-60 m
- Overall project implementation time: 30 months, six work teams
- Access road: a 4 m wide road from main road or villages as well as 2 m wide along the line route will be required for repair and maintenance purposes, when public roads cannot be used.

The area of immediate impact will be the Line corridor Right-of-way (ROW) which will be 50-60 m in width by 1045 km (433 km in Ethiopia) in length from Sodo in Ethiopia to Longonot in Kenya. A parallel strip of land through those sections of the route which pass through vegetation will also be completely cleared of all trees, scrub and undergrowth above a height of 150 mm during the construction stage. Appropriate clearance between conductors and vegetation/structures along this corridor will be maintained throughout the life of the transmission line. Cropping and grazing beneath the conductors is normally permitted.

The total land required will be 2387 ha permanently and 86.2 ha temporarily.

E.4 Resettlement Cost in Ethiopia

Compensation estimates are made for lost assets and properties on affected crops, houses and lost income. No cost estimate is made for land since land in Ethiopia belongs to the public and that it could not be sold or mortgaged. The estimated cost for the RAP includes costs for compensation of crops, compensation for trees, houses, and also administrative, monitoring and income restoration and contingency costs. The total estimated cost for the RAP will be 268,514,294 Birr (or 15,371,870 USD) and of which about 72% goes for compensation payment.

E.5 Legal and regulatory framework

Policies, regulatory and institutional framework of Ethiopia applicable to this project are the constitution of Ethiopia, Environmental legislations and guidelines of Ethiopia, Environmental policies of Ethiopia, relevant sectoral policies, International agreement, the AfDB and The World Bank safeguard policies and guidelines, and etc.

E.6 Institutional Framework

The institutions responsible to ensure implementation of environmental public instruments at Federal and Regional levels are the (Federal) Ethiopian Environmental Protection Authority (EPA) is which the lead institution and the regional Environmental Organs established at regional and Woreda level.

Proclamation No. 295/2002 empowers each Regional state to establish its own independent environmental agency with the responsibilities to coordinate and follow-up the regional effort to ensure public participation in the decision making process, to play an active role in coordinating the formulation, implementation, review and revision of regional conservation strategies as well as to foster environmental monitoring, and protection and regulation.

Some sectoral institutions that were established for the purposes of the sectoral development are, currently, fully delegated by EPA for environmental impact assessment and follow up in their respective sectors. Thus the sectoral institutions that are delegated by EPA are five sectoral institutions. For the environmental matters regarding hydropower and transmission line the responsible institution is the Ministry of Water and Energy. The ESIA/RAP reports shall be evaluated by HoWE and environmental clearance shall be obtained from the same.

E.7 Baseline condition of the project area

E.7.1 Physical Environment

The routing starts at an altitude about 1950 m at Sodo Gantry Centre, where the substation will be build. The altitude decreases from there on, until it reaches Konso Special Woreda at 1270 masl. Then it gradually increases to 2035 m north of Yabello, and further decreases to 1900 m at Mega. The area from Mega onwards decreases up to 965 m at Megado. The land setting of the route line varies between flatter areas and through undulating hills and gentle slopes.

The geology of the route line is characterized by a Precambrian Rocks including a wide variety of sedimentary, volcanic and intrusive rocks that have been metamorphosed to varying degrees.

The soil along the route varies with the topography. In the higher altitude where there is intensive cultivation, the soil is predominantly blackish clay with stone mulches. Gravels and pieces of stone along the route on farms and open land indicate that the soil is not very vulnerable to erosion. The most dominant soil type are (1) red soil around bend 3 & 4. (2) Brownish fertile soil as in Mirab Abay, (3) agricultural farm and (4) Black cotton soils near Mega Hill

E.7.2 Biological Environment

These localities along the transmission lines are agricultural land mainly cultivating crops like pulses (maize, and sorghum) and fruit like avocado and mango sometimes, interspersed with wild plants. The areas between Konso to Mega and down to Megado are mainly covered with woodlands, occasionally with cultivated fields. The Sodo substation is part of the Afromontane grassland without much tree and shrub cover.

Several species of large wild animals have been reported from the area. The study area is no exception to this process. The areas past Konso to Yabello-Mega-Kenyan border have some intact woodland ecosystems which harbors various wild animals.

There are two important conservation areas along the transmission route; the Nech Sar National Park and the Yabello wildlife Sanctuary.

The areas past Konso in direction to Yabello via Mega towards the Kenyan border has some intact woodland ecosystems which harbors various wild animals. The wilde animals observed in the area include the Olive Baboon, Leopard, Serval, Bush Duiker and Mountain Nyala. The characteristic birds include six endemic birds: Black-headed Siskin, Abyssinian Catbird, Abyssinian Long claw, Abyssinian Woodpecker, Yellow fronted Parrot and Spot-breasted Plover.

Threatened mammals are African Wild Ass, and Grevy's Zebra. Endemic bird species occurring are Abyssinian Woodpecker, Yellow-fronted Parrot and Abyssinian Bush Crow. In addition to these, near-endemic bird species like Lappet-faced Vulture, Imperial Eagle, Lesser Kestrel, Wattled Crane, Abyssinian Bush Crow, White-tailed Swallow and Nechisar Night Jar are categorized as vulnerable.

E.7.3 Socioeconomic and Cultural Environment

The population of the Project Woredas are estimated at 1, 376,811 in 2011. Out of this the project woredas in SNNP accounted for 80 percent of the total Project woreda (1,099,8280) people while in Oromia the population accounted only 20 % of the Project Woreda Population (276,983).

Hence overwhelming majority of the total people identified in the Project Woredas live in the SNNP. The proportion of male and female population are evenly split; almost 50% are female. The average population density of the project area is 154 persons per square kilometers in the case of SNNPRs and 11 persons per kilometer square in the case of Oromia.

The people living in the project woredas are mainly from six ethnic groups. These ethnic groups belong to Omotic, Cushetic, Semetic and Nilo Sahara linguistic families. The Cushitic and the Omotic are the most popular and diversified groups. There are other minority ethnic groups living the area including, Amhara, Gurage, Tigre, etc but they are in small number particularly in the rural area where the line passes.

The houses are scattered family dwellings made up of mostly thatched roof and sometimes corrugated iron made of wood wall plastered with mud in most parts of the project area. The settlements are isolated villages on varied terrain particularly without adequate socio-economic infrastructure and services.

The major types of livelihood activities in the project area are Crop Production, Pastorals, agro-pastorals and trade. Pastorals are the most prevalent lively sources especially in Borena zone. The vast arid and semi-arid region is conducive for production of livestock of different types such as cattle, camels and goats. The livestock by-products such as hides and skins are delivered to the central market. The other products such as milk, butter, etc

The third significant livelihood activity is trade which is mainly practiced by town and village dwellers. Another lively hood source is illegal production and sale of charcoal.

Hence the mainstay of the people in both regions is dependent on agriculture and agro pastoralism, farming and livestock rearing are the basic livelihood of the people. Land is the major source of income and food for the population living in the project area.

Cultural and archaeological assessment is conducted to investigate the route A/C of the Ethio-Kenya Power System Interconnection to examine the effects of cultural and natural heritage sites by the project along the transmission line route.

The Konso cultural landscape is the major concerns of cultural heritage located in Konso special woreda. Most of Konso woreda is associated to communal heritage of terraces, cultural sites and very important landscapes of SNNP regional states of Ethiopia.

Several fossils were recovered in Konso –Gardula area in the years 1993 to 1986. The one discovered in 1991 was believed to be remains of *H. erectus* and the oldest firmly dated

Acheulean remains. Fieldwork since 1993 has clarified the temporal and spatial distributions of Konso's fossiliferous sequence. The early Pleistocene series comprises discontinuous outcrops extending for about 15 km. Most of of the Konso fossils derive from two time horizons, one at approximately 1.9 million years ago (Myr), 1.4Myr. Less-extensive collections have been made between these levels. T/L passes through one or two demarcated area of these resources.

The cultural environment of routes after Konso (in Borena Administrative Zone) is characterized by unfertile land covered with acacia commiphora wood land. The important heritage concerns observed during the study along the line routes within the Borana Administrative Zone are water wells and living religious and burial places.

E.7.4 Major Impacts of the project

The main positive impacts of the project are employment opportunities, additional power capacity, development of ICT Hubs, and conservation measures

This study has made evaluation of the negative impacts, with regard to:

- Social Impacts including Settlements and Community Facilities;
- Archaeological and Historical Sites;
- Impacts on Agricultural Land;
- Impacts on Drainage, Surface Waters and Water Resources;
- Solid and Liquid Waste;
- Potential Aesthetic Impacts;
- Electric and Magnetic Fields;
- Impacts on Natural Vegetation;
- Impact on Flora and Fauna;
- Land Excavation, Access Roads and Campsite;
- Soil Erosion;
- Noise, Ozone and Corona;
- Chemical Pollutants;
- Occupational Health and Safety Concerns and Safety Issues as well as injuries,
- Etc, will be analyzed

E.8 Cost Estimates in Ethiopia

The environmental cost estimates address the costs of unavoidable negative impacts that will take place during the project's construction and operation. These impacts are generally categorized into physical, biological and socio-economic.as described in this study. The total environmental cost amounted at ***ETB 283,457,969 (USD 16,227,364)***.

E.9 Conclusion

The overview on the impacts during operation phase is showing that all impacts can be reduced to an acceptable level, if the proposed mitigation measures are implemented and if the IFC's General EHS and the IFC's EHS for Electric Power Transmission and Distribution are applied.
Once the construction sites are rehabilitated, the area permanently occupied by the Project, is expected to be relatively small in comparison with the large extent of the Project and other large infrastructure projects.

It is understood that the best opportunities for the reduction of impacts can mainly be made during the next phase of the Project, prior to construction and operation, while planning the detailed design and the final routing. Considering the proposed mitigation measures, the Project's impacts could be reduced to as low as reasonable possible level and the Project is environmental feasible.